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U.S. Climate Resilience Toolkit Road Test: Bridging the Data-Practice Divide A summary report by Antioch University New England Center for Climate Resilience and Community Preparedness April 2015

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**U.S. Climate Resilience Toolkit Road Test:
Bridging the Data-Practice Divide**

**A summary report by Antioch University New England
Center for Climate Resilience and Community Preparedness**

April 2015

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Acknowledgements

The U.S. Climate Resilience Toolkit Road Test involved numerous participating organizations and individuals. Sincere appreciation goes to:

- **Twenty-nine end-user decision makers** representing cities, towns, and other agencies and organizations in Eastern coastal communities from Virginia to Maine. Implementation of this project was possible due to their voluntary participation and active engagement.
- Federal Partners who provided input and support to this project:
 - **David Herring**, Director of Communications & Education, NOAA Climate Program Office
 - **Fabien Laurier**, Director, National Climate Assessment, Office of Science & Technology Policy
 - **Samantha Brooks**, Implementation Planning Coordinator, U.S. Global Climate Research Program
 - **Rick Driggers**, Director, Data and Systems Integration Policy, National Security Council
 - **Ana Pinheiro Privette**, Project Manager, Climate Data Initiative, NASA Goddard Space Flight Center

Project Team

The Road Test of the U.S. Climate Resilience Toolkit was conceptualized, designed, implemented, and evaluated by a team from **Antioch University (AU)**:

- Abigail Abrash Walton, Co-director, Center for Climate Preparedness & Community Resilience
- Michael Simpson, Co-director, Center for Climate Preparedness & Community Resilience
- Marilyn Castriotta, Project Manager
- Nikolis Gualco, Webmaster
- Bob Kelley, Information Technology Specialist
- Michael Spitze, Information Technology Specialist
- Joanna Wozniak, Project Assistant

Introduction

Antioch University's Center for Climate Preparedness and Community Resilience (the Center) strengthens communities to prepare, respond and recover in the face of climate impacts and other disruptions through collaborative, innovative solutions. The Center's approach is solutions oriented, pragmatic, participatory, and inclusive and is based on change leadership best practices and systems thinking. We focus on stakeholder capacity building at the local scale (watershed, municipal, county, region) of preparedness and resilience nationally and internationally, with an explicit awareness of social and climate justice. Antioch established the Center in the spring of 2014, as the institution's commitment to advance the U.S. Climate Data Initiative.

The Climate Data Initiative, launched by the Obama Administration in March 2014, is intended to stimulate innovation and private-sector entrepreneurship in support of national climate-change preparedness through the federal government's extensive, freely available climate-relevant data resources. The two-fold purpose in leveraging this data is to build tools that will make America's communities more resilient to climate change as well as to forge cross-sector partnerships to make those tools as useful as possible.

The Climate Resilience Toolkit (Toolkit) was launched by the U.S. federal government in December 2014, as the next phase of the Climate Data Initiative. The Toolkit was developed by a team of federal agencies and organizations, led by NOAA, to help meet the challenges of a changing climate. The Toolkit provides resources and a framework for understanding and addressing climate issues that impact people and their communities.

Antioch University's second commitment to advance the Climate Data Initiative was to develop and conduct a scope of work for convening end-user decision makers to road test version 1.0 of the Climate Resilience Toolkit. This Road Test project was designed to provide constructive feedback to federal agencies in order to inform the usability of the Toolkit for local decision makers and planners. The project also was intended to contribute to two broader outcomes: 1. building resilience in coastal communities along the eastern seaboard; and 2. piloting a replicable model for networking and building the capacity of decision-makers in all regions of the country for the impacts of a changing climate. The focus of this Road Test was on coastal communities, in accordance with one of the two primary, initial modules of the Toolkit: coastal flood risk.

Methodology

The U.S. Climate Resilience Toolkit Road Test involved four main elements:

- Convening a range of climate data end-users in, and/or serving, coastal communities from Virginia to Maine to participate in the Road Test.
- Creating an online Facilitated Community of Practice (FCoP) through which these participants could interact with one another, and with the Toolkit’s chief architect and the Antioch Center project team, to learn about, engage with, and provide feedback on the Toolkit.
- Facilitating the 6-week FCoP through which participants pursued a climate resilience research question specifically applicable to resilience challenges in their community or scope of professional focus with coastal communities.
- Evaluating the usability of the Toolkit and the FCoP, through an exit survey and via participant comments collected, through a discussion forum, based on their experience in using the Toolkit to address their climate resilience questions.

Recruitment of participants. The Antioch Center Project Team conducted outreach for the U.S. Climate Resilience Toolkit Road Test in January 2015. The goal was to identify two-dozen participants – climate data end-users, including municipal decision-makers and planners – serving coastal communities from Virginia to Maine. The recruitment process was based on existing professional relationships developed through Antioch’s Center for Climate Preparedness and Community Resilience, as well as referrals provided through this network. Contact was made by phone call and email, with the invitation to join the Facilitated Community of Practice, supplemented with a one-page overview of the project (Appendix A) and access to a dedicated presence on the Center’s website.

Online Platform. *ProBoards*, an online platform, was chosen for the FCoP. A simple system was established by which participants could register and then engage. The site was called “Climate Resilience Toolkit – Discussion Forum” and contained three easy-to-access folders:

1) Introduction

Post an introductory paragraph about your resilience work, including climate stressors and vulnerabilities in your geographic area, as well as potential benefits of addressing climate issues.

2) Research Question

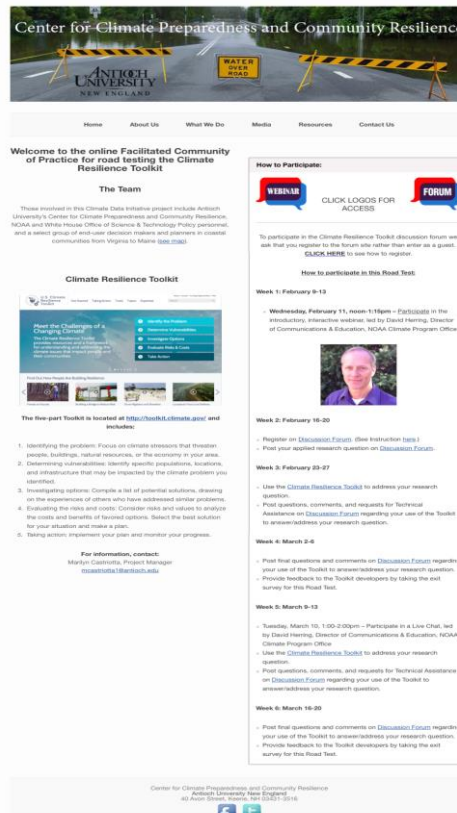
Post your climate resilience research question. This is a specific climate-related challenge in your coastal community that you will use the Toolkit to address.

3) On-going Discussion

Post questions and comments regarding your use so far of the 5-part Toolkit to answer/address your climate resilience research question. Review posts by other participants. Respond with any questions or comments that may arise.

Web presence. A dedicated web presence (with access provided to participants via a link) was constructed on the Center for Climate Preparedness and Community Resilience’s website (Figure 1). The site included information about the Toolkit, a summary of the Toolkit Road Test project, with a downloadable one-page overview, week-to-week steps, and links to the introductory webinar and discussion forum.

Figure 1. Dedicated webpage for Toolkit Road Test



Methods of Engagement. Engagement with project participants included a launch webinar, a Facilitated Community of Practice (also referred to as the Discussion Forum), a Live Chat, as well as technical assistance regarding individual participants’ questions. NOAA’s David Herring delivered an introductory, interactive webinar orienting participants to the overall architecture of the Toolkit. Participants introduced themselves to the group and had the opportunity to pose questions to the Toolkit’s chief architect. The webinar served as a launch to the six-week discussion forum. A subsequent Live Chat was also offered during the fifth week to provide

participants another opportunity to speak with the Toolkit’s chief architect and address any questions regarding their use of the Toolkit.

Exit survey. An exit survey was administered using *Survey Monkey*. The type and format of questions were informed by Quality of Relationship (QoR) instruments used by other researchers: *Climate.gov Evaluation: A Study of the Four NOAA Audiences* (Sullivan, Gold, Kirk, Linds, and Morton, 2015) and *Assessment and Evaluation of the NOAA Climate Services Portal* (Mooney and Phillips, 2012). In addition to identifying participants’ role with respect to the Toolkit Road Test, questions were designed to examine these four QoR index factors:

- participants’ ***satisfaction*** utilizing the Toolkit;
- the ***integrity*** and ***usability*** of both the Toolkit and the discussion forum; and
- the extent of ***interactive influence*** participants felt they had in engaging with and providing feedback to the Toolkit federal agency developers.

The factors of *integrity* and *interactive influence* mirrored the factors of *trust* and *control mutuality*, respectively, from the QoR index.

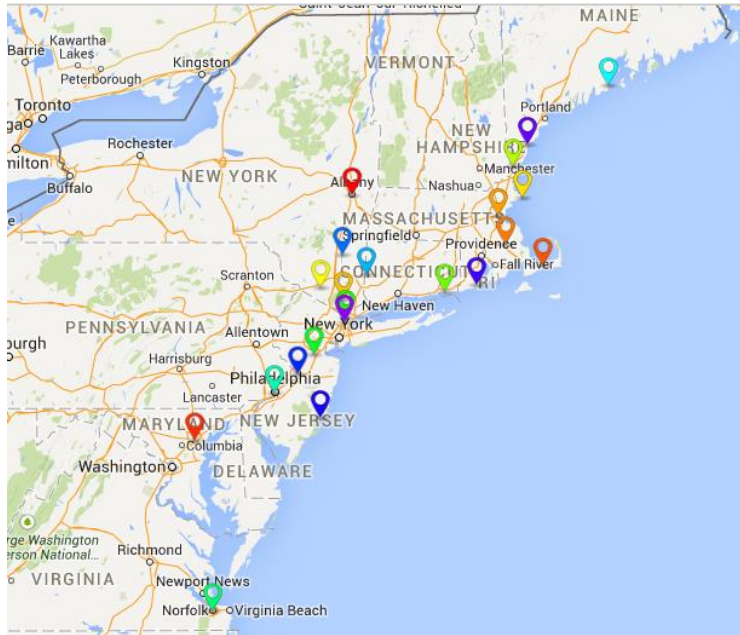
Specifically, the ten-question survey regarding the Toolkit and the use of a Facilitated Community of Practice (FCoP) solicited information about:

- Participants’ organizational role
- Frequency of Toolkit use
- Helpfulness of Toolkit in answering a specific climate resilience question
- Helpfulness of Toolkit in building resilience in the community/ies with which participants work
- Ease of navigation, usefulness, organization, reliability, and authoritativeness of Toolkit
- Likelihood of recommending Toolkit
- Likelihood of getting a timely response to questions or feedback regarding the Toolkit
- Value of: the introductory Toolkit orientation, the Toolkit as a decision-support tool, networking and shared learning with other climate resilience professionals, and connection with the Toolkit Chief Architect David Herring
- Suggestions for improving Toolkit functionality and ease-of-use
- Considerations for convening future climate resilience discussion forums

Results

Participation. Twenty-nine professionals engaged in climate resilience work and representing 25 municipal, regional, state-based, and nongovernmental entities (Figure 2 and Table 1) joined the online Facilitated Community of Practice (FCoP).

Figure 2. Coastal communities represented by Toolkit Road Test participants



Facilitated Community of Practice. The FCoP opened on February 11 and closed on March 20, 2015. FCoP communication took place via: email; the online Discussion Forum; and the dedicated webpage. Participants engaged in four “threads” within the Discussion Forum, resulting in 58 discreet posts (Figure 3) and 573 views.

Figure 3. Online Discussion Forum for Toolkit Road Test


General				
	Board	Threads	Posts	Last Post
	Discussion Forum Climate Toolkit discussion forum Moderator: Admin	4	58	On-going Discussion: Post questions and comments by Imauermuller Mar 23, 2015 at 12:14pm

Table 1. Discussion Forum Participants

Title	Organizational Affiliation	City/Town	State	EPA region
Associate Extension Educator	Connecticut Sea Grant	Groton	CT	1
Project Specialist	Connecticut Sea Grant	Groton	CT	1
Planner II	Cape Cod Commission	Barnstable	MA	1
Finance Committee Member	Town of Brewster	Brewster	MA	1
Environmental Planner, Cambridge Community Development Department	City of Cambridge	Cambridge	MA	1
Planning Director	City of Gloucester	Gloucester	MA	1
Senior Planner	City of Gloucester	Gloucester	MA	1
Marine Programs Associate	Island Institute	Rockland	ME	1
Safety Officer/Natural Resource Specialist	Wells National Estuarine Research Reserve	Wells	ME	1
Coastal Training Program Coordinator	Great Bay National Estuarine Research Reserve	Greenland	NH	1
Coastal Geologist	Rhode Island Coastal Resources Management Council	Wakefield	RI	1
Senior Research Specialist	Rutgers University	New Brunswick	NJ	2
Planner	New Jersey Department of Environmental Protection	Trenton	NJ	2
Recovery Planning Manager	New Jersey Future (NJ Barrier Island Communities)	Trenton	NJ	2
Watershed Coordinator	Jacques Cousteau National Estuarine Research Reserve	Tuckerton	NJ	2
Climate Policy Analyst	NYS DEC Office of Climate Change	Albany	NY	2
Project Coordinator, Climate Change and Health	New York State Department of Health	Albany	NY	2
Sustainability Planner, Department of Development and Planning	City of Albany	Albany	NY	2
Sustainability Consultant	Town of Cortlandt	Cortlandt	NY	2
Planner	Orange County Department of Planning	Goshen	NY	2
Member; Chair	Hastings Conservation Commission; Energy Committee, Sustainable Westchester	Hastings on Hudson	NY	2
Coastal Training Program Coordinator	NYS DEC Hudson River National Estuarine Research Reserve	Staatsburg	NY	2
Director of Sustainability	City of Yonkers	Yonkers	NY	2
Climate and Resilience Planner, Office of Sustainability	City of Baltimore	Baltimore	MD	3
Deputy Director, Mayor's Office of Sustainability	City of Philadelphia	Philadelphia	PA	3
Manager, Office of Energy and Climate Change Initiatives	Delaware Valley Region Planning Commission	Philadelphia	PA	3
Manager, Office of Environmental Planning	Delaware Valley Region Planning Commission	Philadelphia	PA	3
Chief Resilience Officer	City of Norfolk	Norfolk	VA	3
Resilience Officer	City of Norfolk	Norfolk	VA	3

Research Questions. Twenty of the participants who registered for the Discussion Forum posted climate resilience questions (Table 2). The theoretical and applied questions pertained to coastal communities at risk. The main themes or topics included:

- **Citizen action and vulnerabilities**
 - Incentivizing zoning and land use regulations
 - Heat waves and heat islands
- **Communication**
 - Compelling
 - Effective in addressing panic
 - Science-based
- **Cooperation**
 - Municipalities working together
 - Political support
- **Ecosystem impact**
- **Infrastructure design and concerns**
 - Roads, elevation – ferry terminals, rotaries, building codes
 - Power outage, flood zone planning
- **Livelihood and retreat**
 - Funding sources, tax base, property rights, equity, tradition
 - Abandonment decisions
- **Political and budgetary**
 - Political will
 - Budgetary allocation
 - Capital projects
 - Mainstream vs. periodic
 - Metrics
 - Revenue shift – from taxpayer to those reaping benefits on the coast

Table 2. Climate resilience research questions posted on Discussion Forum

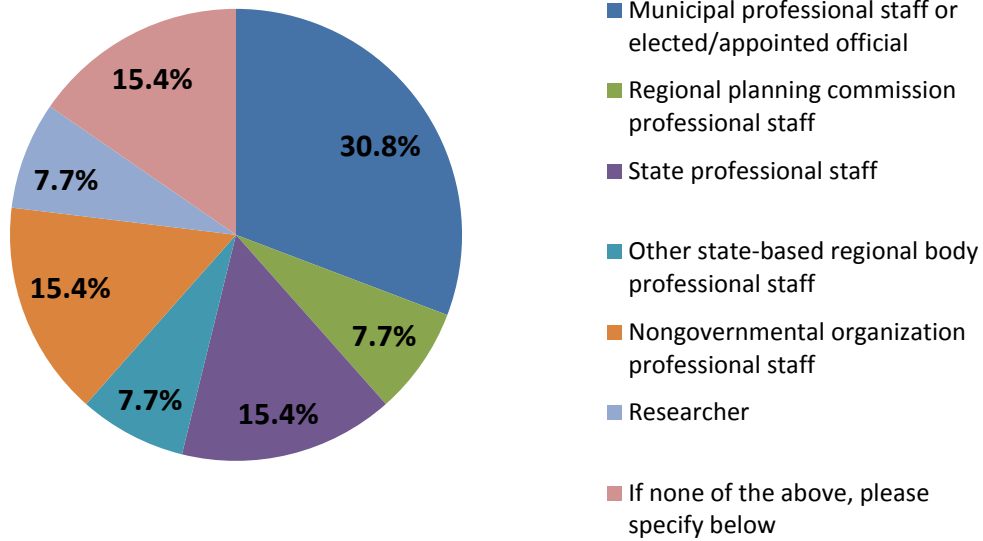
I would like to know what specific designs and technologies are available to start building resilient infrastructure at the local level in coastal communities. How do you build a resilient road? How far do you elevate a ferry terminal? What is the best and most efficient way to reduce coastal erosion? How do you elevate a rotary?
How to assemble a compelling narrative that will foster inter-town cooperation related to climate change and its impact on the Cape? Evidence: unified discussion about climate change and increased budgetary allocation to evaluation it.
How to get mitigation, adaptation, and resilience planning mainstream (without having to rely on periodic funding opportunities) ? Evidence: multiple initiatives at both the local and state levels.
How can I assist government officials in understanding that retreating from or abandoning NH's heavily developed 18-mile coast may be necessary in some cases? What resources are available to plan for revenue shifts ? What tools are available to help them plan and prepare for a stable tax revenue base while preparing for climate change and sea level rise?
All of Connecticut's coastal communities need resilience planning and many of them have taken on this task with volunteer committees focused on one topic such as sea level rise and flooding issues. How can we best assist them to work with neighboring towns and direct them to funding resources ?
How to effectively communicate the science that CT Sea Grant is doing to community stakeholders who might not understand the importance or benefit to them?
How can fishermen and other island and coastal community members adapt their livelihoods in response to a changing climate ? What are the current climate models predicting (i.e. warming surface water temperatures, species shifts)? What are the resources out there related to this issue?
How can rural communities work climate change adaptation into their long-range planning with budget struggles or lack of political support ?
A time element is needed in any resilience strategy. How do we develop a metric ? And how do we shift the bulk of the costs for coastal damages and/or resilience away from the general taxpayer to the people who are reaping the benefits of living on the coast?
We are knee-deep in producing a Disaster Response Plan for the three watersheds that directly affect the Wells Reserve. What information can the tool provide to help us identify the most prominent threats to those areas and how can we help ensure that the water quality and natural habitats remain or return to their natural states after an event?
How can river communities protect themselves from increased and more severe flooding? Are current building codes sufficiently prepared for projected future flood risk?
How can a coastal (or inland but flood-prone) community improve its resiliency in the event of a power outage ?
How can the toolkit be customized or complemented with local, state, or regional resources, and promoted to local governments to facilitate local vulnerability assessments and adaptation planning by communities without the need for intensive state agency intervention ?
The Town of Cortlandt is working on a 2016 Master Plan. New construction near the river (mixed use, restaurants, etc.) is being considered. How can the Toolkit assist with flood zone planning ?
How can we work to incorporate heat threats and other non-flooding threats into climate resilience planning? What is the best approach to assessing vulnerabilities such as heat waves and urban heat island?
How can adaptation strategies be evaluated in terms of the time that they will be effective? Cost/benefit analysis needs to factor in changing conditions over time as sea levels rise. What would an effective metric look like?
What kinds of resources can we give decision makers so they better know how to communicate climate and flooding risks to their residents freaking them out?
Is there a checklist or screening tool that can be used to evaluate capital projects as part of the approval process at the local level?
The City of Norfolk would like to strengthen its understanding of resilient coastal development given rising sea levels and increased coastal flooding. Norfolk is currently undertaking a 3-year project to update its zoning ordinance, an activity that occurs every 20 years. One of the themes of the zoning ordinance rewrite is that it focuses extensively on resilience. Given this background, our climate resilience question is: How does a resilient zoning code in coastal communities facing increased coastal flooding and rising sea levels look like? What are strategies and tools to incorporate into the revised zoning ordinance and comprehensive plan to encourage resilient development through land use regulation in the future? My second question is three-fold: Are there ways to incentivize good land use practices (open space for water management, etc.)? What are the motivators that drive public-private action to produce a more progressive product? Are there ways to monetize public good uses? Are there examples of land-swap, tax incentives, insurance products, etc. that provide owners value for using land resiliently in face of increasing flooding and sea levels?
Where will funding come from? How does society balance individual property rights and takings with the benefits for society as a whole? How do communities decide to abandon land, buildings, and infrastructure that are no longer tenable under new climate conditions? How can multiple small coastal municipalities best work together?

Evaluation. To evaluate the usability of the Climate Resilience Toolkit, as well as the functionality of the FCoP Discussion Forum, an exit survey was created consisting of ten questions. Eight close-ended questions were required, and two open-ended questions were optional.

The survey was emailed to each participant following the completion of the six-week discussion forum. Those who registered for the discussion forum and who actively engaged in the process of testing a climate resilience question received the link to the survey. The survey remained open for a week (March 24-31), with a reminder email sent on March 30.

Thirteen participants completed the exit survey. Results of the 10-question survey are shown through a series of graphs and tables below.

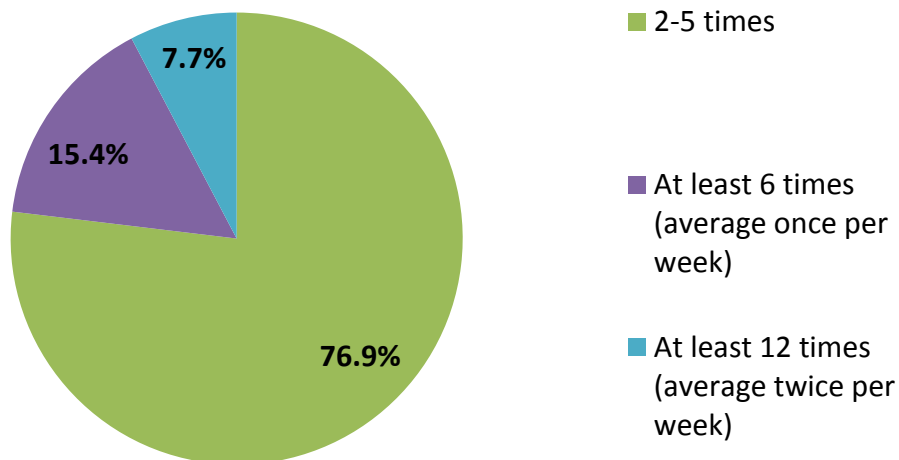
Q1: With respect to your engagement in road testing the Climate Resilience Toolkit, which best describes your role?



Answer Options	Response Percent	Response Count
Municipal professional staff or elected/appointed official	30.8%	4
County government professional staff	0.0%	0
Regional planning commission professional staff	7.7%	1
State professional staff	15.4%	2
Other state-based regional body professional staff	7.7%	1
Nongovernmental organization professional staff	15.4%	2
Researcher	7.7%	1
If none of the above, please specify below	15.4%	2
<i>answered question</i>		13
<i>skipped question</i>		0

Other responses: University Extension, National Estuarine Research Reserve.

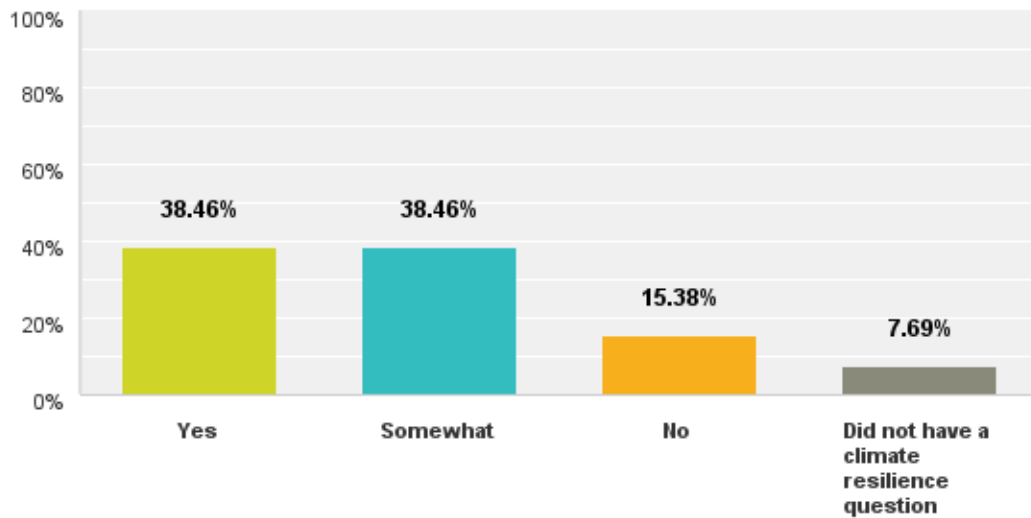
**Q2: How often during the 6-week period
(February 9–March 20) did you visit
toolkit.climate.gov
(the Climate Resilience Toolkit)?**



How often during the 6-week period (February 9–March 20) did you visit toolkit.climate.gov (the Climate Resilience Toolkit)?		
Answer Options	Response Percent	Response Count
Not at all	0.0%	0
Once	0.0%	0
2-5 times	76.9%	10
At least 6 times (average once per week)	15.4%	2
At least 12 times (average twice per week)	7.7%	1
<i>answered question</i>		13
<i>skipped question</i>		0

Q3 Did you find toolkit.climate.gov (the Climate Resilience Toolkit) helpful in answering your climate resilience question(s)?

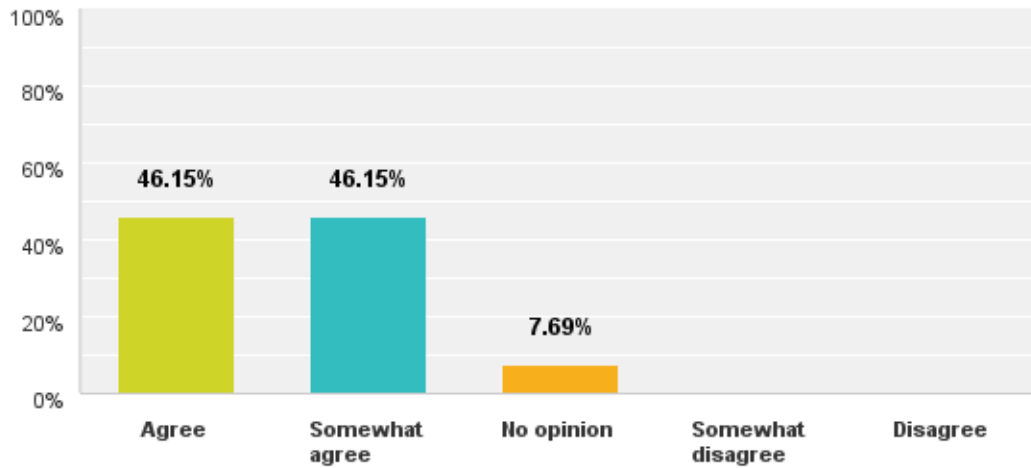
Answered: 13 Skipped: 0



Answer Options	Response Percent	Response Count
Yes	38.5%	5
Somewhat	38.5%	5
No	15.4%	2
Did not have a climate resilience question	7.7%	1
<i>answered question</i>		13
<i>skipped question</i>		0

Q4 The Climate Resilience Toolkit can help me build resilience in the community/ies with which I work.

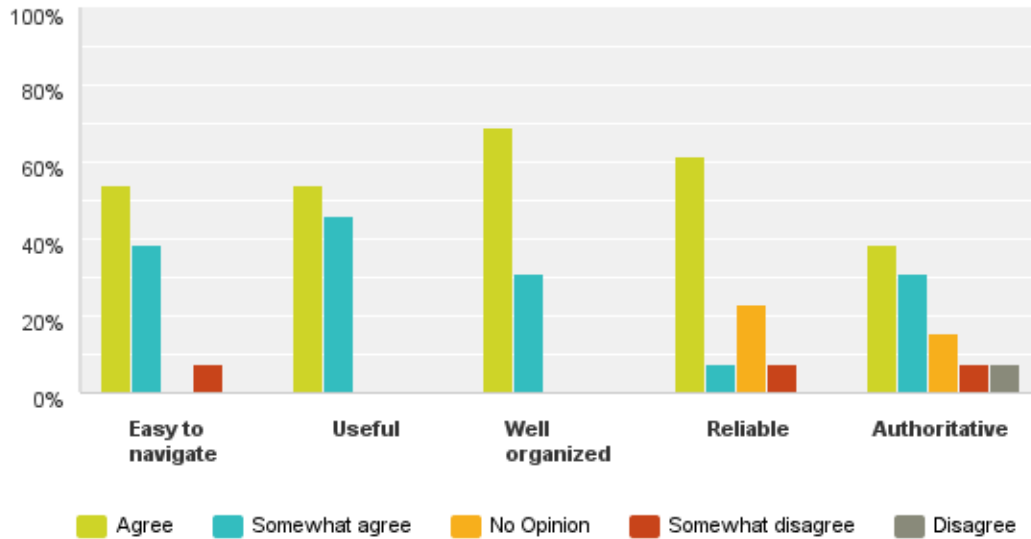
Answered: 13 Skipped: 0



Agree	46.2%	6
Somewhat agree	46.2%	6
No opinion	7.7%	1
Somewhat disagree	0.0%	0
Disagree	0.0%	0
<i>answered question</i>		13
<i>skipped question</i>		0

Q5 Did you find that toolkit.climate.gov (the Climate Resilience Toolkit) is:

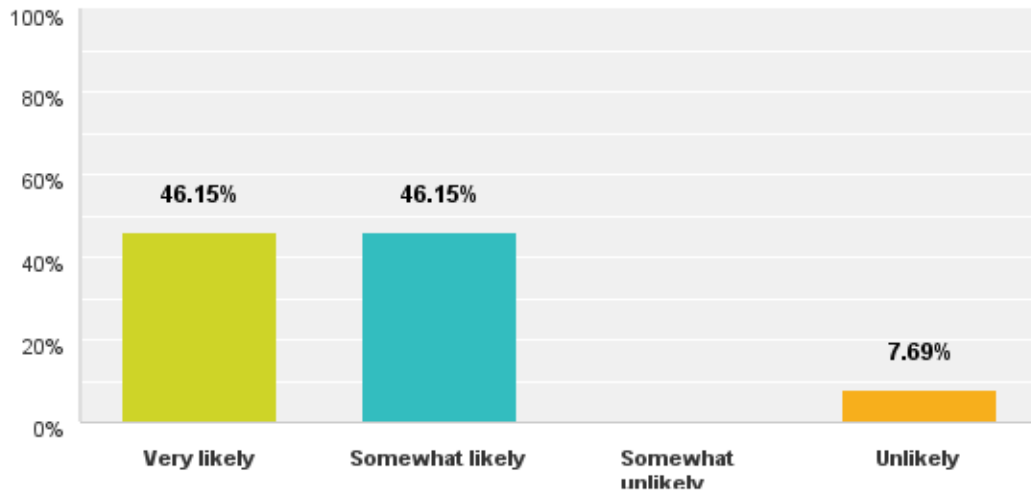
Answered: 13 Skipped: 0



Did you find that toolkit.climate.gov (the Climate Resilience Toolkit) is:						
Answer Options	Agree	Somewhat agree	No Opinion	Somewhat disagree	Disagree	Response Count
Easy to navigate	7	5	0	1	0	13
Useful	7	6	0	0	0	13
Well organized	9	4	0	0	0	13
Reliable	8	1	3	1	0	13
Authoritative	5	4	2	1	1	13
<i>answered question</i>						13
<i>skipped question</i>						0

Q6 How likely are you to recommend toolkit.climate.gov (the Climate Resilience Toolkit) to others?

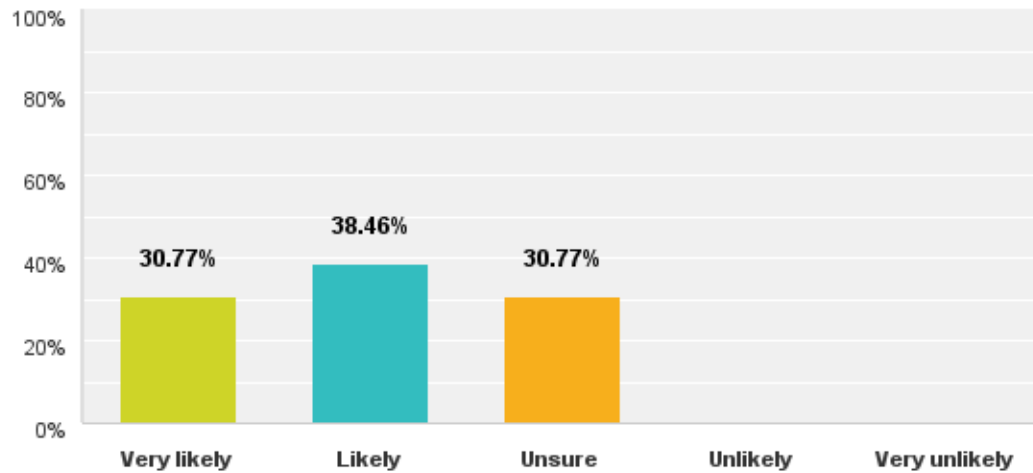
Answered: 13 Skipped: 0



How likely are you to recommend toolkit.climate.gov (the Climate Resilience Toolkit) to others?		
Answer Options	Response Percent	Response Count
Very likely	46.2%	6
Somewhat likely	46.2%	6
Somewhat unlikely	0.0%	0
Unlikely	7.7%	1
<i>answered question</i>		13
<i>skipped question</i>		0

Q7 If you wanted to ask a question or offer feedback about something you read via toolkit.climate.gov (the Climate Resilience Toolkit), how likely do you think it is that someone would read and answer your question within a week?

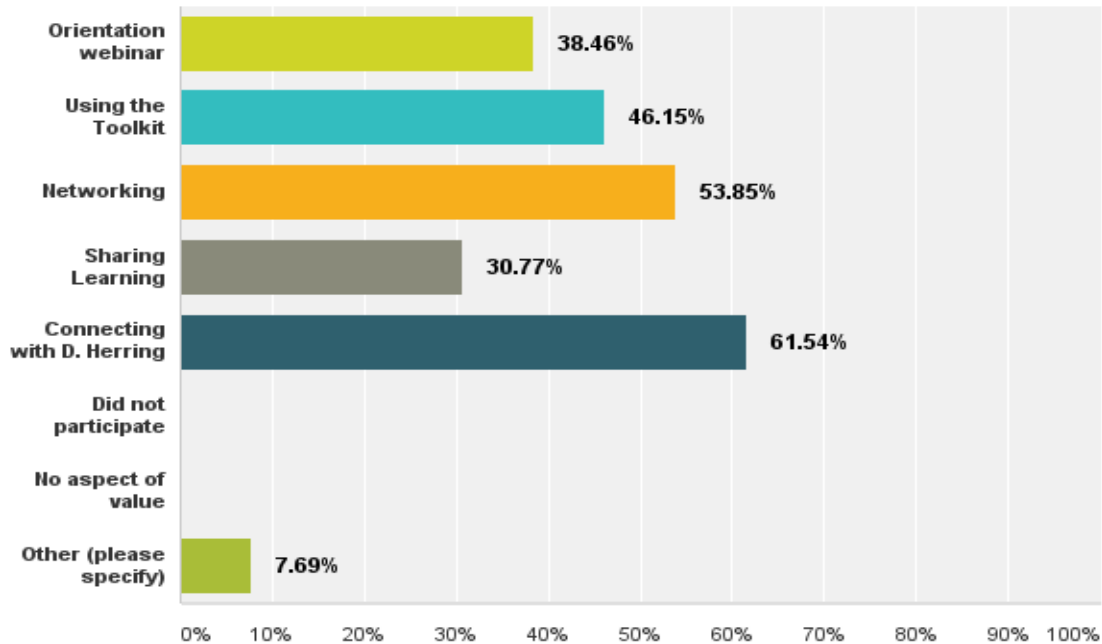
Answered: 13 Skipped: 0



Answer Options	Response Percent	Response Count
Very likely	30.8%	4
Likely	38.5%	5
Unsure	30.8%	4
Unlikely	0.0%	0
Very unlikely	0.0%	0
<i>answered question</i>		13
<i>skipped question</i>		0

Q8 What did you appreciate or find of value from the Road Test orientation and discussion forum (February 9–March 20)? Please select all that apply.

Answered: 13 Skipped: 0



What did you appreciate or find of value from the Road Test orientation and discussion forum (February 9–March 20)? Please select all that apply.		
Answer Options	Response Percent	Response Count
Orientation to the Toolkit	38.5%	5
Using the Toolkit as a decision-support tool	46.2%	6
Networking with other decision-makers, planners, and researchers who work with coastal communities	53.8%	7
Sharing learning with other decision-makers, planners, and researchers who work with coastal communities	30.8%	4
Connecting with David Herring, the Toolkit's chief architect	61.5%	8
Did not participate in the discussion forum	0.0%	0
Did not find any aspect to be of value	0.0%	0
Other (please specify)	7.7%	1
<i>answered question</i>		13
<i>skipped question</i>		0

Other: “I had a family emergency right in the middle of the Road Test, and was out for several days. As a result, I was not able to participate at the level I had hoped.”

Q9: What suggestions do you have, if any, for improving the Climate Resilience Toolkit, and increasing its functionality and ease-of-use? If you already posted on this within the Discussion Forum, then thank you!

Number	Response Text
1	Case studies are helpful but limited in informing decision-making. Need more authoritative/structured guidance.
2	More work is needed to evaluate costs and benefits of various adaptation strategies so municipalities/practitioners can assess alternative approaches
3	I thought the tool was a good clearing house for many climate change tools and applications. It is a very nice tool for looking at climate vulnerability. However, I felt that it was weak on where to go after determining community vulnerability. I realize that there are not many examples of the "big picture" approach out there, but it might be nice to have more of the stumbling blocks to taking a wider look at community-wide resilience.
4	It might be helpful to make the five steps more interactive component and directive. Have each one take you to a screen with less material that gives you options to go to different screens with more material, based on what you need.
5	I believe the toolkit would be helpful to a city just beginning the process of thinking about resilience. Identifying vulnerabilities, thinking about community engagement/input, etc. It might be helpful rather than to organize case studies to organize issues, such as solutions/issues with riverine flooding, earthquake preparedness, etc.
6	We need to look at climate impacts beyond coastal flooding impacts, particular the issues of heat and drought as they relate to human health.
7	Already posted online.
8	There is a lot of text per page, it might even be helpful to choose a bolder more contrasting color headings font. Links to tools, might be nice to know if you are linking to an online tool or something that needs to be download (app/extension) and or if there is an opinion if there are advanced tools.

Q10: Is there anything else that you would like for us to know as we consider convening future Climate Resilience Discussion Forums?

Number	Response Text
1	No need to only focus on coastal communities. Clearer knowledge of expectations/deliverables from beginning.
2	I would like to see you looking at the really hard questions such as; responsibility/costs of maintaining infrastructure to protect coastal property, legal challenges to retreat, how to select which places to invest in coastal protection vs. letting nature take its course; how to shift more of the costs from federal tax payers to the local community, etc.
3	Yes, pull in tools that are aimed at planners and government officials that will help them decide what zoning changes or next steps they need to pursue.
4	No
5	I would have liked to network with the other collaborators more "live" than virtually. I think we would have all gotten more out of it.
6	Excellent out reach, may have benefited from a larger pool. Also if you assigned the questions to subsets to test the site you might receive more grounded and useful feedback.

Discussion

The two main sources of data for analyzing the usability of the Toolkit and the Facilitated Community of Practice were: 1) results of the exit survey and 2) posts made to the “On-going Discussion” section of the discussion forum. The exit survey provided QoR data and some Toolkit feedback. The discussion forum posts provided rich and detailed feedback on the Toolkit.

Survey. During the six-week period of road testing the Climate Resilience Toolkit (Toolkit), most visited toolkit.climate.gov two-four times (Q2). While not all who visited this site had a climate resilience question, the majority found it helpful in addressing their question(s) (Q3) and building resilience in their community/ies (Q4). Whereas the majority of respondents agreed that the Toolkit is easy to navigate, useful, well organized, and reliable, there was a more varied response regarding the Toolkit’s authoritativeness (Q5). Most participants were very likely or somewhat likely to recommend toolkit.climate.gov to others (Q6). The likelihood of Toolkit questions being read and answered within a reasonable amount of time (one week) was high, yet a third were unsure (Q7). The attribute of the Road Test that two thirds of participants appreciated and found most valuable was connecting with David Herring, the Toolkit’s chief architect. The other aspects of the Road Test that participants found valuable were networking with other decision-makers, planners, and researchers who work with coastal communities; using

the Toolkit as a decision-support tool, the orientation to the Toolkit, and sharing learning with other decision-makers, planners, and researchers who work with coastal communities (Q8).

To improve the Toolkit and increase its functionality and ease-of-use, suggestions (Q9) were offered to *include more*:

- **Authoritative and structured guidance** (beyond the case studies) to inform decision-making.
- **Evaluation of the costs and benefits** of adaptation strategies to assist municipalities/practitioners in assessing alternative approaches.
- **Interactive and directive five-step Toolkit** to simplify the process while specifying options.
- **Identification of vulnerabilities organized around issues** (rather than case studies) to help those just beginning to think about resilience.
- **Focus on climate impacts pertaining to human health** to help those dealing with issues of heat and drought.
- **Pleasing graphic design**, such as bolder and contrasting color, headings, and font, to make the site and all its text easier to read.
- **Explicit information about links** – do they lead to an online tool or to a document or app that requires downloading? – to make the linking process more user friendly.

With consideration to convening climate resilience discussion forums in the future, suggestions (Q10) were offered to:

- Broaden the scope (rather than focus solely on coastal communities).
- Provide clear expectations and deliverables at the onset.
- Look at tough fiscal, legal, and ethical questions, such as those pertaining to infrastructure, protection vs. abandonment of property and natural resources, tax burden (federal vs. local).
- Offer ways to address zoning challenges.
- Include more “live” (vs. virtual) networking.
- Increase the pool of participants.
- Assign questions to groups in order to test and get more grounded and useful feedback.

Discussion Forum. The “On-going Discussion” thread of the Discussion Forum drew both general comments and specific, detailed feedback on all five steps of the Climate Resilience Toolkit as well as its five tabs. All feedback from the Discussion Forum is presented below:

General comments:

- The logical, five-step sequence that the Toolkit prescribes and the resource links available are incredibly extensive and valuable.
- The introductory text for each step is well done.

- Clean page layout.
- Appreciate key word and definition.
- Useful and timely resource.
- Nice links to tools and information.
- Very valuable and user-friendly tool, particularly in terms of navigation and language.
- Logically divided into steps that parallel the CDC BRACE framework, which makes it easy to navigate from the point at which a community would be ready to engage.
- Language is practical, realistic, and at a level appropriate for someone who doesn't necessarily work with climate change on a day-to-day basis.
- Really nice clearing house for tools to examine climate change risk and vulnerability.
- Nice portal that can be used by individuals, groups, and communities.
- Found several resources that were directly applicable to issues we're wrestling with, such as "Know Your Line—High Water Mark Initiative."
- You can gather a considerable amount of information by just hunting through the myriad resources the Toolkit's pages offer.

Specific feedback and requests:

- Encourage states to develop a guide to help their communities navigate the toolkit more efficiently.
- Place the glossary on its own page, instead of having an identical glossary on each page of the five steps.
- Include a few sentences to describe each of the resources listed in the call-out boxes to help the user decide what he should actually investigate.
- Improve alignment between the tools listed on the right of the screen and the respective step under which they are listed. (For example, Coastal Resilience and Sea Level Rise, listed under Step 3, seems more useful for Step 2. Also, the entire discussion of farm carbon management in Step 4 tools seems more focused on mitigation and has little to do with evaluating risks and costs. Or are the links on the right not intended to correspond to the steps? If so, it's confusing, and the Toolkit's real estate might be more effectively used by listing resources related to the step.)
- Include more specific references to examples, tools, etc. in the text under each step.
- Direct users more clearly to the Climate Explorer and the relevant instructions and tutorials included there (<http://toolkit.climate.gov/tools/climate-explorer>).
- Create a Toolkit section for communication strategies and best practices.
- Include useful search results for coastal communities looking to improve their resiliency for power outages.
- Provide a bit more detail on the secondary impacts of coastal events vs. just the primary impacts associated with flooding.
- Add information on CO poisoning, which occurs commonly in the aftermath of flooding events.
- Include a recommendation that water supply operators be given badges and access to roads to get to their facility following a storm. For example, during the Superstorm Sandy response, the water supply operators weren't recognized as first responders as were fire, EMS, and others, so the restoration of a safe public water supply was delayed.

Step 1 – Identify the Problem:

- Coastal Resilience Index
 - Make this link a direct link to the Coastal Resilience Index rather than to a PDF.
 - Place this tool under Step 2, vulnerability assessment, because this is exactly what the tool helps you assess.
 - Add to this index: nursing homes, long-term care facilities, dialysis centers, and evacuation shelters for both the general population and those with special needs.
 - Consider private wells/water supply and micro-grids for an alternate power grid for key facilities.
 - Clarify if the one-week established as the standard measure for areas being operational is a standard time period used in the preparedness field.
 - Include information and tools specific to regions, states, etc. Why expend resources completing the Coastal Resilience Index when a robust tool already exists in your state? For example, the Coastal Resilience Index overlaps the content of New York's Climate Smart Resiliency Planning self-assessment tool, which is more comprehensive and NYS specific.

Step 2 – Determine Vulnerabilities

- Built out with more information on regional or state-specific climate hazards.
- Add needed tools; at least some of the tools that assess vulnerability are currently housed under Step 1 and this isn't a logical placement when Step 2 is supposed to be about assessing vulnerability.
- Include more information for communities assessing their vulnerability and risk to ensure they are prepared for flooding:
 - Does the community have a strategic fuel reserve, and is there a protocol for who can access that fuel reserve?
 - Do the community's hospitals have MOUs with other hospitals/long-term care facilities?
 - Is there a comprehensive healthcare evacuation plan? If so, how are evacuations coordinated? Is there staff with neighboring states through MOUs for EMS support, etc.? It is critical to not limit MOU agreements to just neighboring communities, but also to have agreements in place with those outside of the region.
 - Who can deliver equipment? For example, in the case of Hurricane Sandy, New Jersey was closer to bring supplies to New York. Who is outside of region, and what if outside region includes another state?
 - Consider that waivers have to be issued to have licensed practitioners practice in another state (for example, to administer vaccinations, and for nurses to do dialysis care).
 - Where are hospitals' data servers or generators located? Does everyone have generators? If generators are in the basement, for example, they are more vulnerable to flooding. MOUs should be in place so that if data servers go offline, there is someplace outside of the region that houses data. This is especially important for patient records.
 - Protection of water supply – for example, building protective floodwalls, private wells (education/inspection).

- Protection of residential oil/inspection to avoid oil spillage (suggest adding potential interventions as recommendations for prevention of spills).
- Stress importance of accurate GIS mapping of all mains/shutoff valves for the water system.

Step 3 – Investigate Options:

- This section is most lacking in that we would expect to see here some specific intervention suggestions. These should come from the literature, and when possible, have been evaluated/established as best practices.
 - It would be helpful, especially if there isn't a specific list of interventions, to advise on how to identify and select interventions. Describe how to find potential interventions as identified in the literature, and evaluate which of these is most appropriate given the particular jurisdiction's vulnerabilities and resources available.
 - There should be a suggestion for how to develop a list of potential partners for determining vulnerable populations and appropriate interventions. This section needs to be a lot more guided versus telling people to brainstorm. We need some examples!
 - The "if money were no object" question is not realistic or helpful.
 - We suggest inclusion of focused lists of potential interventions for particular resilience challenges. And for particular entities and level of resource availability (for example, low hanging fruit interventions vs. more resource intensive solutions) so that a broad range of options can be considered.
 - Funding source guidance is vague, without listing of specific resources to consider (or links to these).

Step 4 – Evaluate Risks & Costs:

- Make it more robust.
- Add tools aiding in the evaluation of risk vs. benefit (for example, a quadrant to aid in prioritization of interventions to problems with quadrants representing range from low to high risk and from low to high likelihood of occurrence). Perhaps one of the coastal flood risk tools included in the "Tools" main menu section addresses this?
- Include guidance for developing an assessment plan within the mitigation plan.

Step 5 – Take Action:

- Make it more robust.
- Address how communities coordinate outreach to the public for supplies, disaster recovery centers, and sheltering. Regarding concern for special needs shelters, clarify what types of populations they can care for and what resources they need in order to provide this care.
- Add general education on emergency declarations laws/waivers that might need to be made (perhaps a link to this information).

Tabs:

- Taking Action
 - These case studies are wonderfully done and provide diverse examples from across the US. They are great for inspiring interventions as they highlight creative innovation to reducing vulnerability to climate related impacts.
 - Add “health” as a topic to filter by and/or adding case studies that pertain to health impacts.
 - Specific Case Studies
 - Shopping Mall Exhibit Raises Awareness of Sea Level Rise
 - Insightful as it shows how going to where people are is a first step toward building.
 - Waterfront Restaurant Rebuilds to Remain Open Through Future Storms
 - Good, but does not address the whole picture of what to do when the land is underwater at high tide every day. The owner did say that he was planning for 20-25 years and that he would need a boat to get down the street, but really is not considering the impacts of the nuisance flooding to his business.

- Tools
 - ClimateData.us (<http://www.climatedata.us/>)
 - Is the federal government endorsing Habitat Seven, Climate International, and others listed as partners? Some communities may be hesitant to contact partners listed since it’s not made clear whether they expect pay for services.
 - Provides a map-based visualization of projected local temperature and precipitation change across the contiguous United States. Could downscaled data based on RCP 4.5 be added as a potentially more likely "low" scenario?
 - Climate.Data.Gov (<http://www.data.gov/climate/>)
 - There are so many datasets here, that user groups, especially municipal staff and volunteers will need guidance on what to use and how.
 - What does location filter do? Does it actually return all datasets relevant to any specified location?

- Topics
 - Coastal Flood Risk
 - Thrilled to see that the Sea Level Rise link has a layer for riverine flooding.
 - Risk tolerance
 - Push risk tolerance beyond sea level rise projection to look at the tolerance for nuisance flooding, more frequent storm surge damages on both an individual and broader level. At what point does the tolerance for the impacts of climate change exceed the benefits of living in risky areas?
 - Health Sector
 - Improve the health sector part of Toolkit by providing specific examples for each of the five steps that make up the recommended “process.”

Recommendations

Toolkit developers may enhance the usability of the Toolkit through review and considered implementation of the specific Road Test participant feedback, as presented in this summary report. In addition, we highlight here four particular recommendations that surfaced pertaining to ***improving usability and enhanced content***:

1. ***Implement some graphic and navigational revisions so that users are more easily guided to information that is both topic- and location-specific.*** These changes may benefit, in particular, “newcomers” (new visitors to the Toolkit, who have little prior knowledge or expertise). Newcomers, as a sector, likely will grow as the impacts of a changing climate continue and increase. The abundance of online information may prove challenging for these individuals.
2. ***Consider ways in which the Toolkit can be customized or complemented with local, state, or regional resources,*** and promoted to local governments to facilitate local vulnerability assessments and adaptation planning by communities.
3. ***Provide more detailed information on the public health sector,*** which also includes the psychological impacts of climate change and the need for intra- and inter-personal resilience. (N.B., The Toolkit launched a new module on human health in April; this was after the Road Test ended, so participants did not experience the new module.)
4. ***Provide qualitative and quantitative methods to conduct cost benefit analysis of adaptation strategies.*** This will support local governments and other decision-makers in determining how to allocate resources in ways that are most likely to yield robust outcomes over decades-long time horizons.

Finally, conducting a next-step ***Road Test of version 2.0 of the Toolkit*** with those actively engaged in road testing version 1.0 may enable Toolkit developers to gauge improvements in its usability. Providing a more interactive, small group-oriented, discussion forum may be beneficial to the process of engaging climate data end-users and soliciting their feedback.