

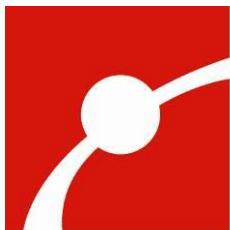
# ***Science Center Public Forums*** **Summative Evaluation Report**

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June 2019

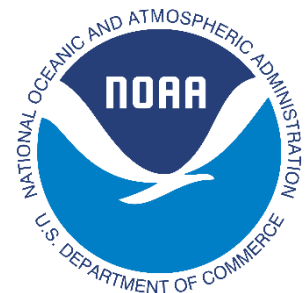
Report 2019-03

Funded by the National Oceanic and Atmospheric Administration (NOAA)



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## Acknowledgements

This evaluation report would not have been possible without the cooperation of many people. The evaluation team would like to thank the project leadership team for its participation and assistance with planning and coordination. This includes David Sittenfeld, Emily Hostetler, Mahmud Farooque, Nicholas Weller, Francis Choi, and Brian Helmuth. We would like to thank the following sites, who hosted the Science Center Public Forums:

- Arizona Science Center, Phoenix
- Bernice Pauahi Bishop Museum of Science, Honolulu
- Chabot Space & Science Center, Oakland
- Gulf Coast Exploreum Science Center, Mobile
- Museum of Science, Boston
- North Carolina Museum of Life and Science, Durham
- Oregon Museum of Science and Industry, Portland
- Science Museum of Minnesota, St. Paul

We would also like to thank all the participants in the forums. These participants go unnamed, but without their support, the depth of information reported in this document would not have been possible. Additionally, the authors thank Keith Allison, a member of the Museum of Science Research & Evaluation Department, who contributed to this work.

This report is based on work supported by the National Oceanographic and Atmospheric Administration under Grant No. NA15SEC008005. Any opinions, findings, and conclusions or recommendations expressed in this report are those of the author(s) and do not necessarily reflect the views of the funder.

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## EXECUTIVE SUMMARY

The Science Center Public Forums project (Grant Number NA15SEC008005) was led by Arizona State University's Consortium for Science, Policy, & Outcomes and the Museum of Science, Boston, in collaboration with Northeastern University. It was funded by the National Oceanic and Atmospheric Administration (NOAA) through their Environmental Literacy Program. The purpose of the project was to engage citizens in discussions and explorations of NOAA data about climate-related hazards, resilience strategies, and related policies. To engage publics in these discussions, the project team created forum modules about four climate-related hazards, which were used as a part of forum programs at eight museums around the US. Additionally, professional development materials and a workshop encouraged educators to use the forum in their educational settings.

The Research & Evaluation Department at the Museum of Science led the summative evaluation for this project. Pre- and post-surveys were used to gather evaluation data from the forum participants, and a separate survey gathered participant demographic information as a part of the forum application process. A post survey was used to gather data from educators who participated in the professional development webinar.

The evaluation findings are structured around three themes: 1) learning, 2) interest, engagement, and attitudes, and 3) educator outcomes. Data about participant learning showed high levels of prior knowledge about environmental hazards and interactions between human and natural systems; resilience efforts; and the ways science and research evolve and change over time. Despite these high levels of prior knowledge, respondents reported statistically significant learning increases with large effect sizes about each of these topics after the forum.

The second theme was about participants' engagement and interest. During the forum, participants used project materials to consider data, hear others' views, share their own views, and engage in joint decision-making. While respondents had high interest before the forums, they reported that they became significantly more interested in research on climate hazards, societal issues, and ways hazards affect their community. Participants were especially interested in and supportive of local resilience efforts.

Third, evaluators assessed the learning, interest, and confidence of educators who participated in a workshop that trained them about how to use the materials. Fewer educators participated in this workshop than anticipated, leading to a small sample size, but data suggest that the workshop supported increased knowledge about how to use the forums, increased interest in using the forums after the webinar, and growth in confidence for using the forum materials.

Overall, this summative evaluation found evidence that the project met its goals. This included participants reporting increased knowledge, understanding, and awareness, increased engagement and interest, and more positive attitudes. Educators reported learning about the project materials and how to use them, and indicated increased interest and confidence in using the forum materials in their educational settings. As a successful educational effort, this project can serve as a foundation for future work that wishes to expand learners' engagement with content and policy about climate-related hazards and resilience efforts.

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# I. INTRODUCTION

## 1.1 PROJECT OVERVIEW

The Science Center Public Forums project (Grant Number NA15SEC008005) was led by Arizona State University’s Consortium for Science, Policy, & Outcomes (ASU CSPO) and the Museum of Science, Boston (MOS), in collaboration with Northeastern University. It was funded by the National Oceanic and Atmospheric Administration (NOAA) through their Environmental Literacy Program. The purpose of the NOAA Environmental Literacy Program is to support “education programs that use NOAA science to promote stewardship and informed decision making.”<sup>1</sup> The purpose of the Science Center Public Forums project was to engage lay citizens throughout the US in discussions about climate-related hazards and resilience strategies and policies in part through the exploration of NOAA data. To engage publics in these discussions, the project team created forum modules about four different climate-related hazards which were used as a part of forum programs at eight museums around the US. Additionally, professional development materials and workshops were created for educators to encourage use of the forum materials with audiences beyond the eight forum sites.

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### *1.1 About the forum programs and educator professional development*

Through this project, day-long forum programs (running approximately 10:00AM to 4:00PM) were created. The general agenda for the forum events was the following:

**Table 1. General agenda for forum events**

Morning Sessions	Afternoon Sessions
Registration & Welcome	Session 3, Part 1: Response Priority & Resilience Strategies
Session 1: Hazard Presentation (Planetarium Show/Video)	Session 3, Part 2: Stakeholder Perspective & Value Mapping
Session 2, Part 1: Response Priority & Resilience Strategies	Session 3, Part 3: Expert Q&A and Group Plan
Session 2, Part 2: Stakeholder Perspective & Value Mapping	Session 3, Part 4: Resilience Strategy Presentation and Coffee
Session 2, Part 3: Expert Q&A and Group Plan	Session 4: Post-Survey
Session 2, Part 4: Resilience Strategy Presentation and Lunch	Adjourn

Each forum site was asked to pick two of the four climate-related hazards for deliberation. The four climate-related hazards sites could choose from were: drought, heat waves, sea level rise, and extreme precipitation. The project team created materials about each of these climate-related

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<sup>1</sup> <http://www.noaa.gov/office-education/elp>

hazards that each site would use to prepare and guide publics through discussions of these topics. Those materials included the following:

1. *Background information:* These materials were sent to lay citizens ahead of their forum participation. These packets included information about the climate-related hazards and case study that they would be discussing. The packet included:
  - a. An introduction to resilience planning: This section described what a resilience plan is, provided an example of real-world resilience plan, and gave step-by-step guidelines for creating and enacting a resilience plan.
  - b. Background examples: Participants read an overview of the two specific climate hazards that would be discussed in their forum (e.g., “Drought” and “Extreme Heat”), and the social, economic, and environmental impacts that each climate hazard would have on the community in question.
  - c. Potential resilience strategies: three potential climate resiliency plans for each climate hazard were described, with a rating of one to five stars for how positively they affected the economic, environmental, and social aspects of the community in question, delineating the pros and cons for each aspect of each plan. Participants also learned how communities have enacted elements of these resilience strategies.
  - d. Participant roles and preparation for the event: This section discussed, in broad strokes, the nature and purpose of the forum, as well as its structure for the day. The participant’s role was described in greater detail.
2. *Digital learning experiences:* The project developed an opening session that walks participants through an overview of the climate hazards and how they affect various parts of the world. Two versions were created: one for a digital domed projection platform and one for a flat screen. In addition, for each climate-related hazard, an interactive Resilience Plan Visualization was created using Google Earth. These experiences utilized NOAA and other relevant environmental datasets to communicate and illustrate the ways human and natural systems interact; information about scientific processes and uncertainty; and the potential impacts of actions aimed at improving resiliency.
3. *Discussion modules:* A number of materials were created so that facilitators could guide lay citizens through discussions about each of the climate hazards. Each discussion module included:
  - a. An introduction and short case study that described the hazard, how it impacts the community, and three resilience strategies.
  - b. A stakeholder value-mapping exercise using perspective cards that identified a variety of community stakeholders and their interests and values, to be considered in the response to the hazard.
  - c. A deliberation exercise during which participants developed a resilience plan using the case study and perspectives, and employing some, none, or all of the provided strategies; participants’ personal views, group discussion, and clarifying answers obtained from experts also informed the group’s resilience plan.

For each of the forums, approximately 60 community members (publics) were recruited to participate. These individuals were chosen such that they reflected the demographic diversity of the host regions in terms of age, gender, income, education, ethnicity, and occupation. A stipend

of \$50 was offered to each participant to help ensure diverse representation in the forums. In addition, accommodations for participants with disabilities were offered to allow participation of marginalized groups who are likely to be disproportionately impacted by environmental hazards but that are frequently under-represented in policy discussions.

Besides the lay citizens, 10 educators who are working on environmental literacy in formal or informal settings, were invited to participate in each forum. Some of these educators also participated in an online webinar to learn how they might use the forum materials as a part of their own educational experiences. As a part of this 90-minute webinar, educators learned about the project and the variety of materials that had been created. Then educators and project team members discussed how those materials could be useful for teachers in a variety of educational settings ranging from elementary to university level classrooms and out-of-school time learning environments.

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### ***1.1.2 About the forum sites***

There were eight sites for the forum programs. In the second year of the project (October 2016 – September 2017), pilot forums took place at the Museum of Science, Boston (MA) and Arizona Science Center (Phoenix, AZ). After these initial programs the forum materials were revised, and in year three (October 2017 – September 2018) the remaining six forums were presented at the Museum of Life and Science (Durham, NC), Science Museum of Minnesota (St. Paul, MN), Gulf Coast Exploreum Science Center (Mobile, AL), Oregon Museum of Science and Industry (Portland, OR), Chabot Space and Science Center (Oakland, CA), and Bishop Museum (Honolulu, HI; see Figure 1).

**Figure 1. Locations of the eight project forum sites**



Each of these sites was asked to have visitors discuss two of the climate-related hazards as a part of their forum. Sites were encouraged to pick the two climate-related hazards most likely to be

relevant to their audience. The climate hazards chosen by each site can be seen in Table 2. Each of the climate-related hazards was discussed by at least three of the forum sites. All of the educators who participated in these forums were invited to participate in an online workshop presented by team members from the Museum of Science, Boston to learn about how they might use the forum materials as a part of their educational experiences. This webinar took place in July 2018.

**Table 2. Climate-related hazards discussed at each forum site**

Forum Site	Climate-Related Hazard			
	Rising Sea Levels	Heat Waves	Extreme Precipitation	Drought
Arizona Science Center		✓		✓
Bishop Museum	✓		✓	
Chabot Space and Science Center	✓			✓
Gulf Coast Exploreum Science Center	✓		✓	
Museum of Life and Science	✓			✓
Museum of Science, Boston	✓		✓	
Oregon Museum of Science and Industry		✓	✓	
Science Museum of Minnesota		✓	✓	
Number of museums using each module	5	3	5	3



## 1.2 EVALUATION OVERVIEW

ASU CSPO approached the MOS Research and Evaluation Department (R&E) to conduct formative and summative evaluations for the Science Center Public Forums project. The purpose of the formative evaluation was to help the project team collect data to inform the development of the forum modules, visualizations, and other materials. Findings from the formative evaluation are reported in other project reports (Pfeifle, S., 2017a; Pfeifle, S., 2017b; Todd, K., 2018). The purpose of the summative evaluation was to understand the ability of the forums and professional development for educators to achieve project goals. Results of the summative evaluation are the focus of this report.

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### 1.2.1 Project goals

There were two main audiences for the science center forums: publics and educators. As stated above, for each of the forums, 60 community members (publics) were recruited to participate. These participants were chosen to ensure that they would reflect the demographic diversity of the host regions. Additionally, for each forum, 10 educators who are working on environmental literacy in formal and informal settings were invited to participate. Besides attending the forum, some of these educators participated in professional development opportunities.

The project team crafted a series of goals that they were hoping the participants would achieve through their involvement in the forums or professional development. Most of the goals applied to both the public and educator participants. However, some goals applied specifically to the educator audiences. Goals for the project included the following:

#### *Public and educator goals*

1. *Knowledge, awareness, and understanding.* Forum participants will have an increased understanding of:
  - a. Environmental changes and natural hazards including rising sea levels and changing frequency and magnitude of heat waves, extreme precipitation events, and drought.
  - b. The nature of scientific processes and uncertainty.
  - c. The ways human and natural systems interact including the ways that people and places are connected to each other across time and space.
  - d. The potential intended and unintended impacts of actions aimed at improving resiliency on different kinds of stakeholders.
  - e. Measures that can reduce vulnerabilities to local hazards.
2. *Engagement.* Forum participants will engage in:
  - a. Discussions about measures that contribute to resilient communities, ecosystems, and economies.
  - b. Use of visualizations, case studies, and other data to make decisions during the forums.
3. *Interest.* Forum participants will have an increased interest in:

- a. Research related to environmental changes and natural hazards including rising sea levels and changing frequency and magnitude of heat waves, extreme precipitation events, and drought.
  - b. Societal issues related to environmental changes and natural hazards.
4. *Attitude.* Public participants will be more supportive of the creation of robust community resiliency measures.

*Additional educator goals*

5. *Knowledge, awareness, and understanding.* Educator participants, who are selected to participate in professional development opportunities, will have an increased understanding of how to use the forum materials (case studies and visualizations), topics, or methods with their students or visitors.
6. *Engagement or interest.* Educator participants, who are selected to participate in professional development opportunities, will have an increased interest in using the forum materials (case studies and visualizations), topics, or methods with their students or visitors.
7. *Other (self-efficacy).* Educator participants, who are selected to participate in professional development opportunities, will increase their feelings that they are able to use forum materials (case studies and visualizations), topics, or methods with their students or visitors.

This report describes the findings of the summative evaluation including the extent to which educators and publics achieved the above listed goals. Additional information about the evaluation methods can be found in the next section.

## II. METHODS

Because forums were conducted at two sites around the country during Phase 2 and six sites during Phase 3, the summative evaluation used practical participant evaluation strategies. Practical participant evaluation “involves trained evaluation personnel *and* practice-based decision makers working in partnership” (Cousins & Earl, 1995). For this project, team members from ASU and MOS were involved in aspects of evaluation planning and data interpretation. Additionally, event hosts from each site completed human subjects training and attended webinar trainings led by MOS evaluators that trained someone from each site to gather data from their events. Evaluators from MOS then focused on creating data collection instruments, analyzing data, and reporting data.

### 2.1 DATA COLLECTION METHODS

There were two data collection methods that were used throughout the project as a part of the evaluation: pre- and post-surveys. Pre- and post-surveys were used to gather data from the forum participants before and after their forum experience (see Table 3). Evaluators paired this survey data with demographic information that the project team collected through a registration form. Beyond these forum surveys, a post-survey was used to gather data from educators who participated in the professional development webinar. More information about how these surveys were collected and the questions asked as a part of them is described below.

**Table 3: Sample size and response rate for forum pre- and post-surveys by site**

Forum Site	Number of forum attendees	Number of pre-surveys	Pre-survey response rate	Number of post-surveys	Post-survey response rate
Arizona Science Center	70	59	84%	59	84%
Bishop Museum	55	54	98%	53	96%
Chabot Space and Science Center	46	53	115% <sup>2</sup>	42	91%
Gulf Coast Exploreum Science Center	39	30	77%	27	69%
Museum of Life and Science	77	38	49%	58	75%
Museum of Science, Boston	77	51	66%	45	58%
Oregon Museum of Science and Industry	47	48	102%	46	98%
Science Museum of Minnesota	78	32	41%	37	47%
<b>Total</b>	489	365	75%	367	75%

<sup>2</sup> Pre-survey response rates sometimes exceed 100% of forum attendees, because not every pre-survey respondent ended up attending the forum.

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### 2.1.1 Forum pre-surveys

Forum pre-surveys were collected from forum audiences prior to their participation.<sup>3</sup> For the forums at MOS and Arizona Science Center (ASC), these surveys were filled out on paper at the forum event. Forum participants for the other six sites were sent an email with a link to the survey when they signed up for the forum and a reminder email 1-3 weeks before the forum.<sup>4</sup> Using these methods, a total of 365 surveys were collected from 489 forum participants.

The purpose of the forum pre-survey was to collect data from participants about their pre-forum knowledge about the goals related to natural hazards and resiliency efforts (Goals 1a, b, d, e).<sup>5</sup> To understand pre-program knowledge in these areas, participants were asked to answer four open-ended questions. The prompts included the following:

1. What I know about climate-related hazards
2. Factors I think impact / affect climate-related hazards
3. What I know about climate resiliency plans
4. Factors I think impact / affect climate resiliency plans

Beyond these main prompts, participants were also asked whether they had already read the background information provided for the forum discussion to understand whether these materials may have impacted their responses. A copy of the forum pre-survey can be found in Appendix A.

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### 2.1.2 Forum post-surveys

Forum post-surveys were collected from public audiences through a paper survey distributed at the end of the program at each site. The surveys were collected as participants left the forum. Using these methods, a total of 367 surveys were collected from 489 forum participants for a response rate of 80%. There were a total of 257 matched pre- and post-surveys.

The purpose of the post-survey was to understand how the forum impacted participant achievement of the goals. This included all of the public and educator goals (Goals 1a-e, 2a-b, 3a-b, and 4).<sup>6</sup> To understand if the knowledge goals (Goals 1a-e) were achieved, the post surveys included a series of close-ended and open-ended questions. Participants were asked the same open-ended knowledge questions on the post-survey that they were asked on the pre-survey. By using the same questions on both surveys, evaluators were able to see if participants' knowledge about climate-related hazards and climate resiliency plans changed due to their forum

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<sup>3</sup> For the MOS and ASC forums, individuals filled out a paper pre-forum survey. This led to very high response rates at both sites (100% and 96%, respectively). The other six sites collected pre-surveys online.

<sup>4</sup> A copy of the forum pre-survey recruitment email can be found in Appendix A.

<sup>5</sup> A complete list of the project goals can be found in the Introduction.

<sup>6</sup> A complete list of the project goals can be found in the Introduction.

participation. Additionally, participants were asked a series of retrospective pre/post questions<sup>7</sup> about the specific knowledge goals to understand whether visitors felt they had any increases in these areas due to the forum. These knowledge questions asked participants to rate how much they knew about the following areas before and after the forum:

- The climate-related hazards that could affect my local community
- Strategies for reducing the impacts of climate-related hazards
- The impacts of resilience strategies on different community members
- The types of impacts communities have on their surrounding environment
- The types of impacts the surrounding environment has on local communities
- The ways science and research evolve and change over time

A mixture of both close-ended and open-ended questions was also used to understand whether the forum achieved its engagement (Goals 2a-b), interest (Goals 3a-b), and attitude (Goal 4) goals for participants. To understand whether participants achieved the engagement goals, they were asked to rate whether they agreed or disagreed with the following statements:

- I heard others' viewpoints about what actions should be taken to reduce the impacts of climate-related hazards.
- I shared their views about what actions should be taken to reduce the impacts of climate-related hazards.
- My group's resilience plan reflected my personal views.

Participants were also asked to rate the extent to which they used the provided materials to inform their views about the resilience plan. To understand whether participants achieved the interest and attitude goals, they were asked to answer a series of retrospective pre/post-questions. For the interest goals, participants were asked to rate their interest in learning about the following areas before and after the forum:

- Research around climate-related hazards
- How climate-related hazards may affect my community
- Societal issues related to the impacts of climate-related hazards

For the attitude goal, participants were asked to rate their agreement with the following statement before and after the forum:

- It is important for my local community to develop and implement a resilience plan.

To help evaluators better understand close-ended responses related to the engagement, interest, and attitude goals, participants were asked to fill out a series of open-ended questions to explain their close-ended responses. A copy of the forum post-survey can be found in Appendix B.

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<sup>7</sup> Retrospective pre/post questions ask participants to rate their pre- and post-treatment knowledge, interest, or understandings after their participation. These questions are used to remove the tendency of individuals to overestimate these understandings before they have participated in the treatment (Rennie and Johnston, 2007).

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### 2.1.3 Professional development post-surveys

Professional development post-surveys were collected from the educator webinar participants after their participation. Professional development participants were provided with a link to the online post-survey at the end of the webinar. Additionally, participants were emailed a link to the survey the day after the webinar to try to increase the survey response rate. Using these methods, a total of 11 surveys were collected. There were 16 webinar participants, so the response rate was 69%.

The purpose of the professional development post-survey was to understand if educators who attended the webinar achieved the educator-specific goals of increased knowledge of how to use project materials, interest in using project materials, and feelings that educators are able to use forum materials and practices with their students or learners (Goals 5-7).<sup>8</sup> To understand whether educator participants achieved the goals, they were asked to answer a series of retrospective pre/post questions. For the knowledge goal, participants were asked to rate their agreement with the following statement before and after the forum:

- I understand how to use these forum materials in my education setting.

For the interest goal, participants were asked to rate their agreement with the following statements before and after the forum:

- Forum materials are valuable tools for my educational setting.
- I am interested in using this forum program with my students or visitors.

They were also asked to choose which particular forum materials they were interested in using in their educational setting. Finally, for the self-efficacy goal, educator participants were asked to rate their agreement with the following statement before and after the forum:

- I feel confident in my ability to integrate these materials into my educational setting.

To help evaluators better understand close-ended responses related to the knowledge, interest, and self-efficacy goals, participants were also asked to fill out a series of open-ended questions to explain their close-ended responses. A copy of the forum post-survey can be found in Appendix B.

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<sup>8</sup> A complete list of the project goals can be found in the Introduction.

## 2.2 DATA ANALYSIS

This project took a mixed methods approach, and data collected as a part of the project were both qualitative and quantitative in nature. Qualitative data was coded inductively as well as using pre-defined codes. For open-ended questions related to forum participant engagement, interest, attitude, and educator-specific goals, evaluators first coded visitor responses based on codes related to the project goals (Goals 2a-b, 3 a-b, and 4-7). After coding based upon these goals, evaluators looked across the remaining responses for common themes using inductive coding analysis. Inductive coding analysis involves “immersion in the details and specifics of data to discover important patterns, themes, and interrelationships” and allows the coding scheme to emerge from the data (Patton, 2002, p.41). For the open-ended questions related to the forum learning goals (Goal 1a-e), evaluators created a pre-defined codebook to explore changes in the sophistication of responses from before to after the forum. Evaluators coded participants’ responses based on a scale of 0 (no response) to 3 (superior response) looking for evidence related to natural factors (Goals 1a and c) and resilience efforts (Goals 1d and e). Evaluators then compared matched pre- and post-responses to look for increases scores from the pre-survey to the post-survey. A copy of the learning goals codebook can be found in Appendix E.

Quantitative data were analyzed using descriptive statistics (counts, means, and percentages). Additionally, Wilcoxon signed-ranks and McNemar’s tests were used to compare individual responses to retrospective pre/post questions. These statistics were used to identify changes in knowledge, interest, behaviors, and attitudes due to the forum program. Mann-Whitney U and chi-square tests were used to assess differences in the forums’ impacts on the different participant types (educator and public). However, no differences were found between educators and non-educators across the data set. For all statistical tests, the level of significance was set to 0.05. Effect sizes were calculated to describe the magnitude of statistically significant changes. The reported effect size calculation of  $r$  is calculated by dividing  $Z$  by the square root of  $N$ , and is interpreted as being a “small” effect size if the resulting value is between 0.1 and 0.3, “medium” if it is between 0.3 and 0.5, and “large” if it is greater than 0.5 (Rosenthal, 1994).

## 2.3 EVALUATION SAMPLE

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### 2.3.1 Forum participants

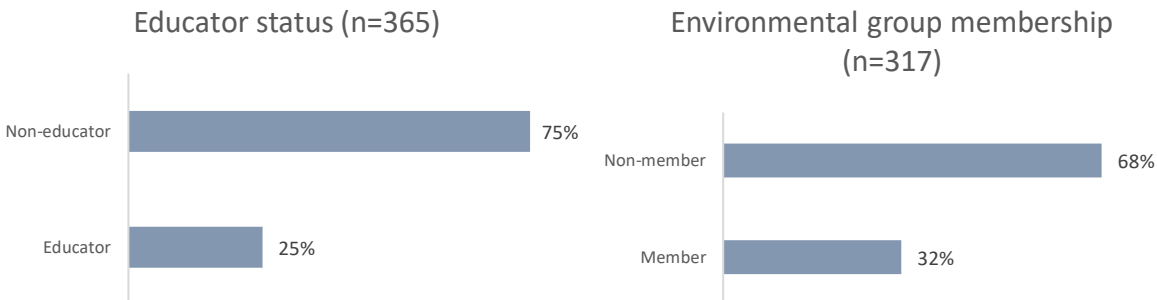
Forums were held at eight sites across the United States: Science Museum of Minnesota (St. Paul, MN), Bernice Pauahi Bishop Museum (Honolulu, HI), Oregon Museum of Science and Industry (Portland, OR), North Carolina Museum of Life and Science (Durham, NC), Gulf Coast Exploreum Science Center (Mobile, AL), Chabot Space & Science Center (Oakland, CA), Arizona State University (Phoenix, AZ), and Museum of Science, Boston (Boston, MA). Sites hosted between 39 and 78 participants, with the total number of 489 forum participants. Overall, when looking at forum participant gender demographics, 60% of participants were female, 38% were male, and 1% didn’t identify as male or female. There was a spread of annual incomes represented among the participants, with 23% making less than \$25,000 a year, 22% making

between \$25,000 and \$49,999, 35% making between \$50,000 and \$99,999, and 20% making \$100,000 or more. A little over half of the participants reported being employed (53%), with only 6% reporting unemployment. Remaining participants were retired (15%), students (15%), or “other” (11%). In terms of racial and ethnic demographics, 60% of participants identified themselves as White (not Hispanic), 11% as Black (not Hispanic), 8% as Asian, 8% as Hispanic or Latino, and 6% described their race as “Other,” while 6% were of mixed race. In terms of education, 36% held a graduate or professional degree, 30% held a bachelor’s degree, 26% had some college, 6% had a high school degree or equivalency, and 1% had no high school diploma. For age demographics, 15% of participants were between the ages of 18 and 24, 38% were between the ages of 25 and 44, 32% were between the ages of 45 and 64, and 16% were older than 65. Lastly, 25% described themselves as educators, and 32% were members of environmental groups.

**Figure 2. Demographics of evaluation sample**







**2.3.2 Educator professional development participants**

In June, 2018, 16 participants participated in an online Professional Development workshop for educators titled “Community Engagement for Environmental Literacy, Improved Resilience, and Decision-Making,” hosted by the Museum of Science, Boston. Eleven participants later completed an online follow-up survey with a 69% response rate. The survey instrument can be found in Appendix C. The respondents represented eight different states, as shown in Figure 3. Participants taught students of all ages in a variety of subjects including science (6), social studies (3), English (2), math (1), history (1), and water conservation (1). Most taught in public schools (6), and some taught in afterschool programs (3), private schools (2), or museums (2).

**Figure 3. Geographic spread of workshop participants**



## III. RESULTS AND DISCUSSION

### 3.1 PARTICIPANT LEARNING

To assess participants' learning, evaluators grouped project goals into three themes. The first theme focused on natural factors and the ways human systems interact with natural systems, encompassing goals 1A<sup>9</sup> and 1C.<sup>10</sup> The second theme addressed learning about resilience efforts and their impacts, addressing goals 1D<sup>11</sup> and 1E.<sup>12</sup> Finally, the third theme addressed project goal 1B,<sup>13</sup> and looked at learning about the nature of science. Quantitative, retrospective pre/post questions addressed all three of these themes. In addition, qualitative, open-response questions on the pre and post-surveys addressed the first two themes. The responses to those questions were coded based on the level of evidence and sophistication that the responses included which were relevant to project goals. More information about this process is in the Methods section, and the full coding rubric is in Appendix E.

Findings about participant learning include:

- 3.1.1 Respondents demonstrated high levels of prior knowledge about environmental hazards and interactions between human and natural systems, and they reported significantly increased learning about these topics after the forum.
- 3.1.2 Although respondents knew about resilience efforts before the event, they reported that participating in the forum helped them learn significantly more about resilience efforts and their impacts on stakeholders.
- 3.1.3 Forum participants reported significant learning about the ways science and research evolve and change over time.

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***3.1.1 Respondents demonstrated high levels of prior knowledge about environmental hazards and interactions between human and natural systems, and they reported significantly increased learning about these topics after the forum.***

On the quantitative, retrospective pre/post survey questions, respondents reported statistically significant learning gains with large effect sizes for each of the survey items about natural systems and the ways they interact with human systems (see Figure 4). The first of these items was, "The climate-related hazards that could affect my local community." Respondents indicated how much they knew about this topic before the forum and after it. Twenty percent of respondents reported knowing "a lot" about this topic beforehand, and this percentage rose to

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<sup>9</sup> Goal 1A: Participants will have increased understanding of environmental changes and natural hazards including rising sea levels and changing frequency and magnitude of heat waves, extreme precipitation events, and drought.

<sup>10</sup> Goal 1C: Participants will have increased understanding of the ways human and natural systems interact including the ways that people and places are connected to each other across time and space.

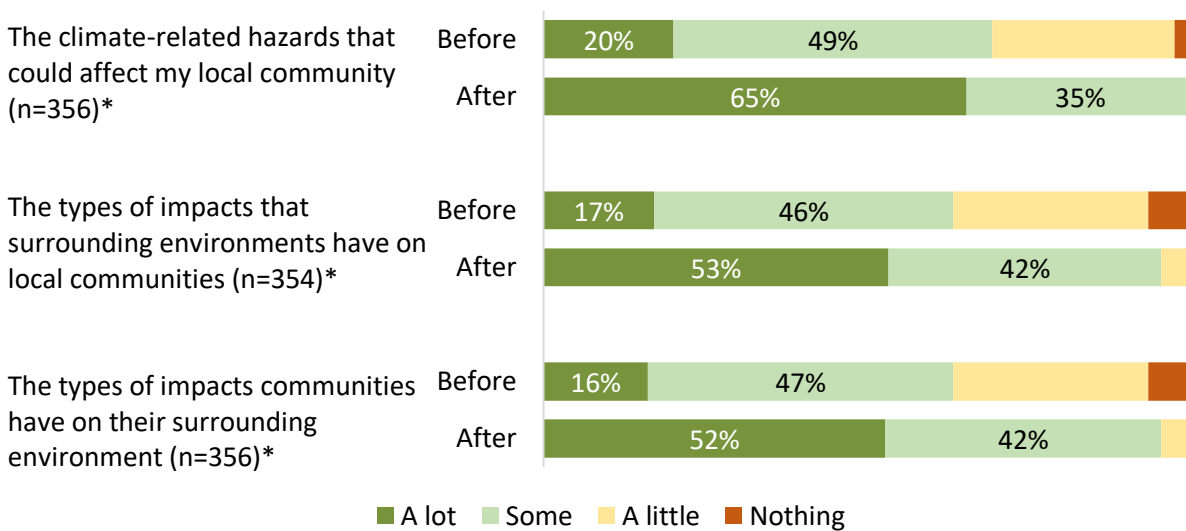
<sup>11</sup> Goal 1D: Participants will have increased understanding of the potential intended and unintended impacts of actions aimed at improving resiliency on different kinds of stakeholders.

<sup>12</sup> Goal 1E: Participants will have increased understanding of measures that can reduce vulnerabilities to local hazards.

<sup>13</sup> Goal 1B: Participants will have increased understanding of the nature of scientific processes and uncertainty.

65% afterwards (n=356).<sup>14</sup> The second survey item was, “The types of impacts that surrounding environments have on local communities.” For this item, 17% of respondents reported knowing “a lot” about this before the forum, and 53% reported knowing “a lot” after the forum (n=354).<sup>15</sup> The third item was, “The types of impacts communities have on their surrounding environment.” The percentage of people who reported knowing “a lot” about this topic rose from 16% before the forum to 52% after the event (n=356).<sup>16</sup> The reported increases for all three of these statements were statistically significant with large effect sizes.<sup>13, 14, 15</sup>

**Figure 4. Responses to survey question, “How much did you know about the following topics BEFORE the forum, and how much do you know AFTER participating in the forum?”**



The qualitative survey responses illustrate what types of knowledge participants had about these topics. Evaluators looked across the survey questions to find evidence of respondents addressing the project goals about understanding environmental changes and natural hazards (Goal 1A), and understanding the interactions between human and natural systems (Goal 1C). While relevant responses were recorded from all survey questions, most evidence for goals 1A and 1C came from survey questions that asked respondents to write down ideas, thoughts, questions, or words that come to mind in response to two prompts: “What I know about climate-related hazards” and “Factors I think impact/affect climate-related hazards.” Responses were coded for whether the respondent:

- **Met Goals 1A and 1C:** The systems-level thinking of 1C assumed at least a basic grasp of the content knowledge (1A) thus, meeting goal 1C meant the participant also met 1A. This category was further broken down into:
  - *Goal 1C, Superior response:* The respondent demonstrated knowledge of how natural and human factors impact one another through two-way interactions.
  - *Goal 1C, Achievement response:* The respondent described a one-way interaction of humans impacting natural factors or natural factors impacting humans.

<sup>14</sup> Wilcoxon Signed Ranks Test: n = 356, Z = -13.790, p < .001, r = 0.731

<sup>15</sup> Wilcoxon Signed Ranks Test: n = 354, Z = -12.915, p < .001, r = 0.686

<sup>16</sup> Wilcoxon Signed Ranks Test: n = 356, Z = -12.553, p < .001, r = 0.665

- **Met Goal 1A but not Goal 1C:** The respondent shared understanding of environmental hazards or environmental changes but did not describe interactions between human and natural factors.
- **Did not meet Goal 1A or 1C:** The respondent did not provide evidence of understanding related to environmental changes and natural hazards or interactions between human and natural systems.

For both pre- and post-surveys, a majority of respondents met the criteria for both of the goals. As shown in Table 4, over 90% of respondents shared evidence of understanding interactions between natural and human factors, meeting Goals 1A and 1C (91.8% of pre-survey respondents and 90.2% of post-respondents, n=244). In addition to the responses that met both goals, some respondents shared a comment that met the criteria for Goal 1A without addressing Goal 1C, writing something about environmental factors such as a fact about climate change or local hazards like flooding or drought (6.1% of pre-survey respondents and 6.6% of post-survey respondents, n=244). Finally, only 2.0% of pre-survey respondents and 3.3% of post-survey respondents did not provide evidence of meeting either goal. There were no significant differences in the relative frequencies of pre- and post-survey respondents meeting either of the goals; thus, there is evidence that the goals were met in both the pre- and post-survey data, and the data suggest there was no statistically significant difference in whether the goals were met more strongly in either pre- or post-event dataset.

**Table 4. Qualitative evidence of knowledge about natural factors (n=244)**

Code	Frequency		Example quotations
<b>Met Goals 1A and 1C</b>			
<i>Superior response</i>	<i>Pre-survey: 44.3%</i>	<i>Post-survey: 31.6%</i>	“Extreme heat, drought, flooding... generally affect citizens of lower economic status more than wealthy citizens; some hazards can be decreased by fast and low cost measures; many will require large and long term investments.”
<i>Achievement response</i>	<i>Pre-survey: 47.5%</i>	<i>Post-survey: 58.6%</i>	“Humans [are] contributing more greenhouses gases to the environment through activities such as burning fossil fuels. As more greenhouse gasses are released into the atmosphere, these gasses trap heat, resulting in a warming of Earth.”
<b>Met Goal 1A but not 1C</b>			“[I know about] sea-level rise, precipitation changes (up-floods, down-droughts), higher air temps.”
<b>Did not meet Goal 1A or 1C</b>			“[What I know about climate-related hazards is] Less than awareness level.”

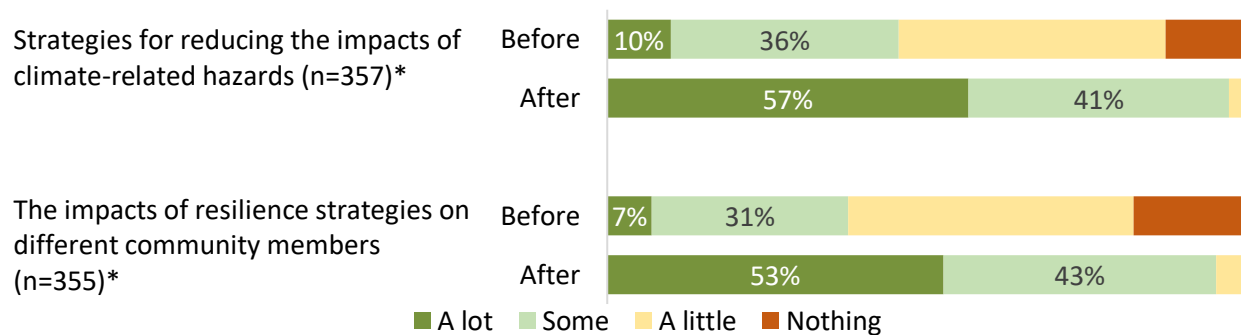
■ Pre-survey ■ Post-survey

Both the quantitative and qualitative data in this section show evidence of knowledge that is relevant to project goals 1A and 1C. The quantitative data show strong evidence of reported changes between pre- and post, with increases in understandings, while the qualitative data demonstrate high levels of knowledge from the beginning without further increases. Although the project worked to recruit diverse participant pools that represented the demographics of the events’ regions, participation was free-choice. Therefore, it makes sense that the evaluation would show that the people who would be most interested in coming to these events would be people who indicated they had high prior knowledge in the topics. Another reason why the evaluation may not have found change in the qualitative pre- and post-survey comparisons may have been that the questions and coding schemes were not set up optimally to measure change; for broad topics like these, it is very difficult for an open-ended survey question to capture *all* of a person’s relevant knowledge. Instead, the responses likely captured what was most top-of-mind when the respondent completed the survey. Given that the qualitative approach may not be precise enough to reliably capture changes in knowledge, the respondents’ strong reported sense that they learned from the event, as indicated in the quantitative questions, paired with comments that reflect understandings of project goals, are good evidence that Goals 1A and 1C were met.

**3.1.2 Although respondents knew about resilience efforts before the event, they reported that participating in the forum helped them learn significantly more about resilience efforts and their impacts on stakeholders.**

To measure learning about resilience efforts as laid out in project goals 1D and 1E, evaluators asked two retrospective pre/post survey questions. For the first question, respondents reported their levels of knowledge about, “Strategies for reducing the impacts of climate-related hazards.” As shown in Figure 5, the percentage of respondents who reported knowing “a lot” about this topic rose from 10% before the forum to 57% afterwards, which was a statistically significant gain with a large effect size.<sup>17</sup> The second item asked respondents to rate their knowledge about, “The impacts of resilience strategies on different community members.” Seven percent of respondents reported knowing “a lot” about this topic beforehand, and this percentage rose to 53% afterwards. This increase was statistically significant with a large effect size.<sup>18</sup>

**Figure 5. Responses to survey question, “How much did you know about the following topics BEFORE the forum, and how much do you know AFTER participating in the forum?”**



<sup>17</sup> Wilcoxon Signed Ranks Test: n = 357, Z = -14.769, p < .001, r = 0.781



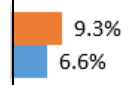
<sup>18</sup> Wilcoxon Signed Ranks Test: n = 355, Z = -15.139, p < .001, r = 0.804

Open-ended survey questions provide additional information about what sort of knowledge people had about resilience strategies before and after the forums. To assess this, evaluators looked across the survey questions to find evidence of respondents addressing the project goals about knowledge of resilience efforts (Goal 1E), and the impacts of resilience efforts on different stakeholders (Goal 1D). Relevant responses were recorded across all survey questions, but the questions most applicable to goals 1D and 1E asked respondents to write down ideas, thoughts, questions, or words that come to mind in response to two prompts: “What I know about climate resiliency plans” and “Factors I think impact/affect climate resiliency plans.” Responses were coded for whether the respondent:

- **Met Goals 1D and 1E:** The understanding of stakeholder impacts in goal 1D assumed at least a basic grasp of knowledge about resiliency plans (1E), thus, meeting goal 1D meant the participant also met 1E. This category was further divided into:
  - *Goal 1D, Superior response:* The respondent described the interactions between resilience strategies and more than one human/social, environmental, or economic factor, including human stakeholders, individuals, cultures, corporations, communities, infrastructure, costs, etc.
  - *Goal 1D, Achievement response:* The respondent described resilience strategies and their interactions with one human/social, environmental, or economic factor.
- **Met Goal 1E but not Goal 1D:** The respondent described what resilience strategies were, but did not mention impacts of these strategies on social, environmental, or economic factors.
- **Did not meet Goal 1D or 1E:** The respondent did not write anything about measures to reduce vulnerabilities or the impacts of resiliency efforts on stakeholders.

As shown in Table 5, most respondents provided evidence to meet both goals 1D and 1E on the pre-survey as well as the post-survey. In fact, a majority earned the highest score for superior responses that illustrated knowledge of the ways resilience efforts interact with multiple stakeholders or factors (66.7% on the pre-survey and 70.2% on the post-survey, n=258). For the respondents who did not provide evidence of meeting goal 1D, an additional 3.1% of pre-survey respondents and 4.7% of post-survey respondents wrote responses that illustrated knowledge of resilience efforts, meeting goal 1E (n=258). A minority of respondents met neither goal (9.3% of pre-survey respondents and 6.6% of post-survey respondents, n=258). There were not statistically significant differences between the code frequencies for pre- and post-surveys.

**Table 5. Qualitative evidence of knowledge about resilience efforts (n=258)**

Code	Frequency		Example quotations
<b>Met Goals 1D and 1E</b>			
<i>Superior response</i>	Pre-survey: 66.7%	Post-survey: 70.2%	“[Factors I think affect climate resiliency plans are] people refusing to believe climate change is taking place. Economics, people don't want to loose profits by acknowledging and doing something positive to curtail it.”
<i>Achievement response</i>	Pre-survey: 20.9%	Post-survey: 18.6%	“Communities’ inability to communicate and prepare [affect climate resiliency plans].”
<b>Met Goal 1E but not 1D</b>			“[Climate resiliency plans are] having a plan to deal with the effects of climate change.”
<b>Did not meet Goal 1D or 1E</b>			“Since I know very little about them, I cannot point to appropriate factors [that affect climate resiliency plans.]”

■ Pre-survey    ■ Post-survey

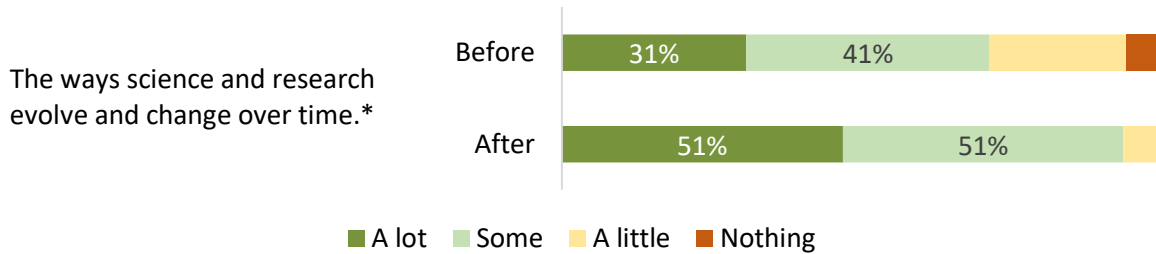
Similar to the data about learning around natural factors (goals 1A and 1C), the data about resilience efforts (goals 1D and 1E) show that respondents reported high levels of learning and demonstrated knowledge of resilience efforts and their impacts both prior to and after the forum. As mentioned in the previous section, the high levels of prior knowledge make measuring increases in the qualitative responses difficult to measure. However, there is clear evidence that participants had strong understandings of the project goals, and the quantitative self-report of increased knowledge with large effect sizes are encouraging data suggesting that there was change over time.

**3.1.3 Forum participants reported significant learning about the ways science and research evolve and change over time.**

Project goal 1B stated that participants would have an increased awareness of the nature of scientific processes and uncertainty. Of all the learning goals, the project team considered this goal to be the lowest priority, and devoted the least attention to it. Accordingly, the evaluation gathered the least data about it. On a retrospective pre/post question, the survey asked respondents to indicate how much they knew about the ways science and research evolve and change over time (see Figure 6). Of all the survey topics, respondents reported the highest prior knowledge for this topic, with 72% indicating that they knew “a lot” or “some” about the ways science and research evolve and change over time before the forum (n=353). Despite these high

levels of prior knowledge, 35% of respondents indicated an increase. This increase was statistically significant with a large effect size.<sup>19</sup>

**Figure 6. Responses to survey question, “How much did you know about the following topics BEFORE the forum, and how much do you know AFTER participating in the forum?” (n=353)**



Given that the project did not focus significant educational effort to directly addressing the ways science and research evolve and change over time, the large effect size of this reported change is somewhat surprising, although encouraging. It seems that participants felt that engaging with the scientific content provided through the forum materials taught them about the nature of science, even without being explicitly told very much about the nature of science. This lends itself well to the informal nature of forum learning; one learns by doing and engaging in mutually-beneficial activities rather than through a traditional, didactic learning model.

<sup>19</sup> Wilcoxon Signed Ranks Test: n = 353, Z = -9.656, p < .001, r = 0.514



### 3.2 PARTICIPANT ENGAGEMENT AND INTEREST

As described in the methods section, the project had engagement goals that participants would participate in discussions about measures that contribute to resilient communities, ecosystems, and economies and that they would use visualizations, case studies, and other data to make decisions during the forums. Additionally, the project intended that participants would have increased interest in societal issues related to environmental changes and natural hazards as well as increased interest in research related to environmental changes and natural hazards including sea level rise, heat waves, extreme precipitation, and drought. To assess these project goals about participants' engagement and interest, evaluators gathered data from several quantitative survey questions and free-response items. The data addressed which project materials were most widely used, what types of public engagement with science activities participants felt they did, and respondents' levels of interest in a range of topics. Questions about interest used the retrospective pre/post approach, while the questions about use and engagement were only asked about participants' forum behavior, and thus had no comparison to pre-event values.

Findings about participant engagement and interest include:

- 3.2.1 During the forum, participants used project materials to engage in discussions and decision-making about resilience planning.
- 3.2.2 While respondents had high interest before the forums, they reported that they became even more interested in research on climate-related hazards, societal issues, and ways hazards affect their community after the forum. Participants were especially interested in and supportive of local resilience efforts, and indicated that they would like even more local information.

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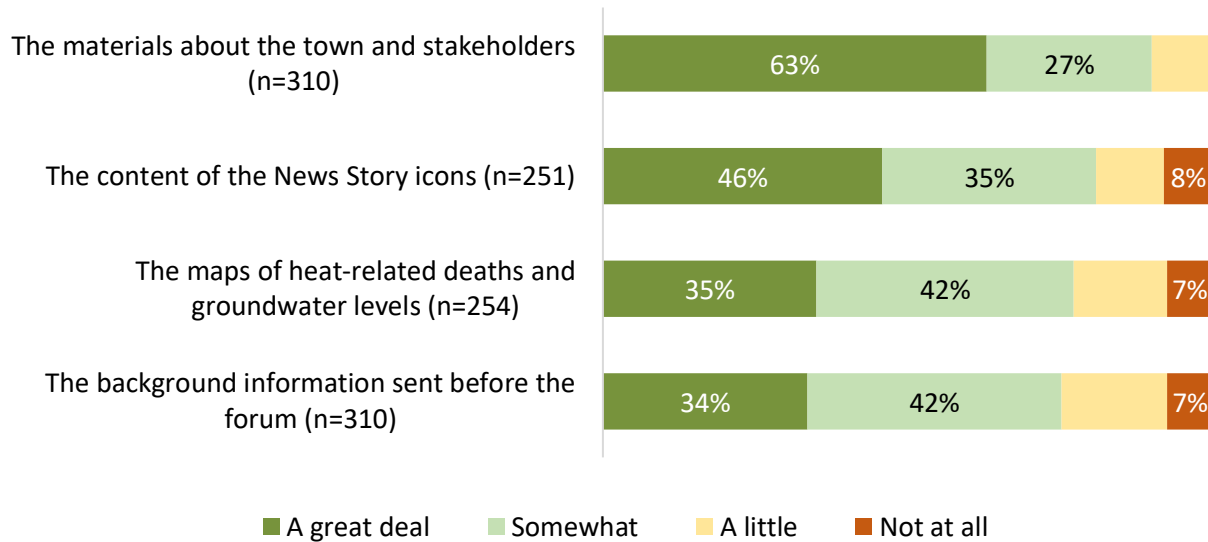
#### ***3.2.1 During the forum, participants used project materials to engage in discussions and decision-making about resilience planning.***

To investigate the project goals about the extent of engagement in the forum, evaluators asked a series of quantitative questions on the post-survey. The first of these questions listed several specific project materials that introduced participants to different types of data about climate-related hazards and resilience efforts. Three of the materials were integrated into the forum program and used during the day: 1) the materials about the town and stakeholders, 2) the content of the News Story icons, and 3) the maps of heat-related deaths and groundwater levels. The fourth material—the background information sent before the forum—was not used during the actual program. Instead, participants were encouraged to read it before arriving. Each table also had a copy on hand for reference during the deliberations.

As shown in Figure 7, at least 90% of all respondents indicated that they had used each of the four materials to inform their views about the resilience plan. The most commonly used resource was the materials about the town and stakeholders, with 90% reporting that they had used these “a great deal” or “somewhat,” and only one person indicating that she or he had used this “not at all” (n=310). The content of the News Story icons were the second most commonly used material, with 81% of respondents using them “a great deal” or “somewhat” (n=251). Maps of heat-related deaths and groundwater levels and the background information sent before the forum were the least used materials, with 77% and 76% using them “a great deal” or

“somewhat,” respectively (n=254 for the maps and n=310 for the background information). This is likely due in part to the fact that the maps were only available for two of the four hazards (heat and drought).

**Figure 7. Responses to survey question, “Please rate the extent to which you used the following materials to inform your views about the resilience plan.”**



These data provide evidence that forum participants engaged with the various forum materials as a part of their decision making process. However, there are several potential implications of these data. To capitalize on the finding that the materials about the town and stakeholders were used most widely, forum organizers may wish to organize content so the most important information for the forum discussion is in these materials. The pattern of usage for the maps and the background information are very similar, even though the delivery mechanism for these were quite different: one was prompted as part of the forum and the other was suggested homework prior to participation. If working with maps during the forum is especially important for forum organizers, they may wish to consider how to make this more of an integral part of the discussion. While it is encouraging that approximately as many people would do a pre-assignment as key forum materials, organizers should still supplement the background information at the forum, knowing that only about one-third of participants used this information “a great deal.”

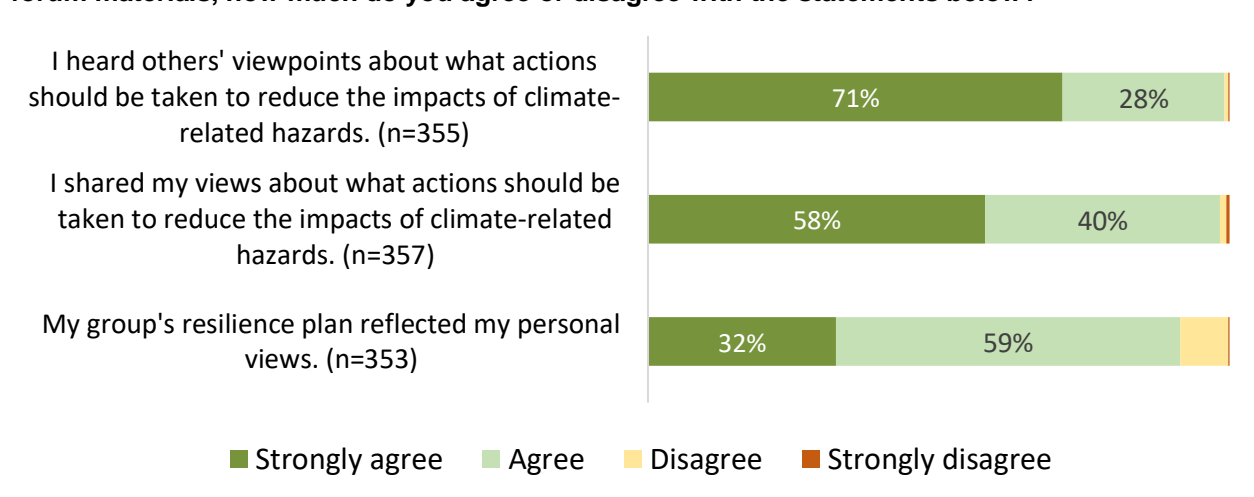
A qualitative question asking respondents to explain their ranking choices supports the quantitative data showing that the materials were widely used, and also adds some supporting evidence about the reasons why people did and did not use the different pieces. All 115 responses, sorted by which project goal they primarily speak to, can be found in Appendix XA. Of these, 81 were related to materials, with the remainder relating to other aspects of the program. The 81 materials-related responses were further coded to look for trends. These coding categories, defined and with examples, can be found in Appendix XB. Most often, the open-ended comments shared a positive reaction to the materials (27%). Critiques of the materials

were that they did not have enough information (25%), were confusing (14%), were generally dissatisfying (12%), were biased (5%), or had too much information (4%).

Twenty percent of the responses mentioned that certain resources were not available to them, or that they were unaware of the resources. For example, one respondent shared, “*The background info and stakeholders were very informative, but I don't even remember seeing heat maps or news story icons.*” This unawareness is likely visible in the quantitative data above as well, as the sample sizes for the content of the News Story icons and the maps are a good deal lower than for the other two materials, likely reflecting the fact that people did not use the materials and thus did not answer the question.

In addition to asking what materials people used to engage in decision making at the forum, the survey asked a multiple choice question about the extent to which participants engaged in three aspects of the forum program discussion: 1) hearing others’ viewpoints, 2) sharing their own views, 3) and working with others to develop a joint recommendation. The data from this question show deep levels of engagement (see Figure 8). Ninety-nine percent of respondents strongly agreed or agreed that they heard others’ viewpoints about what actions should be taken to reduce the impacts of climate-related hazards (n=355). Ninety-eight percent strongly agreed or agreed that they shared their views about what actions should be taken to reduce the impacts of climate-related hazards (n=357). Ninety-one percent strongly agreed or agreed that their group’s resilience plan reflected their personal views (n=353). This is strong evidence that the participants engaged in a discussion about resilience planning as part of the forum.

**Figure 8. Responses to survey question, “Thinking about your experience at the forum and with forum materials, how much do you agree or disagree with the statements below?”**



While over 90% of respondents agreed or strongly agreed they had participated in each of these three activities, looking only at the percentage of respondents who strongly agreed shows more disparity across the three items. Respondents agreed most strongly that they heard others’ views (71%, n=355), then that they shared their views (58%, n=357), and they agreed less strongly that their group plan reflected their views (32%, n=353). This pattern is similar to data from Building with Biology, another project that included forum events. In the Building with Biology forum evaluation, 46% of respondents strongly agreed that they learned about viewpoints different from

their own (n=709), 38% strongly agreed they shared views about synthetic biology (n=702), and 32% strongly agreed their group's final plan reflected their personal views (n=648) (Todd, Kollmann, & Pfeifle, 2018). This trend may be due in part to the group nature of the events. If all people in a small group (often around 4-8 people) had equal time talking, it makes sense that each person would spend more time hearing others' views than sharing. Likewise, if each person came with a different view on a topic, the group plan would not be able to include each person's complete perspective; rather, it would represent compromise and evolving views. Thus, the lower rates of strong agreement should not be considered a negative. Given that the level of overall agreement is over 90%, organizers should feel optimistic that participants engaged in multi-directional aspects of PES.

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***3.2.2 While respondents had high interest before the forums, they reported that they became even more interested in research on climate-related hazards, societal issues, and ways hazards affect their community after the forum. Participants were especially interested in and supportive of local resilience efforts, and indicated that they would like even more local information.***

Several of the project goals focused on changes in interest and attitudes, the project team designed the forums with goals of increasing participant interest in research about climate-related hazards and societal issues related to climate-related hazards, and trying to change participants' attitudes leading them to become more supportive of local resiliency efforts (see Introduction for complete project goals). To assess whether these changes occurred, the post-survey asked retrospective pre/post questions through which respondents reported their perspectives before the event and after it was finished. The results (see Figure 9) show that participants reported statistically significant increases with large effect sizes for each of the items. The percentage of respondents who strongly agreed that it is important for their local community to develop and implement a resilience plan rose from 48% to 88%.<sup>20</sup> For the statement, "I am interested in learning about how climate-related hazards may affect my community," the percentage of respondents who strongly agreed rose from 45% to 81%.<sup>21</sup> The percentage of participants who strongly agreed that they are interested in learning about societal issues related to the impacts of climate-related hazards went from 45% to 77%.<sup>22</sup> For the statement, "I am interested in learning about research around climate-related hazards," 44% reported that they strongly agreed before the forum and 74% strongly agreed afterwards.<sup>23</sup>

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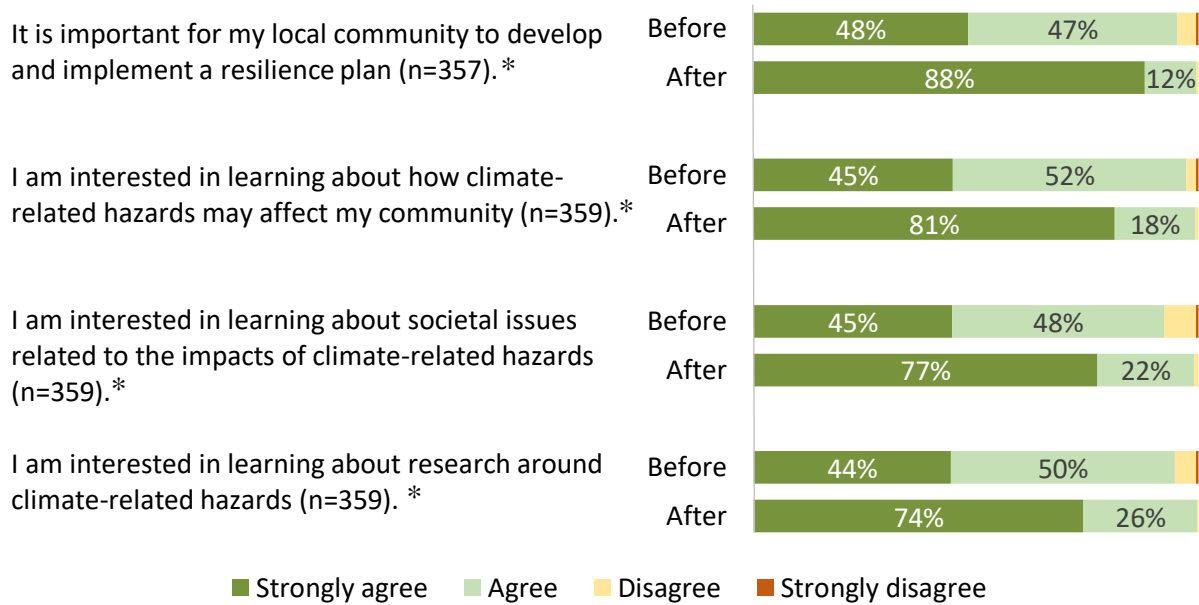
<sup>20</sup> Wilcoxon Signed Ranks Test: n = 357, Z = -11.730, p < .001, r = .621

<sup>21</sup> Wilcoxon Signed Ranks Test: n = 359, Z = -10.337, p < .001, r = .546

<sup>22</sup> Wilcoxon Signed Ranks Test: n = 359, Z = -10.907, p < .001, r = .576

<sup>23</sup> Wilcoxon Signed Ranks Test: n = 359, Z = -10.707, p < .001, r = .565

**Figure 9. Responses to retrospective pre/post survey question, “Please rate your agreement with the following statements before you participated in the forum, and then after.”**



Across the items, respondents came in with high levels of agreement before the forum, with at least 90% of people reporting that they strongly agreed or agreed beforehand. This shows that, even though there was a targeted recruitment effort to get participants who were demographically representative of their communities, the forum participants were generally supportive of and interested in learning about resilience efforts and climate-related hazards. Nevertheless, there was growth in participants’ interest and support. The two items with the highest levels of “strongly agree” after the forum involved a local connection: “It is important for my local community to develop and implement a resilience plan” (88% strongly agreed, n=357) and “I am interested in learning about how climate-related hazards may affect my community” (81% strongly agreed, n = 359).

These high levels of interest in local issues are mirrored in responses to an open-ended question. Visitors were asked to provide an explanation for any of the options for which they had selected “agree,” or “strongly agree.” Eighty-eight respondents provided explanations, and 34 of those respondents wrote responses that indicated interest in how climate related hazards and resiliency efforts might interact with local contexts relevant to forum participants. Most commonly (15 of 34 responses), participants discussed interest in how the local community can help with resilience efforts, including, “*What I can do personally to prepare for climate-related hazards.*” Slightly fewer comments were about interest in local implementation of resilience strategies (12 of 34 responses) and resilience efforts already being made in the participant’s area (12 of 34 responses). One of these respondents said, “*Translating national + local policies + plans to meaningful, feasible steps for local communities.*” Another respondent wrote, “*[I am] interested in learning what Durham is doing to prepare for flooding & drought caused by climate change.*” Another eight responses were about interest in what specific impacts climate hazards would have on the respondent’s local environment. This included comments like, “*[I am interested in] data on climate change affecting Hawaii specifically.*” Finally, six comments about local politics

expressed interest in how local political structures and agents might come into play in the implementation of resiliency plans. For instance, a participant wrote, “[I would like to learn]More about the situation in Oahu; What are planners/policy makers doing to solve these issues?” A full summary of responses to this question, along with additional example quotations, is in Appendix F.

Overall, these data indicate that participants did have increased interest, and there was particularly strong interest in local issues. Participants wanted to have further information about their local situation and possibly further personalization of the forum discussion so that they could think about, and potentially contribute to decisions about, this local context. This finding could have implications for forum developers in the future. Projects like this—which share materials across sites—have a challenge of making materials that are nationally applicable so they generate broad reach, and yet are meaningful in each location where the programs take place. This project attempted to address local connections by encouraging each site to work with their local resilience planner to create a discussion question of local importance. However, the data show that there is still more work that could be done to support sites in this type of local customization of the project materials, both in terms of helping local sites find information that they can share about local issues and in helping the sites connect to local stakeholders who can use the information. Looking forward, the project team has already begun efforts to build capacity for local sites to personalize the forum discussions or create materials with local stakeholders to enhance the personal relevance of the discussion for participants through efforts like coordinated citizen science activities. Future evaluation of these efforts can assess whether local customization changes participants’ levels of interest or attitudes.

### 3.3 EDUCATOR WORKSHOP

Beyond the forums, the project team also conducted a webinar to help educators learn how they might use the forum materials in a range of educational contexts. At the end of the educator webinar, the webinar participants were invited to take an online survey. This survey asked participants about their knowledge of project content areas before and after the workshop, and their knowledge, interest, and confidence in using the project materials in their own educational contexts. Due to the small number of participants in the workshop and thus the small sample size for the survey, analysis of these data took a descriptive approach. The methods section has additional detail about this survey and its associated data analysis.

As discussed in further detail on the upcoming pages, key findings from this survey include:

3.3.1 After the workshop, educators reported increased knowledge about how to use the forums.

3.3.2 Educators reported that they were more interested in using the forums as a part of their work after the webinar.

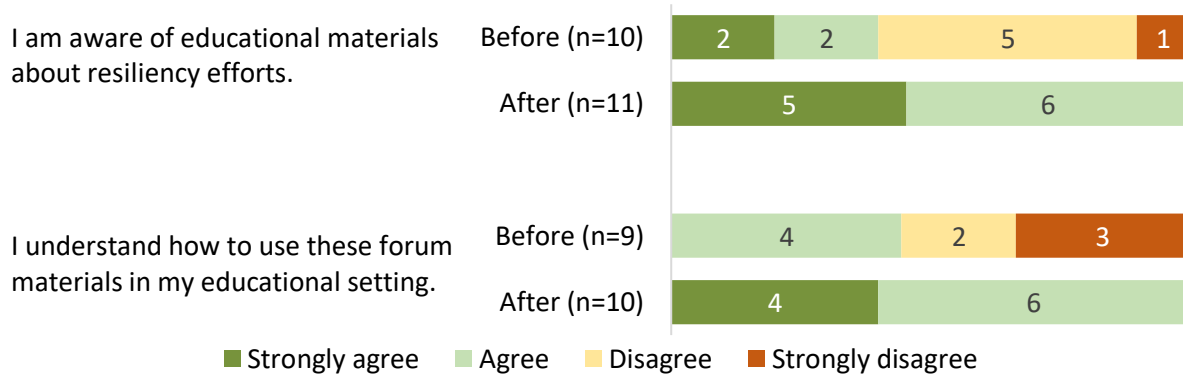
3.3.3 Educators reported growth in their confidence to use the forum materials in their work.

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#### *3.3.1 After the workshop, educators reported increased knowledge about how to use the forums.*

Educators who participated in the online workshop completed an online survey at the end of the webinar. While the total sample size for this survey was relatively small at 11 respondents, the data show positive trends in the educators' reported knowledge, interest, and confidence. In terms of learning, workshop participants reported that the webinar introduced them to materials they had not previously known about and helped them understand how to integrate the materials into their work. Seven of the ten respondents who provided both pre- and post-responses reported increased awareness of educational materials about resiliency efforts and understood how to use the forum materials in their educational setting (see Figure 10). While six people disagreed or strongly disagreed that they were aware of the materials before the workshop, in the post-responses, all of the educators reported that they agreed or strongly agreed afterwards. The data about understanding how to use the materials showed similar reported increases: five respondents disagreed or strongly disagreed that they understood how to use the forum materials before the workshop, but no one disagreed or strongly disagreed afterwards.

**Figure 10. Responses to retrospective pre/post survey question, “Please rank how much you would have agreed or disagreed with the following statements BEFORE the workshop, and how much you agree or disagree with them now, AFTER the workshop.”**



The survey provided educators an opportunity to explain their close-ended responses. Two comments related to these survey questions indicated that the webinar helped the participants learn about the forum materials. The first comment was, “I didn’t know much about the forum materials, but they enhance the educational programs that I have developed about climate resilience to date, and I could see using them in informal education settings and with our [program] as part of training, too.” A second respondent wrote, “I know next to nothing and I am trying to educate myself and transfer it to my students simultaneously. This looked interesting but I had no idea what to do with it. The forum explained and pointed out options.” All open-ended survey responses are printed in Appendix D.

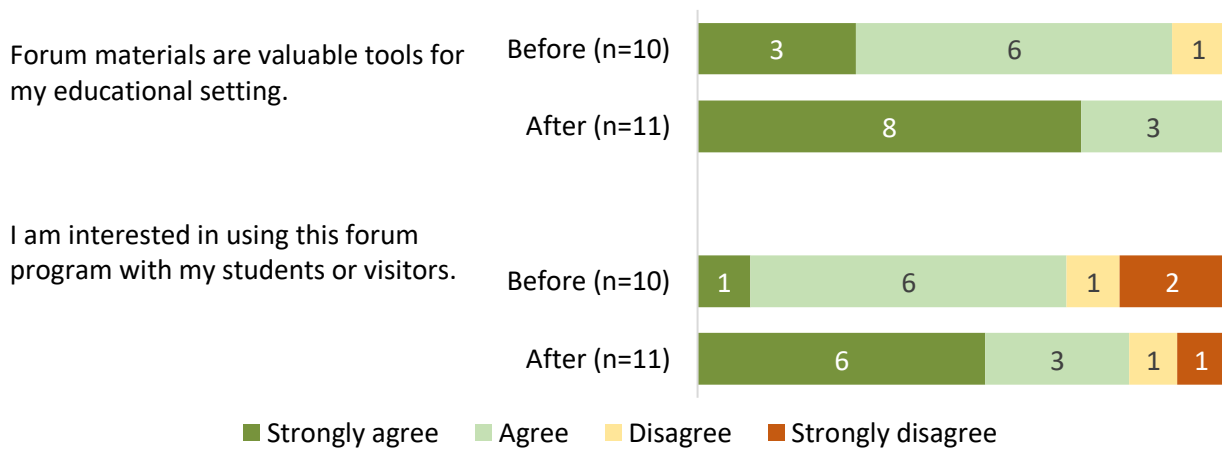
Both the qualitative and quantitative data suggest that the educators who attended the webinar reported increased awareness of project materials and how to use them. While these existing data show evidence that the project goal of increased awareness was met among participants, it should be noted that the small number of participants in the workshop means that the reach of these positive findings was limited. Given that many of the respondents were unaware of the project materials before the webinar, it may be that it was difficult to recruit educators to participate because they had minimal awareness of the project, and thus were unwilling to dedicate their time to learn about it. It may be that different recruitment approaches could do more to share about the project ahead of time to spark additional interest. It is also interesting that the participants in the workshop represented such a variety of educational contexts, ranging from humanities to generalists to science specialists, and reaching students in pre-K through adults. While the materials may have broad appeal, there could also be a benefit of reaching out to groups of teachers who might have particular interest in environmental science and spreading the word about the project through those groups. Another possibility is that the webinar format may not be the most effective approach to sharing project materials. The scheduling during the summer could have been particularly challenging for teachers, as well. While the webinar’s approach of sharing project materials did seem effective for those who participated, considering other formats could be valuable in the future.



**3.3.2 Educators reported that they were more interested in using the forums as a part of their work after the webinar.**

Not only did participants learn about the materials and how to use them, but educators also gained interest in using the forum materials. The respondents had higher levels of agreement after the workshop that the forum materials were valuable tools for their educational setting and that they were interested in using the program (see Figure 11). Of the ten people who provided both pre- and post-responses, four reported increases in the extent to which they agreed the materials were valuable, and five increased their agreement that they were interested in using the forum. All but two respondents noted that, after the workshop, they were interested in using the forum program. The two who did not feel this way both worked with elementary school students. One described, “I would have to adapt it extensively by adding vocabulary cards...all the foundations would have to be in place before I could expect a discussion.” The other mentioned a logistical barrier: “We need school district buy-in.”

**Figure 11. Responses to retrospective pre/post survey question, “Please rank how much you would have agreed or disagreed with the following statements BEFORE the workshop, and how much you agree or disagree with them now, AFTER the workshop.”**

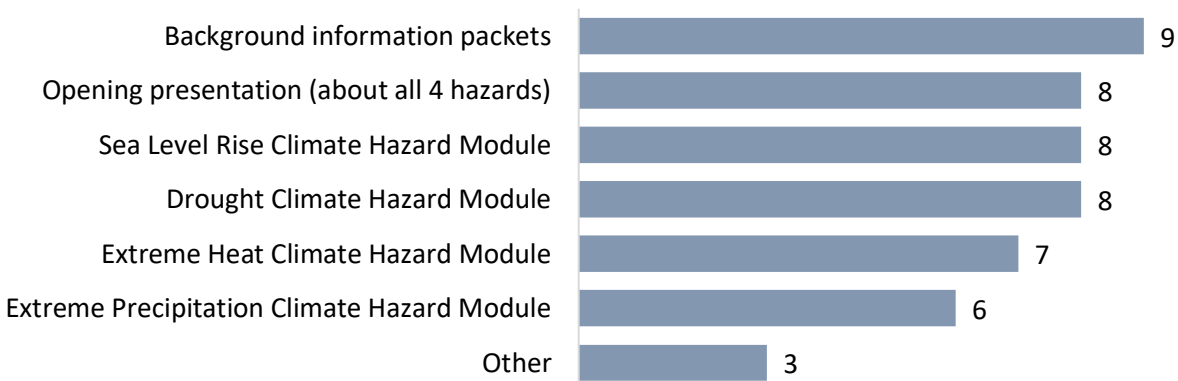


As part of an open-ended question, the educators wrote that they planned to use the forum materials as a way to integrate local concerns into the curriculum, an opportunity for project-based learning, or a chance to model STEM practice. Ten educators responded to the question, “How, if at all, do you plan to use the forum materials in your educational setting?” Four mentioned plans to connect with local climate factors. For example, an educator who teaches water conservation to K-12 and adult students mentioned desire to host a “community presentation.” A high school chemistry teacher wished to “start slow” and use the extreme precipitation and sea level rise modules because, “Sept[ember] is hurricane season.” A 6<sup>th</sup> grade teacher of reading, writing, math, science, and social studies wished to use the drought forum because, “We are also at high risk for drought.” A middle and high school social studies teacher wrote, “I can help guide my students to use these materials and relate to local (or broad) issues.” Three respondents described plans to use the forum as a part of their project-based learning in non-traditional learning settings, including a “Project Based Charter School,” “environmental sciences school,” or “experiential learning site.” A middle and high school social studies and

biology teacher at an environmental sciences school shared, “This is a great tie-in to our mission and vision.” Two respondents indicated plans to use the materials to support STEM programming. An elementary school ESL teacher wished to “reach students before they complete grade three and become in-school science and math drop-outs” and a science and history teacher at a private high school hoped to model “how to think and process information and understand the importance of climate change, engineer, ecology, etc.” Finally, a retired environmental science teacher had vague plans to use the materials “as a springboard for discussion” and a museum educator wrote, “I’m not sure. I think they have great potential.”

The survey also asked which forum materials the respondents were interested in using, and more than half of the educators indicated that they were interested in using each one of the listed materials. As shown in Figure 12, the background information packets were the most popular (9 of 11 respondents were interested in using these) and the Extreme Precipitation module was least popular (6 of 11 were interested in using this). Three respondents wrote in other materials they were interested in using, including: “A list of preselected vocabulary with visuals that can be used to bridge communication for successful discussion,” “local issues/partners,” and a comment that the educator, “would have to redo materials for the grade levels that are of greatest concern [elementary school].”

**Figure 12. Responses to survey question, “What forum materials, if any, are you interested in using in your educational setting?”**



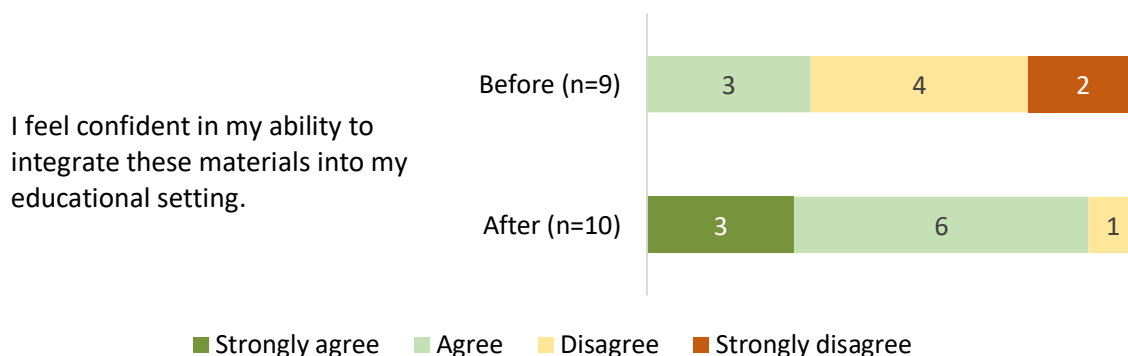
Overall, these data show evidence that the goal of educators becoming more interested in using the project materials was partially achieved, in that the small number of educators who participated in the workshop did generally indicate increased interest in using the materials. However, as mentioned in the previous section, the poor attendance at the webinar begs the question of whether people did not know about the webinar, whether they were unable to come for logistical reasons, or whether they were not interested in attending because they do not wish to use the project materials or felt the webinar would not increase their capacity to do so. Among the survey respondents, it was interesting to see that the educators anticipate using the materials in a variety of contexts, and that some wish to adapt or supplement them to make them more appropriate for a wide audience. Should further use of project materials in educational settings be deemed especially important, the project team could consider opportunities to work with a range

of educators to learn more about how to adjust the materials so they are easily applied in other contexts.

**3.3.3 Educators reported growth in their confidence to use the forum materials in their work.**

In addition to being interested in the forum materials, educators reported increased confidence in their ability to use the materials. The online survey asked a retrospective pre/post question about participants’ extent of agreement with the statement, “I feel confident in my ability to integrate these materials into my educational setting.” Seven of the ten respondents who provided both a pre- and post-value indicated that their confidence had increased, with all but one agreeing or strongly agreeing that they were confident after the webinar (see Figure 13).

**Figure 13. Responses to retrospective pre/post survey question, “Please rank how much you would have agreed or disagreed with the following statements BEFORE the workshop, and how much you agree or disagree with them now, AFTER the workshop.”**



The educators’ increased knowledge about the forum materials paired with growing interest and confidence are encouraging findings that reflect potential future use of the materials with a diverse range of educators in a broad range of educational settings. These data are especially positive given the fact that the materials were originally designed for museums. The forums were created for youth and adult audiences, but only two of the survey respondents indicated that they work with learners over the age of 18, and all of the educators worked with children of some age. Furthermore, many of the educators worked in interdisciplinary areas, with only two reporting that they exclusively teach traditional science fields (“chemistry” and general “science”). In fact, two respondents did not report teaching science at all, but “Social Studies” and “English for speakers of other languages.” While the overall number of participants and survey response rate for the educators was modest (there were 11 respondents out of 16 participants), these data are promising and support an opportunity continued exploration of the use of forums in different contexts. In the future, project teams could consider additional ways of sharing the forum materials with educators, and including them in the process of creating or adapting materials for use outside of the science museum field. In sum, the existing data suggest that there was some evidence that the project goals for educators were met, but that they were met at a smaller scale than originally intended.

## IV. CONCLUSION

The Science Center Public Forums project, led by Arizona State University and the Museum of Science, Boston and funded by the National Oceanic and Atmospheric Administration (Grant Number NA15SEC008005), engaged citizens across the US in discussions and exploration of NOAA data about climate-related hazards and resilience strategies. The project team created modules about four different climate-related hazards: heat waves, extreme precipitation, drought, and sea level rise. Eight museums around the country put on public events that engaged participants through the use of these modules. Additionally, professional development materials and workshops were created to encourage educators to use the forum materials with audiences beyond those that attend at the eight forum sites.

The summative evaluation of the *Science Center Public Forums* project focused on three main areas. These included: 1) participants' learning about resilience efforts, the nature of science, and environmental hazards and the ways they interact with human and natural systems; 2) participants' engagement with project materials and their interest in resilience efforts and research about climate related hazards; and 3) educators' knowledge, interest, and confidence in applying project materials in their educational settings. To assess these areas, evaluators gathered a collection of quantitative and qualitative data via pre- and post-surveys.

In regard to learning, there were three key findings. First, respondents demonstrated high levels of knowledge about environmental hazards and interactions between human and natural systems even prior to the forums, and they reported increased learning about these topics after the forum. For example, 20% of respondents reported knowing "a lot" about climate-related hazards that could affect their local community before the event, and 65% reported knowing "a lot" afterwards (n=356). This was a statistically significant increase with a large effect size. There were similar reported learning gains about the impacts surrounding environments have on local communities (17% knowing "a lot" before and 53% after, n=354); and the impacts communities have on their surrounding environment (16% knowing "a lot" before and 52% after, n=356). Second, although respondents knew about resilience efforts before the event, they reported that participating in the forum helped them learn more about resilience efforts and their impacts on stakeholders. The percentage of respondents who reported knowing "a lot" about strategies for reducing the impacts of climate-related hazards rose from 10% before the forum to 57% afterwards (n=357), and the percentage who knew "a lot" about the impacts of resilience strategies on community members rose from 7% to 53% (n=355). Both of these were statistically significant gains with a large effect sizes. Third, forum participants reported that they learned about the ways science and research evolve and change over time. The percentage of participants who reported knowing "a lot" about the ways science and research evolve and change over time rose from 31% to 51%, (n=353), a statistically significant change with a large effect size. These data indicate that the project achieved in goals related to forum participants' knowledge, awareness, and understanding.

The second main topic of the summative evaluation was the assessment of visitors' engagement with project materials and interest in resilience efforts and research about climate-related hazards. There were two main findings in this area. First, the data show that during the forum, participants engaged with the project materials to consider data, hear others' views, share their

own views, and partake in joint decision-making. All project materials were widely used, with at least 90% of all respondents indicating that they had used each of the materials about which the survey asked. Respondents also reported high levels of engagement in discussion and deliberation: 99% indicated that they had heard others' viewpoints (n=355) and 98% reported that they had shared their own views (n=357). Second, while respondents had high interest before the forums, they reported that they became even more interested in research on climate-related hazards, societal issues, and ways hazards affect their community. For example, the percentage of respondents who strongly agreed that it is important for their local community to develop and implement a resilience plan rose from 48% to 88%, and the percentage of respondents who strongly agreed they were interested in learning about how climate-related hazards affect their community rose from 45% to 81%. Participants were especially interested in and supportive of local resilience efforts, and indicated that they would like even more local information. These data indicate that the project achieved its goals in relation to interest, engagement, and attitude change.

Finally, the evaluation gathered data about impacts on participants of the educator workshop which shared project resources with educators as a way to encourage reuse in varied educational contexts. While few educators participated in the workshop, three key findings emerged from these data. First, after the workshop, participant educators reported increased knowledge about how to use the forums. After the workshop, all respondents agreed or strongly agreed that they were aware of and understood how to use them, compared to less than half of the respondents before the webinar. Second, participant educators reported that they were more interested in using the forums after the webinar. Of eleven total respondents, the number who strongly agreed that the forums were valuable tools for their educational setting rose from three to eight and the number who strongly agreed they were interested in using the forum materials with their students or visitors rose from one to six. Third, participant educators reported growth in their confidence to use the forum materials in their work. The number of educators who strongly agreed they were confident in their abilities to use the forum materials rose from zero to three, and the number who agreed rose from three to six. These findings indicate promise in conducting educator workshops to encourage use of forum materials in more educational settings. However, because the sample size is small, findings are not conclusive. Therefore, project developers should continue to test and evaluate the effectiveness of educator workshops as a part of future projects.

As demonstrated in this report, the Science Center Public Forums project has been successful in reaching learners across the US and engaging them with content about resilience efforts and climate hazards. This work provides a potential platform for continued efforts to develop meaningful educational programming in this area. One potential opportunity for adjusting the forum modules lies in the emergent finding that many participants mentioned wanting more direct connections to local information. This is a particularly difficult request for a project that had a goal of creating materials for use at sites around the country, but there may be ways that the project team could provide additional support for sites to adapt pieces of the modules to make them more specific to their local context. Already, this project helped sites to work with their local resilience planners to come up with discussion questions of local interest, but based on the findings from public participants, this work could be expanded and improved to allow more ways for sites to connect to or provide information about local issues. The future extension work for this project, currently being started, may help with this. As a part of this new project, the

forum modules will be connected with citizen science projects that participants can contribute to in order to support their forum experience with a real-world, locally-situated activity. Other opportunities for local tie-in might be through speakers, locally-specific background information, follow-up activities, or resources and networking with local governmental and other organizations that are addressing climate hazards and resiliency efforts in the forums' close proximity.

From the evaluation point-of-view, there are several lessons-learned from this effort. As described in the body of the report, the evaluators sought to measure learning through a combination of self-report (where respondents noted how much they felt they learned) and comparative content analysis of open-ended responses about knowledge of different areas related to the forum content that respondents made before and after the forums. While the self-report data indicated statistically significant improvements in learning with large effect sizes, the coding approach for the content analysis did not find significant changes. To better understand this apparent discrepancy, future evaluators assessing this type of project should consider whether a different phrasing of survey questions or different approaches to coding could lead to better understandings of changes to participant knowledge as a result of forum participation. In particular, it would be valuable for the questions to ask about more specific content areas in the forums, and for the coding scheme to assume higher levels of baseline knowledge and provide more room for improvement of nuanced understandings.

Another consideration for future work, which is relevant for both evaluators and practitioners, is the recruitment methods for participants, and accordingly the evaluation sample. In this project, forum participants were paid, which project members felt was instrumental in the sites' abilities to include diverse individuals whose demographics matched those of the local population. While participant demographics may have been representative, the evaluation data show that respondents generally came to the forums with high levels of knowledge and interest in resilience efforts and climate hazards. This finding raises the question of whether the recruitment method provided participants who were really representative of the local population, or if it still generally attracted participants who were already highly motivated around these topics. It was suggested that paying participants would minimize any bias of over-attracting people who are highly interested in project topics, but it appears that this may not be the case. Future projects might wish to consider selecting sites in locations where resilience knowledge is likely to be low; including a question about viewpoints, museum visitation, interest, and prior knowledge as part of the selection criteria; holding the events in community locations that typically attract diverse audiences or working with community organizations serving these audiences; using different marketing platforms that reach broad audiences; shortening the duration of the program or, when the budget allows, offering larger incentives. For many sites, it was their first time hosting forum events. As sites become more familiar with this type of programming or receive additional capacity for doing so, recruitment efforts may become smoother. One other factor is that the program emphasized the fact that everyone has local knowledge for resilience planning. This may have influenced respondents' conceptualization of what counts as prior knowledge.

Overall, this summative evaluation of the Science Center Public Forums project found evidence of the project meeting its goals. This included participants reporting increased knowledge, understanding and awareness, engagement, increased interest, and more positive attitudes. While

fewer educators participated in the educator-specific project activities than hoped, there was preliminary evidence that these educators reported learning about the project materials and how to use them, and indicated increased interest and confidence in using the forum materials in their educational settings. As a successful educational effort, this project can serve as a foundation for future work that wishes to expand learners' engagement with content and policy about climate-related hazards and resilience efforts.

## REFERENCES

- Cousins, J., & Earl, L. (Eds.). (1995). *Participatory evaluation in education: Studies in evaluation use and organizational learning*. London: Falmer.
- Pfeifle, S. (2017). *Drought and heat waves: Preparing for Metro-Phoenix's uncertain future formative report: Preliminary findings from forum participant and facilitator surveys*. Boston, MA: Museum of Science, Boston.
- Pfeifle, S. (2017). *Sea level rise and extreme precipitation: Preparing for Boston's uncertain future formative report: Preliminary findings from host site focus group and forum participant surveys*. Boston, MA: Museum of Science, Boston.
- Rosenthal, R. (1994). *Parametric measures of effect size*. In H. Cooper & L. V. Hedges (Eds.), *The handbook of research synthesis*. (pp. 231-244). New York: Russell Sage Foundation.
- Todd, K. (2018). *Extreme precipitation: Preparing for Boston's uncertain future formative report: Preliminary findings from facilitator and participant surveys*. Boston, MA: Museum of Science, Boston.



## APPENDIX A: FORUM PRE-SURVEY

As a part of the **Heat Waves and Extreme Precipitation: Preparing for Saint Paul's Uncertain Future** forum, researchers from Arizona State University and the Museum of Science, Boston are conducting an evaluation to understand how the program impacts participants' learning and interest. The purpose of this evaluation survey is to understand what you know about the topics that will be covered during the forum prior to your participation. Your feedback is very valuable to us and will be used to help us improve our program.

### **How long will the survey take?**

The survey should take no longer than 10-15 minutes to complete.

### **Information about participation:**

- Participation includes both the completion of this survey and the completion of a post-survey at the event on May 12.
- The questions in this survey are about your current understanding of the topics that will be addressed during the program. This survey is not a test, but a way to get a sense of how the materials we have created helped you learn about this topic. It's fine to not know anything about this topic!
- Completion of this survey is voluntary and optional. You may choose to skip any of the questions and may stop the survey at any time. Your choice to complete or not complete the survey will not affect your participation in the daylong deliberation or in any future opportunities with the Science Museum of Minnesota.
- This survey is confidential. We ask for your name for tracking purposes, and will remove it upon completion of your survey. Once you have submitted your survey, your responses will be permanently disconnected from your e-mail address and contact information.
- All your responses will only be reported as aggregate findings. Your data and these findings will only be used to develop and evaluate the program and inform program funders of the outcomes of the program.
- You must be at least 18 years old to complete this survey and to participate in the daylong deliberation.

Please complete this survey by **May 11**.

If you have any questions or concerns, please direct them to Liz Kunz Kollmann at [ekollmann@mos.org](mailto:ekollmann@mos.org) or (617) 589-0467.

This project is supported by a national Environmental Literacy Grant from the National Oceanographic and Atmospheric Administration (NOAA).

(untitled)

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ID 11

1. Please provide your first initial and last name:  
(This will be removed from your responses upon completion of the survey)

ID 3

2. As of now, have you read any of the background information for the **Heat Waves and Extreme Precipitation: Preparing for Saint Paul's Uncertain Future** deliberation?

- Yes, I have fully and completely read the background materials.
- Yes, I have partially read or skimmed the background materials.
- No, I have not yet looked at the background materials.

(untitled)

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ID 4

3. Please use the following **two** boxes to write down any ideas, thoughts, questions or words that come to mind in response to the following about "climate-related hazards."

**What I know about climate-related hazards:**

ID 5

**Factors I think impact / affect climate-related hazards:**

(untitled)

---

ID 7

4. Please use the following **two** boxes to write down any ideas, thoughts, questions or words that come to mind in response to the following about "climate resiliency plans."

**What I know about climate resiliency plans:**

ID 8

**Factors I think impact / affect climate resiliency plans:**

(untitled)

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ID 10

**Thank you for completing our survey! Please submit your responses below.**

We greatly appreciate your time and thoughtful responses. We are looking forward to seeing you on May 12!

If you have any questions or concerns about the evaluation, please contact Elizabeth Kollmann at [ekollmann@mos.org](mailto:ekollmann@mos.org) or (617) 589-0467.

### **Thank You!**

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ID 1

Thank you for taking our survey. Your response is very important to us.

## APPENDIX B: FORUM POST-SURVEY

ID: Bishop Post- \_\_\_\_\_

Data collector initials: \_\_\_\_\_

Date: \_\_\_\_\_

### ***Sea Level Rise and Extreme Precipitation: Preparing for Honolulu's Uncertain Future***

Please tell us about your experience at our forum! Participation is voluntary. All responses are confidential. This survey will take about 10-15 minutes of your time to complete. We greatly appreciate your feedback.

1. Please provide your first initial and last name: \_\_\_\_\_  
This will be removed from your responses after the forum.

2. Did you read the background information before attending today's forum?  
 Yes       No

Now that you've completed our program, please use the following two boxes to write down any ideas, thoughts, questions, or words that come to mind in response to the following about "climate-related hazards."

3. What I know about climate-related hazards:

4. Factors I think affect climate-related hazards:

Please use the following two boxes to write down any ideas, thoughts, questions, or words that come to mind in response to the following about "climate resiliency plans."

5. What I know about climate resiliency plans:

6. Factors I think affect climate resiliency plans:



1

ID: Bishop Post- \_\_\_\_\_

Data collector initials: \_\_\_\_\_

Date: \_\_\_\_\_

7. How much did you know about the following topics **BEFORE** the forum, and how much do you know **AFTER** participating in the forum? (Check one 'BEFORE' and one 'AFTER' rating for each topic)

	<b>BEFORE the forum, I knew...</b>				<b>AFTER the forum, I know...</b>			
	Nothing	A little	Some	A lot	Nothing	A little	Some	A lot
The climate-related hazards that could affect my local community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strategies for reducing the impacts of climate-related hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The impacts of resilience strategies on different community members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The types of impacts communities have on their surrounding environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The types of impacts the surrounding environment has on local communities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The ways science and research evolve and change over time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. Please rate your agreement with the following statements **BEFORE** you participated in the forum, and then **AFTER** you participated in the forum. (Check one 'BEFORE' and one 'AFTER' rating for each topic)

	<b>BEFORE the forum:</b>				<b>AFTER the forum:</b>			
	Strongly disagree	Disagree	Agree	Strongly agree	Strongly disagree	Disagree	Agree	Strongly agree
I am interested in learning about research around climate-related hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am interested in learning about how climate-related hazards may affect my community.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am interested in learning about societal issues related to the impacts of climate-related hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is important for my local community to develop and implement a resilience plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

For the places above in which you rated "agree" or "strongly agree," please explain what you are interested in learning more about.



ID: Bishop Post- \_\_\_\_\_

Data collector initials: \_\_\_\_\_

Date: \_\_\_\_\_

9. Thinking about your experience at the forum and with the forum materials, how much do you agree or disagree with the statements below?

	Strongly disagree	Disagree	Agree	Strongly agree
I enjoyed this event.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I shared my views about what actions should be taken to reduce the impacts of climate-related hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I heard others' viewpoints about what actions should be taken to reduce the impacts of climate-related hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My group's resilience plan reflected my personal views.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The experts responded to participants' questions in a way I could understand.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Please rate the extent to which you used the following materials to inform your views about the resilience plan.

	Not at all	A little	Somewhat	A great deal
The background information sent before the forum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The materials about the town and stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please use the space below to explain any of your responses from the previous two questions about the forum materials.

11. **Rants and Raves:** Please tell us any final thoughts about this forum. What did you like and/or not like about it? Share your concerns and great ideas.



# APPENDIX C: PROFESSIONAL DEVELOPMENT POST-SURVEY

## Community Engagement for Environmental Literacy, Improved Resilience, and Decision-Making

Thank you for your willingness to complete this online survey! The purpose of this survey is to get feedback from people who used the Professional Development Workshop "Community Engagement for Environmental Literacy, Improved Resilience, and Decision-Making."

Please complete this survey by July 18.

How long will it take?

- The entire survey should take about 5 minutes to complete.
- The survey includes some questions about you, and then some questions asking what you thought about the workshop.

Information about your participation:

- To take this survey, you must be 18 years of age or older.
- This survey is optional. You can skip any questions that you do not want to answer, and you may stop the survey at any time.
- Your survey responses will be anonymous.
- The information you provide will be used to improve experiences for people who participate in our forum project.

Thank you for your willingness to participate and your efforts to improve **NOAA Climate Resiliency Forums!**

Next

1. **Before** this workshop, how much did you know about **climate resiliency efforts**?

- Nothing - I did not know about resiliency efforts prior to this forum.
- A little - I had heard of some plans to respond to climate changes and hazards, but did not have an in-depth understanding about them prior to this forum.
- Some - I had a good idea about one or more resiliency efforts that are planned or currently in effect.
- A lot - I had deep understanding of one or more resiliency efforts that are planned or currently in effect.

2. Please rank how much you would have agreed or disagreed with the following statements **BEFORE** the workshop, and how much you agree or disagree with them now, **AFTER** the workshop.

	BEFORE the workshop	AFTER the workshop
I am <b>aware</b> of educational materials about resiliency efforts.	-- Please Select --	-- Please Select --
I <b>understand how</b> to use these forum materials in my educational setting.	-- Please Select --	-- Please Select --
I feel <b>confident</b> in my ability to integrate these materials into my educational setting.	-- Please Select --	-- Please Select --
I am <b>interested</b> in using this forum program with my students or visitors.	-- Please Select --	-- Please Select --
Forum materials are <b>valuable tools</b> for my educational setting.	-- Please Select --	-- Please Select --



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3. Please briefly describe your responses to the previous question.

---

4. What forum **materials**, if any, are you interested in using in your educational setting? (Check all that apply)

- Background information packets
- Opening presentation (about all 4 hazards)
- Extreme Heat Climate Hazard Module
- Extreme Precipitation Climate Hazard Module
- Drought Climate Hazard Module
- Sea Level Rise Climate Hazard Module
- Other - Write In

---

5. How, if at all, do you plan to **use** the forum materials in your educational setting?

---

6. What **changes or support** would make the forum materials more usable in your education context(s)?

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7. In what **setting(s)** do you teach? (Check all that apply)

- Public school
- Private school
- Museum
- Afterschool program or camp
- I am not an educator.
- Other (please specify):

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8. What **age(s)** are your students or visitors?

---

9. What **subject(s)** do you teach?

---

10. What is your **zip code**?

Characters used: 0 (minimum 5)

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## Thank You!

Thank you for taking our survey. Your response is very important to us.

## APPENDIX D: EDUCATOR WORKSHOP SURVEY RESPONSES

**Please briefly describe your responses to the previous question.**

*The previous question asked respondents to indicate their agreement with the following statements:*

- *I am aware of educational materials about resiliency efforts.*
- *I understand how to use these forum materials in my educational setting.*
- *I feel confident in my ability to integrate these materials into my educational setting.*
- *I am interested in using this forum program with my students or visitors.*
- *Forum materials are valuable tools for my educational setting.*

I'd need more training to make use of the forum materials. I'd need practice. Also, I'd like to see them facilitated for speakers of other languages than English, by native speakers of those languages.

I am a first grade teacher. My district does a great job of pushing out professional growth opportunities. When I saw this course posted I didn't realize it would be geared for a much older audience. The topic is of high interest and would certainly capture the attention of my students due to real world application. If I were to use the Environment Resilience Plan I would have to adapt it extensively by adding vocabulary cards with visuals, performing specific tests that demonstrate "Keep Water" vs "Take Water" vs "Maintain" Basically, all the foundations would have to be in place before I could expect a discussion/solution. In this case, it could take two to three weeks.

I know next to nothing and I am trying to educate myself and transfer it to my students simultaneously. This looked interesting but I had no idea what to do with it. The forum explained and pointed out options.

Elementary school. Especially the primary grades, is prime time for initiating information and instruction about the environment. Instead, we just keep on doing what we have been doing. Reading adoptions seldom give important information to early readers. Math books ignore it completely. We need students who can read maps and complete graphs, high school students who come to our school after school and provide some of the level-appropriate informal education of which you spoke. We need school district buy-in. And so on...

I am a volunteer at Museum of Life and Science, rather than formal educator, but I view topic as critical and is a subject of discussion with my friends and associates. I want to use the materials to help them see issues more broadly.

I have been working with my high school students with the idea of a plan, design and evaluate with local information. However, when I want them to manipulate real data they had a hard time. This material will be an introduction and model of how to examine real situations.

Jane Goodall Environmental Sciences Academy is a project based school and the materials provided are a great starting point and guide for students to use.

I didn't know much about the forum materials, but they enhance the educational programs that I have developed about climate resilience to date and I could see using them in informal education settings and with our Green Team youth corps as part of training, too.

<b>How, if at all, do you plan to use the forum materials in your educational setting?</b>
I teach in a Project Based Charter school. I can help guide my students to use these materials and relate to local (or broad) issues. They could use these with geography and/or science classes.
I'm not sure. I think they have great potential.
My hometown is the "lettuce capitol" of the world. We are also at high risk for drought. The drought forum would be the most relevant with sea level rise being our neighbor.
Start slow. Sept is hurricane season. Start with extreme Precip and Sea Level rise modules.
Continue providing after-school opportunities for young children vis-a-vis forums such as "Bedtime Math," and "Mystery Science" to reach students before they complete grade three and become in-school science and math drop-outs.
My program would use the materials both for a community presentation and youth presentations.
Informally, as springboard for discussion among associates.
I want to use this material as an introduction and modelling of how to think and process information and understand the importance of climate change, engineer, ecology, etc....
I will present the materials to students who can choose if it is a project they are interested in doing. As we are an environmental sciences school, this is a great tie in to our mission and vision
I will introduce it to our Green Team youth corps during their training. I may want to adapt it for use as an "onboard activity" on our experiential learning site, the Science Barge.

<b>What changes or support would make the forum materials more usable in your education context(s)?</b>
N/A
Multiple languages. Training for non-English speakers to be facilitators.
A list of preselected vocabulary with visuals that can be used to bridge communication for successful discussion. Explicit science experiments that demonstrate each resilience plan.
Cannot say as yet-no experience to draw upon.
(No response)
As a materials developer and teacher of English learners for many, many years I would add primary grade versions with maps, photos, and other illustrative materials.
Don't know yet.
Make participant packets available to participants for further reflection, by using separate "answer" sheets to turn in rather than the whole packet. I found role playing of stakeholders worked well in our group as it forced consideration of other viewpoints. In the less guided local example of Xmas tree farms, people tended to their own opinions and prejudice, skewing the solutions. We were lucky to have one participant who had actually worked on tree farm, which added a dose of reality.

I wish you could have material for 5-grade ex. integrate vocabulary and clear definitions. Also, I will like to see more information on how my students can help with this information their community.

As of now, I am not sure of what changes or support I would need.

Demonstrating alignment with NGSS or highlighting key environmental studies, earth science, engineering concepts learned.

**What subject(s) do you teach?**

Social Studies

Reading, Writing, Math, Science, Social Studies

Primarily chemistry

environmental science

English for speakers of other languages

Water Conservation

Science and History

Social Studies and Biology

Science

## APPENDIX E: CODING RUBRIC

Code category	Natural factors (like weather)	
<b>Project goals</b>	1A. Environmental changes and natural hazards including rising sea levels and changing frequency and magnitude of heat waves, extreme precipitation events, and drought.	1C. The ways human and natural systems interact including the ways that people and places are connected to each other across time and space.
<b>Did not meet goal 1A or 1C</b>	The respondent does not write anything about weather, environmental changes, natural hazards, or the ways natural systems interact with human systems	
<b>Met goal 1A but not 1C</b>	The response discusses 1A, describing the environment without mentioning human factors (1C). This might be offering relevant vocabulary or buzzwords, general statements about the changing environment, or even sophisticated responses that don't describe how the environment and human systems interact. Examples might include: -"Melting ice caps" -"Rising sea levels" -"Floods"	
<b>Met goals 1A and 1C, achievement response</b>	This is a low-level response meeting goal 1C. The respondent mentions both human and environmental factors, and describes how one influences the other (one-way interaction). When grammatical context is not provided, imply the question wording in the response (i.e., if the person just wrote "land usage" in response to the question about factors that affect climate-related hazards, you should interpret the response as "Land usage [affects climate-related hazards].") Examples could include: -"Hurricanes are destroying ocean-front property." -"Pollution is fostering climate change." NOTE: If the respondent talks about a human action specifically designed to address resiliency (including planning, preparedness, etc.), it should be coded in "resilience efforts," below. If there are two, one-way interactions, it belongs here.	
<b>Met goals 1A and 1C, superior response</b>	This is a high-level response meeting goal 1C. The respondent mentions both human and environmental factors, describing or implying how both influence each other (two-way interactions). An example might be: -"People are impacted by the environment and the environment impacts people. It's all interconnected."	

<b>Code category</b>	Resilience efforts (anything intentionally designed to promote resilience)	
<b>Project goals</b>	1D. The potential intended and unintended impacts of actions aimed at improving resiliency on different kinds of stakeholders.	1E. Measures to reduce vulnerabilities to local hazards
<b>Did not meet goal 1D or 1E</b>	The respondent does not write anything about measures to reduce vulnerabilities or the impacts of resiliency efforts on stakeholders.	
<b>Met goal 1E but not 1D</b>	<p>This code is for responses that address goal 1E but not 1D. The respondent offers relevant vocabulary or buzzwords, or describes what resilience strategies are, but does not mention impacts of these strategies on social, environmental, or economic factors. Examples could be:</p> <ul style="list-style-type: none"> <li>- "Erosion bars."</li> <li>- "Sea walls."</li> </ul> <p>This is also general statements saying resilience efforts are good or valuable, or lists of factors that do not imply an interaction.</p>	
<b>Met goals 1D and 1E, achievement response</b>	<p>This is a response that addresses goal 1D with low levels of sophistication. The respondent describes resilience strategies and their interactions with ONE human/social, environmental, or economic factor (this includes human stakeholders, individuals, cultures, corporations, communities, infrastructure, costs, etc.). This would also be statements that discuss the complications and difficulties of resilience efforts or mentions trade-offs without specifying what the trade-offs are. Examples could be:</p> <ul style="list-style-type: none"> <li>- "Building a dam might exacerbate the drought."</li> <li>- "Planting a garden could reduce flooding in my basement."</li> <li>- "Sea walls are very expensive."</li> </ul>	
<b>Met goals 1D and 1E, superior response</b>	<p>These are responses that address goal 1D with a high level of sophistication and specificity. The respondent describes the interactions between resilience strategies and more than one human/social, environmental, or economic factor (it's ok if it's two or more within one of those categories, like mentioning two different human stakeholders as long as they are specifically called out as two different people/things). This includes human stakeholders, individuals, cultures, corporations, communities, infrastructure, costs, etc. Examples might be:</p> <ul style="list-style-type: none"> <li>- "It's hard to weigh the impacts of a resilience plan on different people."</li> <li>- "Low-income communities are likely to bear the most negative impact of resilience measures."</li> </ul>	

**APPENDIX F: FREE RESPONSES TO POST-SURVEY QUESTION 8**

Code	Project goal	Frequency	Example quote
How I/my community can help	4	15	I'm interested in the problems posed by climate change and how we as a community solve them
Education/outreach/Engagement	4	10	Ways in which to combat misinformation and poor understanding that discourages effective climate responses
Local implementation	4	12	Are my city planners thoughtfully trying to address these issues? Are they using money wisely? Are they actually implementing plans, or just "planning" and those plans will be planned "again" with the worst person in the job?
Local politics	4	6	More about the situation in Oahu; What are planners/policy makers doing to solve these issues.
Resilience (general)	4	11	Variety of types of hazards, range of strategies
Implementation (general)	4	3	development and implementation
What is being done at the local level	4	12	I'd love to learn more about the climate resiliency plans my community currently has and how the community members can become more involved in shaping it!

How to best incorporate perspectives/work together	4	3	How diverse community members can convene and work together
Buy-in	4	12	That's why I came
Specific resilience measures	3a	5	Drought resiliency and how local communities and individuals can help. How conservation can help mitigate problems.
Climate hazards/change	3a	9	Anything with environmental issues/Global Warming.
Research	3a	6	I am interested learning more about research and climate-related hazards
Local impacts	3a	8	Resilience Strategies; Data on climate change affecting Hawaii specifically
General info	3a	3	I'm interested in learning about <u>anything</u> related to resiliency, and sustainability.
Historical/political/economic factors	3b	9	What are the political, economic, & social hindrances? (i.e. why haven't policies worked historically & what could potentially hinder it in the future.) Also, how does legislation connect with Native Hawaiians and their traditional practices? Are these solutions that utilize cultural practices?
Intersections with race and class; Social Justice	3b	6	I'm most interested in these issues as they relate to lower income, multi-ethnic neighborhoods.
Other	--	5	I



## APPENDIX XA: FREE RESPONSE FEEDBACK ON FORUM MATERIALS

The following pages share the 115 responses to the free-response area following the question in which participants could rank how useful the various forum materials were for their experience. Of these responses, 81 were fully or partly about forum materials (Goal 2B).

Goal	Participants' responses
1C	After attending this forum, my perspective of [local area] heat and drought has been intensified. I became more aware of how these disasters could impact human life in [local area].
1D	Learned much more about the conflicting desires of the various stakeholders.
2A	Because of the knowledge level of all officials in the room, it made the experience much more fruitful.
2A	I would love to have others with opposing views here, like climate deniers, to either expose them to this information or just to have their input.
2A	We had to make compromises within our group. So my personal choice wasn't always what we went with, but I felt comfortable with our decisions.
2A	We had healthy discussions about the group plans that both did/did not reflect my personal views. It would have been nice to share more as a large group who we are/ what part of [local area] to get a better sense of voices represented.
2A	Not many people of color in attendance.
2A	With each shift in how we'd allocate our resources. We were able to visualize what that impact was and change plans accordingly.
2A	The groups were diverse, but limited info was shared between the groups. Maybe mixing them up would be good halfway through.
2A	I found this a useful and rewarding experience. For me engaging in the group decision process is a useful model for others.
2A	The material sent was extremely informative but putting in context and hearing others' views made a big difference.
2A	Enjoyed the panel. Do think that some mention of dissenting opinion should be mentioned.
2A	This was informative and a great discussion. I enjoyed it immensely.
2A, 2B	The "game board" and scenarios were quite interesting. However, I strongly believe the learning came through reading the material, forming an opinion, discussing our opinions, and forming a consensus on a resilience plan. The conversation among all members was a key element in the learning process.
2A, 2B	The background info allowed me to start thinking about possible topics but the material at the forum and discussion allowed to put in perspective what's involved in implementing changes.
2A, 2B	The forum materials were very engaging. I also think that the diversity of the group I was in made the discussions super rich.

	It was nice to be given information that was as up-to-date as humanly possible. Being in a proactive and diverse environment was fun.
2B	I loved the event, but the materials weren't "perfect." (I didn't expect them to be – it's impossible). I prefer a lot more information and details, and conflicting info should be made completely clear.
	The deliberation #2 maps were difficult to understand.
	The town & stakeholders were quite limited & our group felt they were not fully reflective of the [local] community.
	I think the pre-work reading was very useful and helped me make more educated decisions about the resilience plan we chose.
	Not localized and not pertinent to [local] challenges per se.
	I have been following climate information before participating in this forum, but I felt it was important to look at stakeholder info to make decisions on the individual scenarios.
	I would like a bit more about the plans positive + negatives (more +/-).
	Nice that we get to see how other cities deal with these issues but would be nice to focus on [local area].
	They were an excellent guide.
	Questions and info could be much, much more <u>concise</u> ; [A] little convoluted – require some clarity with certain questions, information and options.
	Sufficient to help most of us understand the stakeholder's opinions & the threats (environmental, economics).
	Where were the "News Story" icons? Where were maps of heat-related deaths and groundwater levels?
	The forum was well-organized. There was much material to digest in a short period of time. However, the material was readable and understandable. I needed more time to read and study the material given.
	The maps could have been a little easier to understand the news stories were very helpful/insightful.
	The background materials and forum were unbiased because they did not talk about the role coal-powered power plants contribute to global warming
	We saw no maps of groundwater levels, but maybe that was for the drought module, which our group didn't do.
	I found the forum information sent ahead was very informative. I learned I knew quite a bit already, plus added more in-depth information to that content.
	This was a great experience. I would have appreciated the views and opinions of the stakeholders having a weightier effect on my decision-making.
	There's a white bias.
	I missed the first link on the prep materials but I am excited to look at them more now. I didn't have time to prep for this.
	But my group based discussion on background. (Google earth) better for flood simulation.
	I like maps – it helped me. Looked at background information, somewhat helpful.

	<p>Couldn't read, (News stories), too distant. Info sent would have been given to me as a hard copy due to visual issues and so I could've highlighted certain points/topics.</p>
<p>The background materials or the resiliency plans should have been proofread by subject experts. Increased evaporation does not "increase the amount of air in the atmosphere." Utility transformers are not a significant solution.</p>	
<p>The information that was given had enough information to prepare me for today.</p>	
<p>I do not recall interaction with experts responding to participants.</p>	
<p>I felt more details were needed, but probably would extend the event to more than a day.</p>	
<p>Heat Deaths Map uses a confusing [roster] with nuclear data – 7/16 death per square or something. Also resilience strategy 'stars' chart was confusing – are stars showing cost or value? 5 stars = expensive or highly beneficial?</p>	
<p>As far as stakeholders go, there was zero representation for homeless populations in either of the extreme precipitation or heat examples.</p>	
<p>News story icons were essential in the overall assessment of the impacts of the resiliency plans.</p>	
<p>No old or disabled, no Asians, no teens represented. No really rich homeowners in flood exercise who would not want to move. Need at least one contrarian in the mix.</p>	
<p>The stakeholders mostly 11/12, represented middle-class people. Yet, most communities are no longer majority middle-class. So...</p>	
<p>It seemed like there were many stakeholders involved whose perspectives were under-represented, particularly people living in poverty- very fragile populations in both urban and rural settings.</p>	
<p>I liked the deliberation model, I liked hearing from multiple stakeholders; stakeholder cards were limited/biased: disproportionately professionals/middle-upper-class. Not enough of poor, oppressed, exploited represented. More explanation and transparency of rules of game and this meeting, please! There was not enough [locally specific] material.</p>	
<p>I didn't know much when I arrived, so I shared what I thought but got so so much more out of listening to everyone else's ideas and views. The forum materials felt unbiased and I appreciated the use of fictitious cities to maintain anonymity. I appreciated the variety in the stakeholders but it could've been cool to have a devil's advocate, i.e. a climate change denier. Our group didn't use the Google Earth visualization very much. The background info and stakeholders were very informative, but I don't even remember seeing heat maps or news story icons – didn't detract from the experience.</p>	
<p>It would be helpful to have gotten the background info more than one day before the forum.</p>	
<p>The resilience plans for the drought didn't combine the options that we wanted. It would have been nice to let us choose from a menu of options and then see the results – perhaps a video game type of program would do this better.</p>	
<p>The videos were weak. Our leader, [name], was fantastic! She kept us moving and we had a lot of fun. Thank you.</p>	

I don't recall any maps of heat-related deaths or groundwater levels.
It was maddening to have to guess what the results of our planning would be. I love the news reports! Excellent idea. I wish I could see the news reports first.
Everything was clear and well-prepared.
Loved the Google Earth (in planetarium) – would have been helpful to have the iPads move around the table. Glare – hard to see. Story icons could have a glossary. Would be nice to also have a copy of the story for participants. Add new technologies like zeromass.com alternatives.
I don't recall seeing a heat-related deaths map.
I only said "not at all" on the last two because we ran out of time and we did not use these materials.
The second city was challenging to follow, i.e. fire issue...I enjoyed the new stories, but wished things would allow more adaption. Liked zooming into the future.
No advanced info was received but found on web. That did not hamper participation.
I felt like the news stories focused on the "negative Nancy's."
The maps need slight improvement.
I am not sure that the news stories are fair or accurate.
Difficult to read in time allotted. No time to discuss. Too verbose: needs to be [illegible]. Forum materials were extensive. Facilitators did not seem to understand the procedures for the first event on sea level rise and so our group was frustrated.
(Google Earth was) complex, a lot to take in given time. (News story) Not much time left to consider.
It was very helpful to have them ahead of time so I could be somewhat prepared and focused on what the program will cover.
I did not receive any background information before the forum, which is why I didn't use it, I would have if I had been sent it.
Prep materials weren't distributed.
Some of the maps could have been better labeled.
I don't remember maps of heat-related deaths.
Some stakeholders in each scenario (rich in Kingtown). Government and Native Americans in drought.
I didn't get any materials. Everything was well done.
Game/role-play design was confusing.
The Google Earth visualization didn't make much sense, but the news stories had a big impact on our group's thinking.
My link wouldn't open so I wasn't able to read the info before I came today.
I tried to remember what I saw in the graphs but it would have been more helpful to have a hard copy.
I wanted an option C, new tech for real solutions that would still be relevant 500-1000 years from now.
For the "unbiased" question, I think some of the resiliency options were biased toward the status quo- nothing particularly innovative in terms of micro-grids, solar and wind energy, etc.

	Unsure what icons were used.
	Material (scenarios and discussions used) used was effective and efficient.
	Maps of made towns didn't seem important until the name of the real place was revealed. But at that point, I didn't have time to re-evaluate the map.
	The maps and real news stories help to give me an idea of what decisions could result in.
	I liked the information provided prior to the forum. I wish I had a little more information about specific economic impacts.
	I have a low opinion of media sourced content.
	Background info was very good and prepared me for the topics. The stakeholders were diverse and challenged us.
	The locations of the casualties related to heat were useful.
	Most of the time, when my table read the news stories, they only read the headlines. But the headlines were occasionally misinterpreted or misunderstood. E.G. "Bus drivers see increase in heat illness" – some people though this meant that bus drivers were affected by heat illness. Also, no one read the content of the of the news stories.
	The materials were well put together and useful. Although there needs to be more background information on the two cities.
	The pre packet was long, but informative.
	Good, but could include more data. GIS is great, use the layers to give more info. Positives and negatives.
2B, 3A	They were very helpful and I plan to share them with my neighbor.
3A	Thoroughly enjoyed this and am encouraged to learn more.
	I would like to recreate this event in my neighborhood.
	This event brought more focus to the areas I need to look at more – especially in emergency response situations. No known 'Cert' team in 'old town'/downtown.
	I need to educate myself more about climate change and its [sciences?].
	I learned a lot today things I can use tomorrow.
4	I've learned that we must all come together and start now to save and repair our world.
	The forum has led me to believe more research is needed.
	All of these factors are necessary when implementing solutions to climate change to the point where everyone needs to participate.
6	This was a good [speculating?] exercise that could be used in k-12 schools (MS Science, e.g.) and in museums like [this one].
N/A	Interesting process, well thought out, thanks.
	A lot of knowledge we used came from personal background knowledge. (Climate change solutions in New Orleans, Europe, etc.)
	This was a wonderful event + I really enjoyed it!
	Well-prepared, comprehensive.

	I would prefer to speak with someone vs. trying to record this on paper (I have suggestions) [provides their email].
	I was an observer (government employee who works on climate action) so didn't share views in order to allow responses to be voice of community.
	Very informative and interactive, hoping for some way we can see where our work from the day was translated.
	The resilience plans were not necessarily going to be my views since we were roleplaying.
	Really enjoyed the approach of the forum.
	I also relied on my science background to participate.
	The wider pace was quite fast to read everything without pausing or if you weren't fully paying attention.
	It was good- brief but effective.

**APPENDIX XB: CODING CATEGORIES FOR FREE RESPONSE  
FEEDBACK ON FORUM MATERIALS**

The following table shares coding categories for all 81 responses that spoke in whole or in part to Goal 2B: “Engagement: Forum participants will engage in use of visualizations, case studies, and other data to make decisions during the forums.”

<b>Coding category</b>	<b>Criteria</b>	<b>Example responses</b>	<b>% of 2B-related responses</b>
General positive response to materials	The materials and forum event were deemed adequate or good by participants	<p>It was very helpful to have them ahead of time so I could be somewhat prepared and focused on what the program will cover.</p> <p>Everything was clear and well-prepared.</p> <p>Sufficient to help most of us understand the stakeholder's opinions and the threats (environmental, economics).</p>	27%
Not enough or incomplete information provided	<p>Participants expressed desire for more information, or saw places where the information seemed incorrect.</p> <p>This code also applied to participants who made suggestions for how to improve the materials, the pacing of the day, and other suggestions they felt would benefit the forum event.</p>	<p>The background materials or the resiliency plans should have been proofread by subject experts. Increased evaporation does not "increase the amount of air in the atmosphere." Utility transformers are not a significant solution.</p> <p>The second city was challenging to follow, i.e. fire issue...I enjoyed the new stories, but wished things would allow more adaption. Liked zooming into the future.</p>	25%
Inaccessibility or unawareness of a resource	Materials were either inaccessible to participants, or the participants did not know of the	<p>Where were the "News Story" icons? Where were maps of heat-related deaths and groundwater levels?</p> <p>Couldn't read, (News stories), too distant. Info sent would have been</p>	20%

	availability of some materials	given to me as a hard copy due to visual issues and so I could've highlighted certain points/topics.	
Confusion - did not know how to use materials	Participants expressed confusion about how to use the materials.	Heat Deaths Map uses a confusing [roster] with nuclear data – 7/16 death per square or something. Also, resilience strategy 'stars' chart was confusing – are stars showing cost or value? 5 stars = expensive or highly beneficial?  More explanation and transparency of rules of game and this meeting, please!  The deliberation #2 maps were difficult to understand.	14%
Critique of stakeholders content	Responses were critical of the stakeholder content; stakeholders or materials about the stakeholders were described as being biased toward or against certain populations, or a critique of how the stakeholder materials was presented or utilized.	The town and stakeholders were quite limited and our group felt they were not fully reflective of the [local] community.  This was a great experience. I would have appreciated the views and opinions of the stakeholders having a weightier effect on my decision-making.  As far as stakeholders go, there was zero representation for homeless populations in either of the extreme precipitation or heat examples.	12%
Information provided seemed biased	The resources and discussion were not extensive or in-depth enough, or biased in some way.	For the "unbiased" question, I think some of the resiliency options were biased toward the status quo – nothing particularly innovative in terms of micro-grids, solar and wind energy, etc.  I am not sure that the news stories are fair or accurate.	5%



		There's a white bias.	
Too much information	Response indicated that there were too many resources, too much information in general, or not enough time to engage with or absorb all the resources and materials provided	<p>Questions and info could be much, much more concise; a little convoluted – require some clarity with certain questions, information and options.</p> <p>(Google Earth was) complex, a lot to take in given time. (News story) Not much time left to consider.</p> <p>Difficult to read in time allotted. No time to discuss. Too verbose: needs to be [illegible]. Forum materials were extensive. Facilitators did not seem to understand the procedures for the first event on sea level rise and so our group was frustrated.</p>	4%

## APPENDIX XC: “RANTS AND RAVES” FREE RESPONSES

The following pages share all 237 responses for the final free-response question, “Rants and Raves: Please tell us any final thoughts about this forum. What did you like and/or not like about it? Share your concerns and great ideas.” Because the responses were so diverse, they were not split further into coding categories.

Participants’ Responses
I loved this and feel more equipped on climate and its effects and we can stop it and adjust.
I think this forum should teach us strategies about making [local power plant] produce more clean energy. I feel this forum focused more on adapting to climate change and less on stopping the people who are causing the problem.
This was an excellent event - well-planned, cordial event staff, awesome venue. Provocative questions, interactive approach and a diversity of voices/lived experiences made this exciting for me and encouraged me to begin working with the communities I'm a part of and serve to educate/prepare to respond to climate emergency hazards through resiliency planning and emergency preparedness.
I had a great time learning and I hope these resiliency plans are implemented sooner than later!
We like that the stakeholders exercise had you think outside of yourself. The small group was great. It was important to become more educated. We wanted more info on how to move forward, to be a part of the solution. Materials, resources, and connections for moving forward. This was amazing, though. I learned a lot and really appreciate this work. Thank you so much.
Not sure how the results of today will be used (or at all); would be great if ways to be involved beginning today were offered.
This was a terrific introduction to resiliency planning. I would like to hear/know about climate communications and what individuals/community can do. Thank you!
Great learning experience which inspired to develop a curriculum to teach my first graders about environment and global warming.
It was very informative, I got a lot of insights to integrate in my science curriculum as an educator.
A little long. The game with limited options- money and choosing might want to expand.
Great diversity represented in stakeholders. [Thank you!]
Did not seem to adequately reflect true stakeholder impact, e.g., corporations, industry, lobbyists, politicians. Difficult to discuss while trying to really keep stakeholder issues at hand as personal biases kept cropping up. Super awesome and necessary, but difficult to feel optimistic that progress and improvement can be realistically obtained.
I liked how this forum gives us insight on how discussions on climate resiliency are made. It is difficult, not everyone will be happy, but it was definitely something I am grateful I had the opportunity to partake in.
This was a great exercise in how resiliency planning takes shape, and how difficult it can be to make tough decisions.

<p>Showed how difficult it is to reach consensus. Diversification of approaches is best.</p>
<p>The forum was informative and engaging. It helped me understand the system dynamics of climate resiliency [effects?]. I would suggest you make even more explicit how the day's research will be used by museum. I would also expand the time allotted to applications made to our own [local area].</p>
<p>I thought it was fabulous. Not only did I learn about resilience planning, I learned about how to work effectively with a diverse range of shareholders, and consider a wide range of perspectives- I've never thought about all of the complex components of climate resiliency. I feel like I've learned so much and gained valuable perspectives that I'll be able to apply throughout my career.</p>
<p>Eye-opening how difficult and challenging it is to make a change.</p>
<p>I had a great time! I really enjoyed evaluating different plans based on different community stakeholders.</p>
<p>Where policies follow natural law instead of conflict, such policies are sustainable, reproducible and consistent.</p>
<p>Precipitation. Resilience plans A and B should not be mutually exclusive: wastewater versus runoff!</p>
<p>What I like is how I got to play roles in forming solutions to improve issues in drought and heat.</p>
<p>Great table participation once we determined what responses were sought. Especially enjoyed the presentation by [name redacted] of [research institute name redacted]</p>
<p>I loved having the chance to attend. My facilitator was kind and patient. The materials were well-done and invited lively discussions.</p>
<p>I liked the face-to-face discussion with the facilitator, it really made discussion on the issue more open and motivating. I liked the organization of the day, and I believe that this is the perfect way to educate people about SLR &amp; flooding, and develop people's (of all ages) local awareness of the community and environment.</p>
<p>Limit time on discussion items.</p>
<p>Too long! However, the speaker [name redacted] did a great job explaining current research findings and how it related to climate change and sea level rise. I thought the curriculum was beautifully organized! Thank you for this opportunity.</p>
<p>I loved it. I would have liked to see more people with opposing viewpoints – [local area] has tons of people that get along.</p>
<p>It was great fun talking to the other people at my table, even when we had some disagreements.</p>
<p>A lot of this information overlapped with a current course I am taking so it's interesting to see different views of other people.</p>
<p>Rave: good flow of time; our facilitator [name redacted] was patient, kind, and neutral. Breakfast was amazing. Rant: sandwich was soaked</p>
<p>Facilitator well-trained.</p>
<p>Look forward to again participating in future forums. Excellent, skilled facilitators are critical... ours did a great job!!</p>
<p>Facilitator was superb!</p>

Our facilitator [facilitator name] was AMAZING her knowledge is tremendous!! Also she was wonderful at ensuring all voices are heard. ["There is so much more to know and consider" written along side of entire question 7] [At Q10 part 1, wrote "Sorry – I only did first survey just before so wanted to be a blank slate"] [At q10 part 2, wrote "These were essential in comparing how to address everyone's needs and in understanding impact"].
I thoroughly enjoyed it and loved connecting with the different participants and other community leaders.
I did not know what to expect. [Name], our table monitor, was so laid back and made us all feel very comfortable- also the process was very interesting and much fun. It really makes you think about how our climate change affects all of our lives.
I didn't feel that the group was demographically representative, in part because the compensation level was low. I enjoyed the event and conversation.
I enjoyed our diverse group at table in age and experience and all actively participated.
I liked listening to other participants.
I liked the participation working together as a table to understand stakeholders and create plans.
Lack of racial representation is a concern. Otherwise- a great event!
This was a great forum! It gave me a chance to see others perspective, and learn about climate change and its impact on each individual. It was a bit hard to be unbiased.
All quite good. Great conversations. Very well facilitated. Great structure. Thanks.
Educate, Inform, Empower! One people one Earth!! I had a good time discussing and planning with fellow members of my community.
Diverse voices & perspectives were quite welcome. I do wonder whether the degree of knowledge and engagement is much higher than is representative of general [local] population. Though... but that's a "nature of the beast" issue.
Extremely educational. I enjoyed giving my input and having my opinions listened too.
I enjoyed meeting new people that had different and same opinions about scenarios presented
Facilitators should be more educated to explain deliberation.
I enjoyed the activities but did feel like some of the plans were very black and white. As a college student, I did feel like I was a little out of the conversation mainly because everyone else was so knowledgeable and sometimes my opinions did not weigh as heavy. Great forum either way, thanks!
I truly enjoyed the thoughtful collaboration that took place today. I was part of a stellar group of fantastic, educated, consciously aware women! Would do this again in a heartbeat!
Age and race. Love the diversity of the audience. I really commend you!
This was a worthwhile forum and broadened my perspective on academic involvement in the area of climate change. Having the combination of the scientific community and average citizens was interesting.
I like that we all got to participate and view each other's opinion and compromise our decisions together. You never know what's really happening in other cities until you place yourself in their shoes.

It was very informative and educational. Different groups here, which represent different views and community priorities.
I like the diversity and we were able to agree to disagree. "Keep the forums diversified."
I wasn't sure what to expect, but I really enjoyed it. My table had an interesting mix of perspectives. I appreciate that the program was not focused on proselytizing.
I liked meeting my team members and hearing their thoughts, as well as other tables' thoughts and potential solutions. I think it fosters a connected, collaborative environment that is essential to addressing climate change.
Good mix of [local] citizens with diverse experiences and opinions. Also willing to contribute (at least at [my table]!)
The only thing that was a minor bother was it did feel like some participants were trying to overstep our facilitator. That made discussion a little tough sometimes.
I was very impressed at how well organized this project/forum was handled. I was under the assumption this would be a "simple" round table discussion but the way the material was used (scenarios) made me feel my presence and ideas were valued and discussions effective.
Really liked the group aspects, would have liked to switch groups between activities to be able to hear more opinion/ideas.
Like having a very diverse table. Got many good points made that I hadn't considered.
Great material, good diversity of people.
I liked being able to collaborate and feel like my voice is heard.
I had such an awesome time! I really enjoyed creating climate resiliency plans and being able to talk through concerns presented in the scenarios. The experts were also super helpful and I loved the venue!
Good to bring community members and share some basic information on such planning through active participation. Glad to have a local planner at lunch and time for local section at end, wish that could have been longer.
Excellent event; the scenarios are a great way to get folks to interact and learn from each other. I enjoyed – and learned from – my tablemates' various perspectives. My group was diverse and had a great dynamic. Using the "stakeholders" to illustrate divergent and conflicting interests that policy makers must consider was very useful. You may want to consider including additional stakeholders, such as economic and business leaders, real-estate developers and investors, who usually have more influence and power over government policies than do most of the stakeholders currently represented in the scenarios. The last three questions were very difficult to answer, and it was hard to know what was being sought. Suggest simplifying and clarifying each question. E.g., instead of "How do people feel about..." simply say, "Based on the scenarios and discussions, identify the key tradeoffs in formulating/enforcing policies. [Written at bottom of page 1, not associated with questions there: "Next time, suggest not asking such broad questions at the end of a long day..."]
The themes for each resilience strategies could be more specific (i.e. Inform the Public à Inform the Public and Power); Group should leave out their own bias to more accurately reflective the stakeholder examples given.

The agenda was perfect. The break and flow of everything was great. Info released was helpful speakers were very informational.
Was happy to see others I know (but didn't know would be here). Thank you for good, abundant food and drink. Room was way too cold. Happy to hear from [local politician] and I want to be involved in city's plan forward. Felt like this was very well organized stayed on task with time sequences on screen. Thank you for opportunity to engage!
The event was interesting I expected a day of speeches or people reading essay out loud. Some of the presenters sent subliminal messages and spoke racial hate slurs that made me feel uncomfortable. Learning about heat and drought was great, the "training", and comments to "brothers" was something else. How do you screen participants? I've experienced monitoring, talking in my private home environment and have felt I was surveillance. At the event I believe I heard the voice of the "monitor" that I think was taking pictures. With the undertones mentioned on the other page. Not ready for this diverse world.
Our table was fortunate to have the viewpoint of someone with a disability. It provided valuable input on the use of permeable pavers and wheelchairs.
I'm not sure how to improve the review of the thoughts of the various prepared statements; nevertheless, it should be improved. This was a wonderful program- thank you very much!
These great projects work though would be good to have chips.
Great forum, very well facilitated. Some of the maps were hard to read. The demographics were strange on the two towns.
Some material poorly conceived
More on local issues. Shoreline's emergency management plans.
Workshop was not specific to [local area] for the most part. Second exercise was too much. I did not gain additional insight (it was repetitive of the first exercise).
I would like to see it more reflective of [local area] for examples of sea change & precipitation.
Great use of storytelling with the character cards.
Concerns for extreme precipitation and sea level rising could reflect [local area] more. Stakeholders could reflect [local] community.
Should have a follow-up to develop local[ly focused] scenarios. [Written on back of last survey page] Knowledge, skills attitudes. Dramatically.
Local questions are run on sentences. Simple questions = same answers.
Photos of examples were helpful. Laminated picture cards and tokens were great visuals.
We needed a table facilitator to understand the [situations], which were confusing.
You did a great job making this material accessible to a lay audience. It was a bit hard to remember/follow all the city/stakeholder info when discussing- could this be part of the background materials?
I really enjoyed the game aspect/visualized board as a central [illegible] point. I would have liked more time and emphasis on [the local area] specifically and also how we can continue to engage after today.
The examples were great! It would have been good to do more on a real problem.

<p>It was fun, just long enough, well-orchestrated and graphics-heavy. Kudos. Only research question I'd have is whether the photos of individual stake holders affected out responses to issues. (i.e., using a Latino-looking small farmer holding a hoe to represent a soybean farmer).</p>
<p>Great forum- Head to set a wide variety of volunteers. Could you print plans 1 and 2 on one page? I lost the cool map when I handed in my plans. Heat ensure safety. Busses should be buses. Great questions! Great food! Thanks for the well [supported?] day!</p>
<p>Tighten up the timing. Feel longer than it need to be for the modules. But should dedicate more time to the [locally] specific portion- that idea generation is more valuable product of this forum.</p>
<p>Maybe discuss how each of the plans would be preferred by each~ role-play throughout. 1. An agenda would have been great and outline of the whole day, rather than each step with amount of time (shorter break). 2. Re-think the time required for each step, I think several groups were consistently "ahead" or "behind" schedule. 3. Was the goal to rely heavily/solely on the information provided? Our group chose often to rely more heavily on prior knowledge. 4. I would have loved to have a count-down timer, rather than a static time that went from 25 minutes à time's up. 5. Provide clear goals/tasks- don't change \$\$ to \$ doesn't matter halfway through. 6. Perhaps do a ranking scale of most à least important for stakeholders, or limit "most important" to 3 people? 7. Let us keep a copy of the "My Resiliency plan" forms and/or maps of Rivertown for reference and give access to everything online.</p>
<p>I was hoping it was more grounded in [the local area's] response to these issues. It seemed like it would be easier to comprehend and gain buy in with actual [local] stakeholders and community issues.</p>
<p>The plan A + B "solutions" were very constrained- which is never the case in the real world. Breaks too long- would rather be out earlier.</p>
<p>Great idea! Good plan (generally), long for one day. "Heat" options were unsatisfactory. Two part days would be better brainpower wise. It's difficult to do the area specific task at the end of a long, brain power draining day</p>
<p>This was valuable, but could be made more engaging. The same methods could be used in different ways for each situation.</p>
<p>I wish the maps used in planetarium presentation had keys. The scenarios set during presentation were not diverse.</p>
<p>I would have preferred working on real data about [local] locations.</p>
<p>Small group discussions with some lecture that went beyond handouts exercise of different shareholders was slow may have been due to facilitator not being prepared she had good skills though. I had problems hearing others in my group</p>
<p>Very informative. The exercise was also engaging and the speakers were terrific. I became more aware of resilience challenges. Also, suggestion: the materials were confusing at first. "Coin" system took our table a while to realize "Plan A's" had to have 2 coins. Perhaps use big and small coins. Also, visually, the "My Resistance Plan 1 and 2" and the workbook should be vertical or horizontal, not one and the other because it was hard to flip back and forth. Be better to give us more info on the purpose and reasons for forum before we arrive. I would start with drought scenario as it was a simpler concept.</p>

I would love to see more ecological design woven into the scenarios (e.g., rainwater harvesting, controlled burns, mandatory renewable energy, reduction of resource use, local agriculture).
We learned about problem solving together. This is a great gathering. It is so good getting people together to share ideas, learn deliberate, plan. Thank you! Great program, overall. The games assume scarcity and austerity. The rules of a failed status quo system were set in advance. Good for NOAA and [host institution] for doing this work! It would be great to get more people in here. Paying people is good. Get a more multiracial gathering next time! I'm glad this material will be useful for museums!
I enjoyed my forum. Suggestion is to put full resiliency plan outline on user materials, rather than one copy to share. Not much diversity in "stakeholders," mostly middle class. All socio-economic demographics should be represented. Final group discussion- poorly put together, poorly written, questions too general.
I don't think doing two scenarios was necessary. The second one was very similar conclusion but different issue. Best part was the discussion questions at the end. Also when doing intro of what this project is used for, don't refer to people as "lay people" that language is for grants and you should never say that to someone's face.
A quick "sample" walkthrough of the "game boards" (via slides) would have helped us get up to speed quicker. Videos needed much bigger screens.
Good engagement. Maybe have just one resilience planning session, but have half of the group do drought and the other half doing sea level and having a shorter day.
I think we were given too many instructions verbally. Repeated instructions. :)
Main rant: the maps of Kingstown were very murky. Loved the thinking about trade-offs.
This would be more meaningful if we looked at these topics on a local scale- like [city and local region]. Not a clear call to action on climate resiliency planning.
I do not know why we were titrated information instead of having it all in the beginning. I missed that logic.
Possibly actually using real cities. Belter to include a real example because it will instill the severity of the issues. [On back of sheet, wrote a cover letter for a job at the organization]
I think being clearer about what this process is for and if it is only to educate us or to do something else. Also- feed this into a real resilience plan. Make this process part of a real planning program.
Great forum. Though, I was hoping to have more of a local focus, as opposed to hypothetical. For instance, status of [local area's] resilience plan.
The wonderful expertise of all involved! The time to discuss and format- lunch time presentation by local experts! <3 Clarity of the "scenario" role- allowing for flexibility and geographical utility/lunch! Thank you
I think the more expensive plans should be below/after the less expensive plans. Would be more intuitive.
It's an important topic. Are the fictional locations necessary? I'd love to see it updated to work with more graphics, flexibility, and sharing of ideas. Would love to have in libraries or more "public spaces"



In general I suggest scaling back each module and making material more consistent. It was somewhat challenging to keep track of and distinguish some plans from others and Plan A/B description on laminated cards sometimes differed from their descriptions in the exercise packets. Fewer plans or stakeholders may be better at least in the first exercise.
I liked that the flood place was Charleston. Would like to know examples of real world attempts and what worked/didn't work.
Would have like more expert presentations about local concerns and what is being done- but overall wonderful discussions and programming.
I would like that answer sheet for scenarios be separate, so that we could take scenario packets with us. Excellent!
The presentation about climate change before lunch needed a little bit more polishing. The NASA maps were good but needed a long time period.
I think this was great and should be done more with other topics like HEALTH INSURANCE.
I did not like having to speak up to talk. (I didn't). The slides needed to be clearer.
One suggestion would be to incorporate more real life situations to consider as well as the ability to see the outcomes for all 16 situations.
1. Loved how organized it was/format. 2. Food &snacks. 3. Good timing. 4. Good discussion! Thank you. * I didn't like that there was no built-in compare/contrast chart in workbook to analyze plans.
The sessions should have an extra box for tax cut or tax hike (a take hike gives you an extra token, for example) (I would not have used those, but they should exist for completeness) Thanks for a good session! :)
Maybe a more hands - on scenario and not just on paper.
I really enjoyed it and our group leader at the [our table] was excellent. When they show the results to our choices for the heat results, they should show projections in ten years also.
Scenarios are too restrictive. Need to be able to pick and choose ideas from the various options. There is little or no discussion on laws that pertain to the actual restrictions that limit some of the ideas or option that could be looked at.
I would have preferred the forum to have more specifics about local community resiliency planning.
I was disappointed during the Resilience Plans 1 and 2 when we were not allowed to choose Plan A for more than one choice.
Everything was awesome. A recap of each fake city would be helpful before deciding on resilience plans.
I very much enjoyed the structure. It gave us information peace-meal (piece-meal?) so we could understand/discuss/absorb without becoming overwhelmed. I wish I had more quiet, personal time to read the resiliency plans because there is a lot to comprehend and weigh internally before I can discuss with the other participants.
There was extensive views in the materials presented which was frustrating in reaching conclusions that were not already pushing in that direction.
Great job of creating groups and activities. With the activities it would be helpful to read bullet points before cards.

Solution options were a little too "All or nothing" in nature, each had too large of tradeoffs rather than grouping in the context of best practices.
More discussion idea submission rather than mystery city.
Did not like the way plans were played. Felt that it would have been great to pick pieces that were valuable to our communities without spending money on things we didn't need or want to spend money on.
I learned a lot and feel that others need to understand how climate is changing.
I would love to share some of the visuals that could be shared.
I hope this work today will help people in the future to remedy the problems.
Great event! Suggestion- to prompt the objectives of this forum a little better. Cross section of community. Community perspective to garner public input. Some believe this was forum of professionals.
There was a lot of concern about equality, equity, and impacts on low-income populations, but I see a lot of pushback from the public on current equity issues such as garbage collection, minimum wage, compostable containers, etc. How will you get public buy-in on these climate resiliency equity issues?
There's a bias toward white ideals. I do like all the sciency people.
Thank you for organizing
If the forum is held at a place that does not have a recycling bin, like the [host site], please use paper cups and paper plates. So much plastic went straight into the trash, which felt very strange, considering the focus of the forum.
I cannot think of anything I'd improve the forum at the moment. Perhaps have the classrooms someplace a bit more quiet.
N/a
I liked lunch but wish the exact ingredients of the foods could have been listed. Especially the cookies which I did not eat (or labeled vegan/vegetarian/contains/meat/dairy/gluten/soy/etc.
?
More local exposure/involvement w/to.
Needed more break in moving for bathrooms- people drink more caffeine (a diuretic) in the morning than in afternoons.
Loved our facilitator, [name] was cute.
Amazingly organized!
It was.
A fun event. Would participate again.
Incredible overall experience.
The entire program was excellent – however many of our group members "hit the wall" and became quite tired around 3:00PM/3:30PM. Perhaps this should be a little shorter in time.
It was great! Maybe didn't need quite so much time for the exercises/it was a little too long (too much sitting).

I liked the way it was set up and the activities we worked through. I wish we had more time to discuss [local] topics. The last session did not seem to have enough time to discuss the questions.
Great forum!
Awesome + educational.
Super helpful, and very fun effective way to spend time on a Saturday
It is a great learning experience. I really enjoyed it.
It could have been more lively
Great!
Very much enjoyed this and look forward to future events
I was brainstormed to some extent. I learned a lot about the related topics.
This was extremely engaging and informative. I learned a great deal about the variety of climate resilience plans.
I am so very thankful this forum took place in [local area]. I work with an environmental organization here and often we feel disheartened by local politics, etc. This is extremely helpful!
It was a great forum with great leaders
Great experience. I hope our thoughts make a difference to solve these issues in our country.
This was fantastic! I am so enriched through my participation and can't to share what I learned! Thank you!
I loved it! Wish it happens more often in future!
More of these, please!
I found it very "user friendly" – inviting, welcoming non-intimidating and thought provoking.
I really enjoyed the layout of this forum. I thought it was easy to follow and never felt nervous I wasn't an "expert".
Interesting. Socially-environmentally necessary discourse. Would have been nice to be a bit shorter event. The final portion was a lot of time spent for few solutions. Long day.
Good space, comfortable and good presentations, good food.
This was a great way to spend a Saturday morning.
I like the forum! And I think it is very informative.
Great job! Very cool forum – I loved the structure!
Excellent timing, organization, and facilitation.
Well-planned.
Loved it.
So good! Highly impressed.
10/10 – well done! Very empowering.
Nice to be in a place that validates climate change!
Well organized for such a complex topic. Clearly this takes a lot of thought.
Really well run event, great staff...thank you!
Thank you, facilitators!
Great mix of people! Well done!

Good groups. Good prep.
I enjoyed this forum and found it really interesting. Not enough people are informed.
I think this sort of exercise is a very important/effective way to teach people/get people thinking deeply about the complexities of these very real world and local problems!
This forum was informative.
Bravo, great event and very dedicated staff/volunteers at the forum.
It was inspiring to work with such a diverse, educated group. Thank you.
Great event! Very respectful facilitator's.
Great experience!
I enjoyed the forum but I felt that the time spent on each scenario was not enough. The constant interruptions from the head facilitator telling us time frames/limits was annoying. Good food!
Should have formal 5-10 min break in morning.
I'm impressed- I though the forum was well conducted- great experience!
Great organization/presentation. Facilitator Katie- Great job.
I would love to continue these conversations!
Fantastic job!
The pacing of the decision-making processes on drought and sea level rise was a bit too fast. It was hard to track all stakeholder positions. Felt a bit rushed.
Food was great, people were awesome! Very informative event, should definitely hold similar ones!
Loved the participatory day. Thank you all so much.
Very interesting and useful. I think timing could have been condensed (our group moved quickly towards consensus)- would have liked to work on more problems (or had shorter session).
[Facilitator name] is cool!
Well-organized and great and welcoming staff. I really enjoyed this event and learned a lot.
Great!!! I would like to attend again!
Great forum! I enjoyed it and learned a lot!
I learned a lot out of this something I need to know.
I enjoyed the forum information. I liked the game.
Very informing experience.
It was very informative. I learned a lot.
It was a great opportunity to explore in more depth a topic that interests me and impacts our community. Thanks!
Loved it.
Great learning experience!
I am so glad I was invited and able to make it.
Actually had a lot of fun and learned a great deal. Nice to be around people invested in community.
Great food/ Love our facilitator.

I enjoyed the forum, thought the information was informative and also easy to digest. I would maybe suggest having less groups per event to offer an option for shorter days.
I enjoyed learning facts and experiencing process.
So great! Maybe a break in the middle of each session would help things feel more productive. About 5 minutes!
This was a great experience. I was not sure what to expect, but learned a lot.
My first and I enjoyed it a lot.
The forum was too long and should be shortened. I learned a lot and enjoyed it.
Very interesting and stimulating.
I liked it very much and am excited to see what public policy or ideas come of it.
Thank you for having me. I learned very much.
Great food. Comfy enough chairs. Clear instructions, diverse tables and learned a lot.
Very well managed and facilitated. I would love to see [name's] dissertations after he finishes. Very interesting.
Great job! Really well organized, excellent scenario sets ups, our facilitator [name] did her job very well.