2017

Municipal Climate Adaptation Series: Drinking Water

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Introduction

Climate Change is affecting communities both on the coast as well as inland. Regardless of whether it is Sea Level Rise, Storm Surge or more powerful storm events, these changes are affecting our municipal infrastructure. While local and regional predictions of future climate can be imprecise, problematic, and often contradictory, making it difficult to plan for specific predicted changes in the climate, general trends all indicate thperiod of greater variability in our climate: more intense summer storms and extreme winter weather, flashier discharge of surface water with higher frequency of floods and droughts, and generally higher temperatures in all four seasons.

If global temperatures continue to rise, increases in the number and severity of storms, floods, droughts, and other weather extremes, will have serious impacts on the environment and on society. Societies that are unable to deal with these extreme events will experience more disasters. Climate simulations to predict seasonal temperature and precipitation show a strong trend in Maine toward warmer and wetter conditions. Reports project increases in both temperature and precipitation, which tend to be greatest in the north and least along the coast. The warming trend implies a significant shift in northern part of the state, from a snowmelt-dominated regime to one that shows significant runoff during winter. This shift will likely pose challenges in managing water supplies, flood mitigation, and understanding of the ecosystem.

Coastal communities are experiencing flooding damage, erosion, and landslides more frequently. The coastal damage will have negative economic effects as well as the obvious hazardous consequences. According to the Federal Emergency Management Agency (FEMA), in southern Maine, a 1" rise in sea-level will make all storms more damaging with serious economic and ecosystem consequences to the region. Fishermen have already noticed significant changes in the lobster fishery. Changes in the lobster fishery have serious implications for Maine's coastal communities where thousands of licensed lobstermen and women support numerous related industries such as boatbuilding, lobster trap production, and bait distribution and transportation.

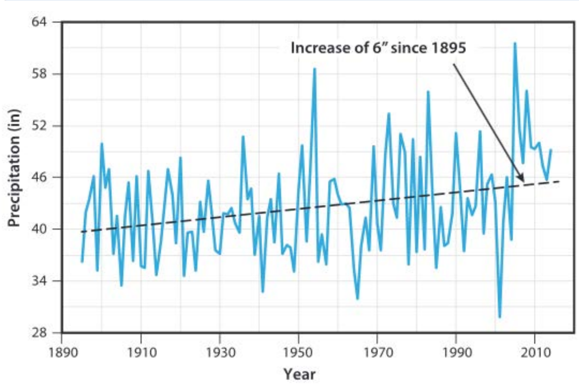
Climate Change and Drinking Water

"Maine has 2200 public water systems which serve drinking water to half a million people by drawing water from more than 2600 individual water sources (wells and surface water intakes)."[1] "A public water system is defined as any publicly or privately owned system of pipes and facilities through which water is served to 15 or more service connections or to 25 or more persons per day for at least 60 days per year."[2] These systems range "in size and function from large community systems serving entire cities or towns to seasonal restaurants and camping facilities which serve only a few hundred people for the summer. The vast majority of these water systems utilize one or more wells drilled in fractured bedrock. However, most large community water systems are supplied by a well or wells installed into loose, unconsolidated materials such as sand and gravel or by water drawn through an intake in a lake or pond."[3] Public water systems are required to have their water quality monitored on an annual basis. The remainder of Maine's residents gets their drinking water from a private source, usually a dug or drilled well. Water quality monitoring on private systems however is up to the individual owner.

Sebago Lake

Source water for Maine's largest drinking water provider, Portland Water District, serving over 15% of the state's population.

Maine's Total Annual Precipitation



Total annual precipitation, 1895-2014, averaged across Maine from gridded monthly station records from the U.S. Climate Divisional Datbase. A simplified linear trend (black line) inches, or about 13%, during the recording interval. (http://cci.siteturbine.com/uploaded_files/climatechange.umaine.edu/files/MainesClimateFuture_2015_Update2.pdf)

Impacts of a changing climate pose threats to Maine's drinking water quality. Maine is experiencing, and current predictions indicate continued increases in rainfall amounts with changes in timing and intensity of precipitation as well as increases in sea level. Over the last century precipitation has increased by more than 10% in the Northeast,[4] the greatest increase of any region in the

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[1] Maine Department of Human Services Drinking Water Program. (2000). *Maine Public Drinking Water Source Water Assessment Program.* Augusta, Maine. P.2 (http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/wrt/documents/swapforweb.pdf)

[2] Ibid. P.9

[3] Ibid. P.3

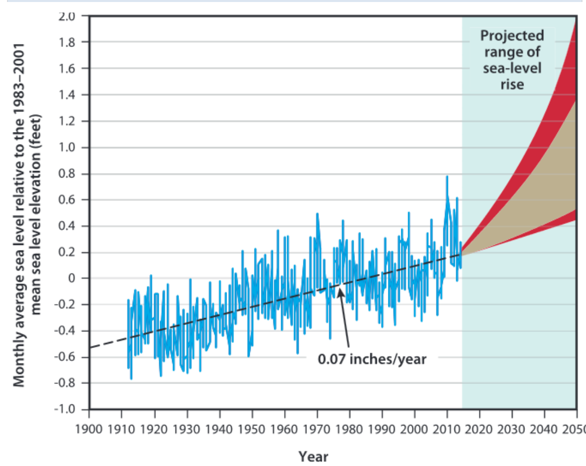
[4] Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014: *Climate Change Impact in the United States: The Third National Asessment.* U.S. Global Change Research Program 841 pp. dio: 10.7930/J0Z31WJ2. P.373

country. This translates to a precipitation increase of about 6 inches per year[5]. Of greater concern is that over the last 55 years precipitation quantity has increased 70% during extreme precipitation events (events in which 2 or more inches of precipitation fall within a 24 hour time period)[6]. Although these extreme events occur more frequently along the coast and western mountains of Maine, their frequency is increasing statewide. Extreme precipitation events often lead to flooding. Flooding with these events may be short in duration and confined to small geographies but brings increased risk for contamination to drinking water. Flood waters wash sediments, pathogens, pesticides, and salt into surface water bodies. When precipitation events are more extreme less water is absorbed into the ground. For example, during a rain event in which 2 inches falls over 48 hours much of the water will be absorbed because the rate of precipitation is slow enough to allow soils to absorb it. In contrast, a rain event in which 2 inches falls over only 12 hours much of the water will wash away as storm water into surface water bodies and other storm water conveyance systems because the rate of precipitation is too great to allow soils to absorb it. This scenario leads to greater recharge of surface waters but reduced recharge of groundwaters.

Despite overall increases in precipitation, snow fall in Maine has decreased by about 15% since the late 1800s[7]. Changes in the timing of precipitation – wetter spring and fall with longer dry spells during summer months – coupled with decreases in snow fall and groundwater recharge during extreme precipitation events, referenced above, may lead to decreases in groundwater recharge necessary to maintain underground aquifer sources and the wells dependent on them. Shallow wells will be the most influenced by these changes.

Sea level has risen nearly 8 inches over the past 100 years, the rate it is rising is increasing, and conservative estimates project it will rise another 6 to 24 inches over the next 35 years.[8] “Storm surges can add 3 to 4 feet of

Sea Level Trend at Portland, Maine



Sea level rise at Portland provided by NOAA Center for Operational Oceanographic Products and Services. The mean sea level trend is 0.07 inches per year based on monthly mean sea level data from 1912 to 2013, which is equivalent to a change of 0.62 feet in 100 years. The projections reflect the range of possible scenarios based on other scientific studies. The current projected range of sea level rise of 0.5 to 2.0 feet by 2050 falls within a larger range that incorporates uncertainty about how glaciers and ice sheets will react to the warming ocean, the warming atmosphere, and changing winds and currents.(http://cci.siteturbine.com/uploaded_files/climatechange.umaine.edu/files/MainesClimateFuture_2015_Update2.pdf)

[5] Fernandez, I.J., C.V. Schmitt, S.D. Birkel, E. Stancioff, A.J. Pershing, J.t. Kelley, J.A. Runge, G.L. Jacobson, and P.A. Mayewski. 2015. Maine’s Climate Future: 2015 Update. Orono, ME: University of Maine 24pp. P.12.

[6] Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014: *Climate Change Impact in the United States: The Third National Asessment.* U.S. Global Change Research Program 841 pp. dio: 10.7930/J0Z31WJ2. P.373

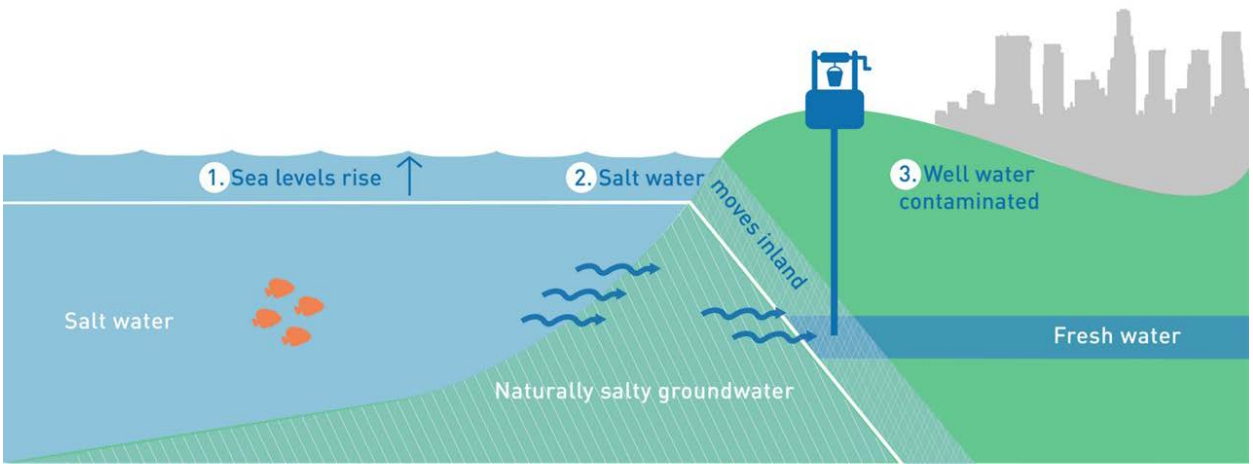
[7] Fernandez, I.J., C.V. Schmitt, S.D. Birkel, E. Stancioff, A.J. Pershing, J.t. Kelley, J.A. Runge, G.L. Jacobson, and P.A. Mayewski. 2015. Maine’s Climate Future: 2015 Update. Orono, ME: University of Maine 24pp. P.14.

[8] Ibid. P.20.

water on top tidal heights.[9]" Rising sea level affects salt marshes, beaches, and flood zones. Salt marshes serve to protect coastal areas from storm surge, and their utility diminishes as they are lost to rising seas. Existing development along beaches becomes vulnerable to coastal land slides as beaches erode under rising seas. And coastal flood zones move further and further inland as sea level rises.

Sea level rise threatens coastal wells in 2 ways. First, expanding flood zones put more and more well heads at risk for salt water intrusion from storm surge and coastal flooding. Second, rising sea level changes the interface between salt water and coastal fresh water aquifers. As sea level rises the depth of fresh water within the aquifer shrinks. Maine's islands and many penninsulas are especially at risk.

Higher Sea Levels Can Contaminate Wells



http://www.clearpath.org/content/clearpath/en/why-clean-energy/impacts-and-risks/sea-level-rise-impacts-beaches/_jcr_content/cp-content-parsys/column_control_4/par2/image.img.jpg/1434643178436.jpg

Adaptation and mitigation strategies to address the effects of climate change will need to include both supply-side and demand-side strategies. Policy development will need to incorporate a variety of stakeholders as water is critical to many sectors – energy production, health, food, and ecosystem integrity.

Ways to address threats to drinking water

A growing number of tools exist to assist communities and infrastructure owners/operator in assessing and planning for climate impacts to drinking water supplies. The following sections provide overviews of a few of the tools available:

- EPA Climate Ready Water Utilities Initiative
- EPA Community-Based Water Resiliency (CBWR) Tool
- EPA CREAT Tool

[9] Ibid. P.21

- Resilience Measurement Index
- Water Safety Plan Manual

Tool: EPA Climate Ready Water Utilities Initiative

Background

Created by the US Environmental Protection Agency, the Climate Ready Water Utilities initiative provides a clearing house of resources for water utilities, inclusive of wastewater and stormwater, for addressing climate change impacts. Resources include climate change science and data, tools, and trainings; and are intended to increase understanding of climate change and decision making around adaptation.

Intended Users

The broad diversity of resources available offer options for a variety of users with differing levels of knowledge. Trainings are available for both those seeking to increase their understanding of the issues and related tools, as well as how to increase understanding and engagement of others around the issues.

Using the Tool

The Climate Ready Water Utilities initiative is broken into three categories: home, tools and resources, and training. Home is where users will find an overview of the initiative, a video of water utilities that are undertaking action and its importance, announcements of new resources, and a place to register to receive email updates on news and new resources. Tools and resources provides links to tools, data, information, and case study resources for evaluating and understanding vulnerability, planning for impacts, and adaptation strategies. Two of the available tools, the Community-Based Water Resiliency Tool and the Climate Resilience Evaluation and Awareness Tool are outlined below. Training offers a library of webinars and announcements of training events. Additionally, links to general information on drinking water and related education, funding opportunities, regulations, pollution, science, infrastructure, and public engagement are also available.

Accessing the Tool

The Climate Ready Water Utilities initiative is housed online and available at: http://water.epa.gov/infrastructure/watersecurity/climate/index.cfm. All downloadable resources are available for free. Additional information on the initiative can be obtained by contacting the US Environmental Protection Agency either through the Contact Us link available on the website or at:

U.S. Environmental Protection Agency
Office of Water (4100T)
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Tool: Community-Based Water Resiliency (CBWR) Tool

Background

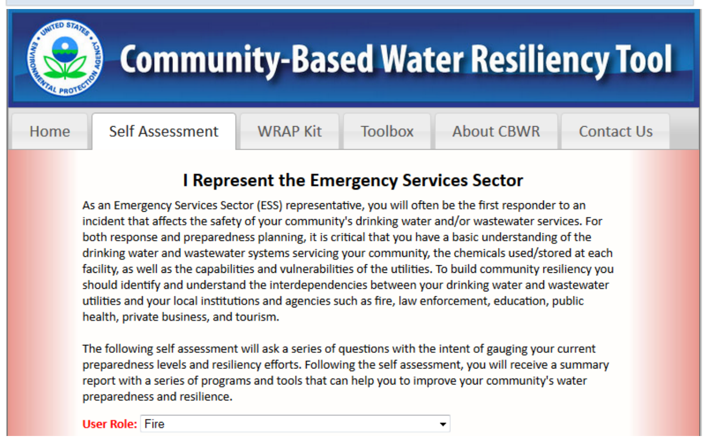
Developed by the US Environmental Protection Agency the Community-Based Water Resiliency Tool is a user friendly tool that guides users through a self-assessment, provides tailored recommendations on tools and resources, offers a Water Resiliency Action Plan kit to help users plan community meetings and workshops, and access to hundreds of tools and resources.

Intended Users

The Community-Based Resiliency Tool can be used by a wide variety of stakeholders. It offers preloaded self-assessments for use by water utilities, healthcare and public health providers, state / tribal authorities, emergency service providers, and local officials and community partners.

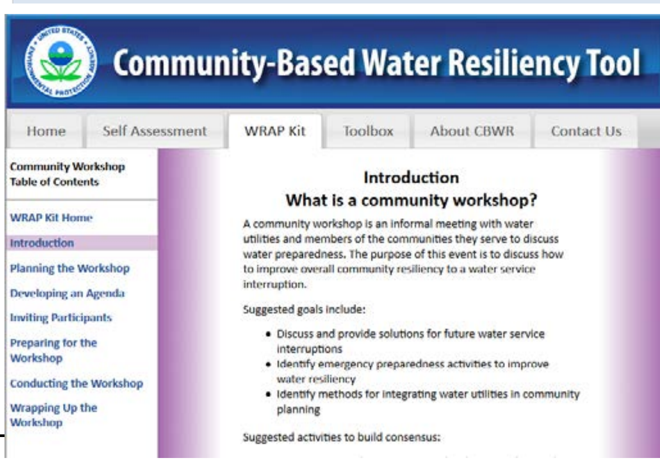
Using the Tool

Sample Self Assessment



The Community-Based Resiliency Tool is composed of self-assessments, the Water Resiliency Action Plan (WRAP) kit, and a toolbox of tools and resources. The self-assessments can be completed by individuals or groups of stakeholders and are intended to identify those tools and resources best suited to the stakeholder(s). Self-assessment questions are accompanied by menus of standard answers, and options for submitting more specific answers. The more time a user, or set of users, takes to specify responses the more targeted the report of tailored resources will be.

Water Resiliency Action Planning



The Water Resiliency Action Plan (WRAP) kit provides guidance on hosting a community workshop or community meeting. Community meetings are intended to educate and raise awareness of local water resilience challenges, and community workshops are designed to set goals and responsibilities around water emergency preparedness. For organizing either a community meeting or workshop the kit provides step-by-step suggestions for meeting/workshop planning, setting the meeting/workshop agenda, identifying and inviting stakeholders, preparing for and conducting the meeting/workshop, and post-meeting/workshop activities. The kit includes presentations, videos, document templates, and tips for success.

The Toolbox of tools and resources can be viewed in several ways: by stakeholder group (water utilities, healthcare and public health providers, state / tribal authorities, emergency service providers, and local officials and community partners), all tools, or those related to hosting public meetings and workshops. Tools and resources are further broken into seventeen issue categories.[10]

Toolbox of Resources

Accessing the Tool

The Community-Based Resiliency Tool is web-based and can be downloaded for free. Additional tool and program information can be obtained by contacting the US Environmental Protection Agency:

Email: wsd-outreach@epa.gove
Telephone: (202) 564-3779
Mailing Address:
USEPA Headquarters
Water Security Division, CBWR
Ariel Rios Building
1200 Pensylvania Ave., N.W.
Washington, D.C. 20460

[10] Issue categories include: aging infrastructure, asset management, communication and outreach, contaminant detection, drinking water systems, emergency preparedness and response, funding, general water security, ICS/NIMS, laboratory support, local emergency planning committees, mutual aid assistance, protective practices and funding resources, training and exercises, vulnerability assessments/emergency response plans, wastewater systems, and water sector interdependencies.

Case Study

St. Clair County, Michigan implemented the Community-Based Water Resiliency Tool in May of 2012. A day long round table session was hosted by the St. Clair County Homeland Security-Emergency Management Office. The day-long event featured speakers, breakout sessions, and an emergency response panel session. A full description of the event can be found at: http://water.epa.gov/infrastructure/watersecurity/communities/upload/epa817s13001.pdf

Tool: EPA Climate Resilience Evaluation and Awareness Tool (CREAT)

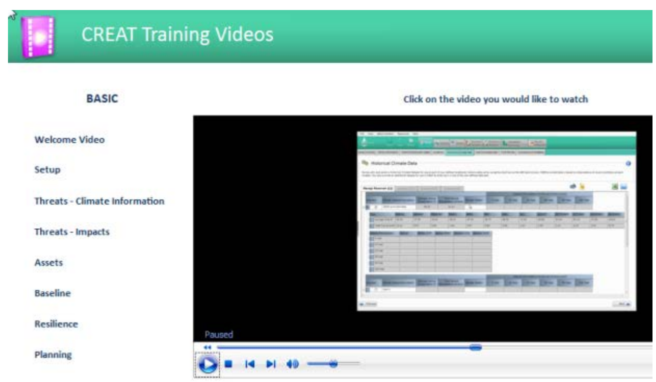
Background

Created by the US Environmental Protection Agency and released for public use in 2015 the Climate Resilience Evaluation and Awareness Tool is a downloadable software application to assist water utilities in understanding threats and vulnerabilities, options for adaptation, and impacts of adaptation strategies. Evaluations and planning can be tailored to a utility's unique infrastructure. The software includes a series of training videos to help users conduct an analysis and the ability to conduct and refine multiple analyses for one or more utilities.

Intended Users

The tool's application is intended for water utilities, but the application is available to all interested users. Given the more complex nature of the application utilities may want to have an individual or organization well versed in climate change, adaptation, and planning assist with completion of the analysis.

Built In Training Video Options



Using the Tool

To begin users will need to familiarize themselves with the tool via the available trainings contained in the software download. Trainings are broken into two series, Basic and Advanced. The Basic series is comprised of eight training videos that walk users through an overview of the application's analysis components – setup, climate threats, climate impacts, assets, creating a baseline, resilience options, and planning. The Basic series of training videos takes a little more than one hour to complete. The Advanced series is comprised of nine training videos that build on the components covered in the Basic series but with more detail on how to complete each component of an analysis, plus a training specific to sea level rise. The Advanced series of training videos takes about an hour to complete. However, completion of the training videos themselves is not sufficient to have proficient skills in completing an analysis. Users should be prepared to return to the training videos while completing an initial analysis and it is suggested that a mock analysis be completed to more fully understand the analysis components and process.

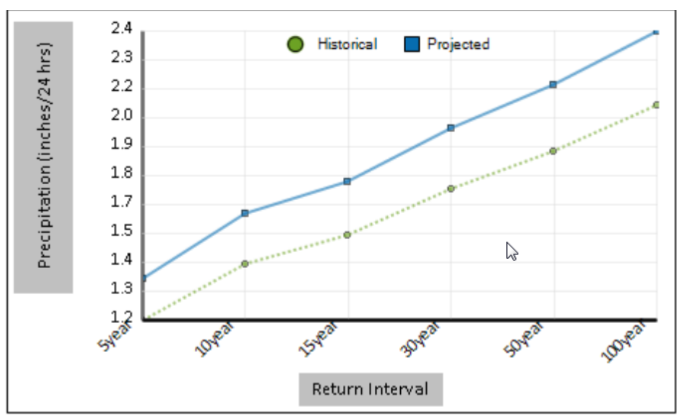
Once a user has familiarized themselves with the Climate Resilience Evaluation and Adaptation Tool, they are ready to begin an analysis. The Setup component of an analysis initiates with having the utility complete worksheets to assist in filling out the necessary contextual information. Worksheets include Pre-Assessment Discussion where goals, choice of participants, and asset categories are considered; Climate Data where data resources, locally collected data, and climate scenarios are considered; Setup Data where asset locations, scenario time periods, climate related event likelihood, and event consequences are considered; and Adaptation Preparation where adaptation strategies, implementation, and actions are considered. These worksheets do not need to be completed before initiating an analysis but are helpful in thinking about the analysis ahead of its completion.

CREAT Process Diagram

The Setup component continues with having a utility enter:

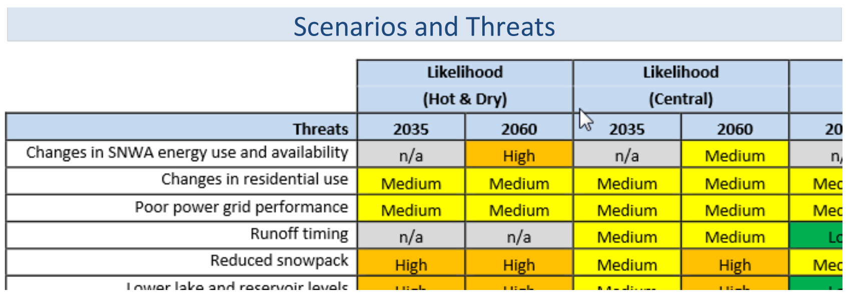
- General Utility Information - contact information, ownership, population served, basic financial information;
- System Information – system identification, average household water costs, miles of mains;
- Locations – latitude/longitude/elevation of infrastructure, and descriptions for each piece of infrastructure entered;
- Historical Climate Data – select or upload a climate data set, data can be edited and customized;
- Likelihood Approach – opt to either conduct an analysis on the likelihood that all threats will occur, or assess the likelihood of individual threats;
- Time Periods – select CREAT provided planning time periods of year 2035 and year 2060, or enter customized time periods; and
- Consequence Weighting – weight the consequences of threats to selected assets

Geographic Specific Climate Data



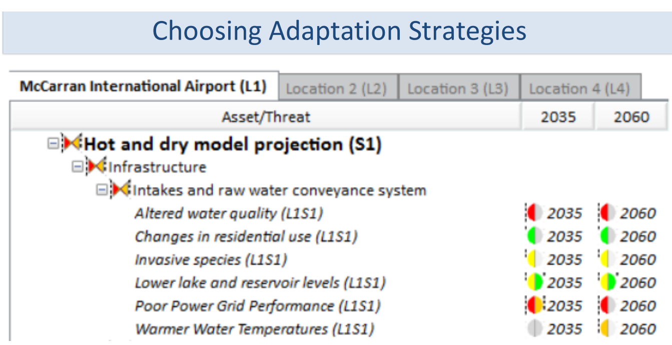
Once Setup is complete, a user then steps through the Threats component that includes climate information to help users in their decision making; the ability to edit selected climate scenarios in terms of temperature, precipitation, and if applicable sea level rise; select climate change related threats such as altered demand and increased flood frequency taking into consideration location and climate change drivers such as increasing temperatures and changing storm intensity; add desired parameters to threats; and assess likelihood of threats. The Threats component is followed by the Assets component of the analysis. A user selects natural and built assets such as flood protection, surface water, treatment plant, and distribution system. Selected asset information can be customized providing specific locations, descriptions, and photos.

With the next component a user begins the actual analysis. A Baseline Analysis is generated by a user choosing adaptation strategies or measures if applicable already in place for each asset/threat pair created during the Threats and Assets components. Users choose measures from the categories of alternative strategies such as green infrastructure, expanded capacity such as new construction, and expanded operating flexibility such as research and development. Building on the Baseline Analysis users then complete a Resiliency Analysis choosing new adaptation strategies they might implement for each asset/threat pair. The tool informs a user of the likelihood of a threat occurring, the degree of consequence to the asset, and the degree of change in consequences between current strategies or measures already in place and selected strategies for consideration.



	Likelihood (Hot & Dry)		Likelihood (Central)		
Threats	2035	2060	2035	2060	20
Changes in SNWA energy use and availability	n/a	High	n/a	Medium	n,
Changes in residential use	Medium	Medium	Medium	Medium	Mec
Poor power grid performance	Medium	Medium	Medium	Medium	Mec
Runoff timing	n/a	n/a	Medium	Medium	Lc
Reduced snowpack	High	High	Medium	High	Mec
Lower lake and reservoir levels	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

To help a user further determine what new adaptation strategies to consider the next component is Adaptation Planning. This component allows a user to create packages of adaptation strategies including the ability to add strategies not available in the CREAT library of strategies. Details like cost can be added to give each package the necessary specificity to compare them. The tool can generate a spreadsheet report so data can be reviewed, saved, and input into other documents.



Finally, once a user is satisfied with all data and decisions incorporated into the CREAT analysis, a report can be generated. The tool is able to self-generate a written report in Microsoft Word that a user can edit if desired. The report contains methodology and contextual information as well as data and results from the analysis.

Again, although the tool includes resources to increase understanding of climate change, assets, threats, and adaptation strategies, it is recommended that use of the tool be facilitated by someone experienced in climate change adaptation.

Accessing the Tool

The Climate Resilience Evaluation and Awareness Tool is web-based and can be downloaded for free. Additional tool and program information can be obtained by contacting the US Environmental Protection Agency:

Email: CREAThelp@epa.gov
Mailing address:
U.S. Environmental Protection Agency
Office of Water (4100T)
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Case Study

In 2013 the Southern Nevada Water Authority (SNWA) worked with the US Environmental Protection Agency to conduct an analysis and identify adaptation strategies using the Climate Resilience Evaluation and Awareness Tool. Population growth and drought had routinely presented challenges for the SNWA, but climate change added a level of uncertainty that called for a proactive approach in planning for future water supply. SNWA's work with EPA resulted in a full risk assessment determining the potential impacts of climate change on its operations and identifying adjustments to management of future water supplies. Via two webinars EPA introduced SNWA staff and others to the CREAT software and analysis process. Subgroups then met to collect and refine data. Finally, a two day exercise was held to complete the analysis and build an adaptation package. A full description of the process can be found at: http://water.epa.gov/infrastructure/watersecurity/climate/upload/epa817s13002.pdf

Tool: Resilience Measurement Index

Background

The Resilience Measures Index was developed in 2013 by Argonne National Laboratory for the US Department of Homeland Security. It is used to determine the resilience of critical infrastructure through evaluating preparedness, mitigation measures, response capabilities, and recovery mechanisms. The evaluation allows infrastructure operators to "compare their level of resilience against the resilience level of other similar facilities nationwide and guide prioritization of improving resilience."[11]

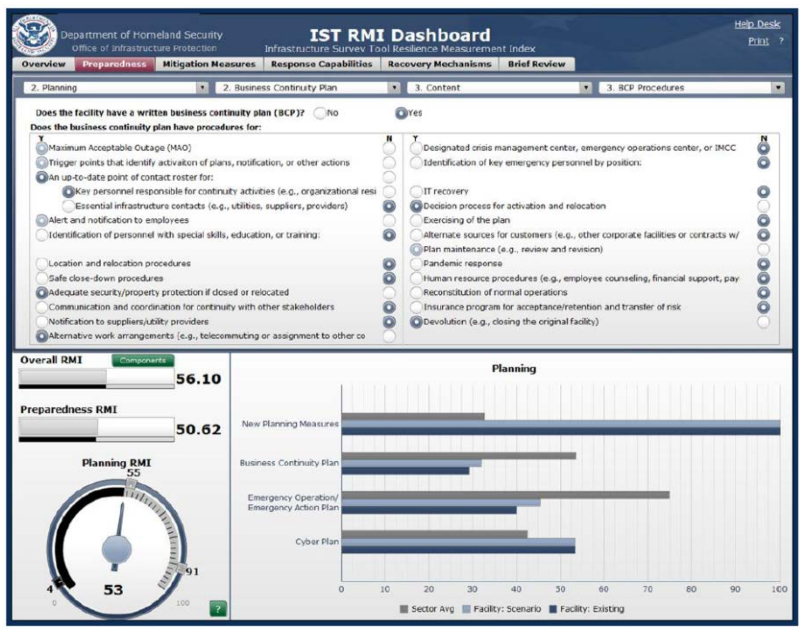
Intended Users

This tool is limited to infrastructure owners/operators.

Using the Tool

In order to be eligible to utilize the Resilience Measurement Index, a drinking water utility must have previously participated in the Enhanced Critical Infrastructure Protection Initiative and have had data entered into the Infrastructure Survey Tool. The Infrastructure Survey Tool is a web-based tool for data collection and analysis. Data collected from the Resilience Measurement Index builds on that of the Infrastructure Survey Tool allowing for use of an interactive web-based dashboard. The dashboard includes a Facility Scenario function allowing operators to see the potential impacts of resilience strategies (polices, procedures, or operational methods). Following a Resilience Measurement Index assessment operators are then eligible to take advantage of both the Protective Measures Index (determines physical infrastructure vulnerabilities) and the Consequences Measurement Index (determines the maximum potential consequences of an adverse event). Combined these indices allow "for a

RMI Dashboard Overview Screen



RMI Dashboard Selections: Planning/Business Continuity Plan/Content/Procedures (illustrative)

[11] Argonne National Laboratory Decision and Information Sciences Division. (2013). *Resilience Measurement Index: An Indicator of Critical Infrastructure Resilience* (p.x). Oak Ridge, TN: US Department of Energy

comprehensive assessment of risk that can support decision-making about protection, business continuity, and emergency management of critical infrastructure."[12]

Other than the Infrastructure Survey Tool requirement, use of the Resilience Measurement Index is straightforward. Data is collected on-site by Homeland Security staff. The on-site data collection takes approximately four hours. The data is then uploaded to the Infrastructure Survey Tool where operators can then access it.

Accessing the Tool

Use of the tool is free and available through the Maine Office of Homeland Security. Interested drinking water providers should contact:

William DeLong, Maine Protective Security Advisor
US Department of Homeland Security
William.delong@hq.dhs.gov

Case Study

The U.S. Protected Critical Infrastructure Information Act prevents the sharing of those utilities that have completed the Resiliency Measurement Index. However, a few common themes have emerged from those Maine utilities that have completed the index. The greatest of these being the costs associated with infrastructure upgrades necessary for improved resiliency. Although utilities can request a rate increase from the Public Utilities Commission to cover costs of maintenance, it may be difficult to request rate increases to cover the costs of upgrades to infrastructure that has not met its anticipated life expectancy. An additional concern shared among utilities who are dependent on surface waters for supply is contamination from non-point source pollution, particularly from agricultural and residential uses.

[12] Ibid.

Tool: Water Safety Plan Manual

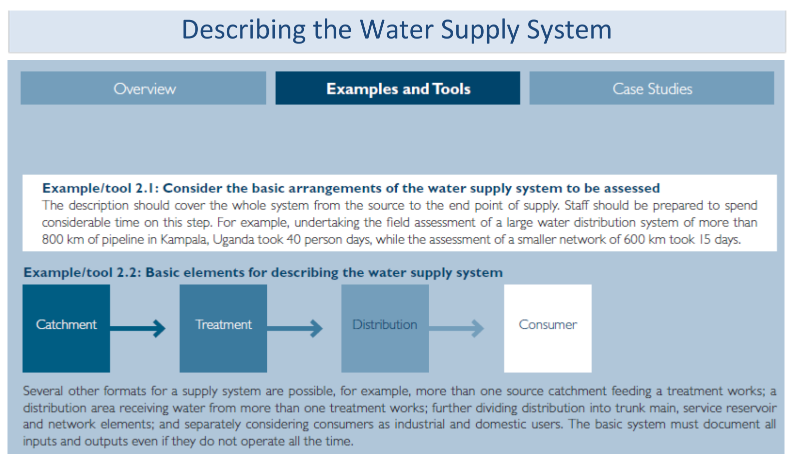
Background

The Water Safety Plan Manual is an in-depth, step-by-step risk management tool for drinking water providers of all sizes. Developed by the World Health Organization and the International Water Association, the manual walks users through 11 learning modules that both produce a water safety plan as well as procedures for monitoring implementation and success of a plan.

Intended Users

Although drinking water infrastructure operators are intended to lead the effort, they will require the assistance of other key stakeholders in order to complete a thorough and robust water safety plan. Other key stakeholders might include local elected officials, municipal public works staff, county emergency management staff, or large land owners.

Using the Tool



The Water Safety Plan Manual is composed of 11 modules that walk an infrastructure operator through development of a plan. The modules have been constructed in a manner that allows the user to develop an approach to producing a plan appropriate to the operator. As it is an in-depth process, producing, implementing, and maintaining a plan will cost money, but can result in long term savings. Additionally, a knowledgeable team must be assembled to produce a successful, robust plan – smaller infrastructure operators may need to bring in more outside expertise than their larger counterparts.

Each of the 11 modules includes an overview of the module, examples and tools to assist with plan development, and case studies related to the particular module. Modules include:

1. Assembling the Water Safety Plan team
2. Producing a detailed description of the water supply system
3. Identifying hazards and hazardous events and assessing the risks or vulnerability
4. Determining and validating existing control measures, their effectiveness, and identifying gaps
5. Developing, implementing and maintaining an improvement plan

6. Defining and validating the monitoring of control measures and procedures for evaluating their effectiveness
7. Verifying the effectiveness of the Water Safety Plan – compliance monitoring, auditing of operational activities, and consumer satisfaction
8. Preparing normal and emergency/incident management procedures
9. Developing supporting programs to ensure continued skills, knowledge, and commitment to the Water Safety Plan
10. Planning and carrying out periodic review of the Water Safety Plan
11. Revising the Water Safety Plan following unforeseen emergencies or incidents

Accessing the Tool

The Water Safety Plan Manual can be downloaded for free. Additional materials to assist with development, implementation and maintenance of a water safety plan area also available on the World Health Organization's Water Safety Portal.

Case Study

Use of the Water Safety Plan Manual is undocumented in the United States. However, a case study prepared for the World Health Organization's Water Safety Portal discussing its use in England and Wales provides transferable lessons regardless of overarching political structure or water system size (some of these water suppliers provide water to populations as small as 2,500). Preparing Water Safety Plans was mandated on the privately-operated organized pipe water suppliers by a regulating body. The regulator then wrote the case study focusing on the challenges encountered by the regulator and private operators with the intent of helping others in their efforts to prepare and implement Water Safety Plans. Common challenges included:

- planning buy-in and appropriate staffing;
- data collection;
- broadening the understanding of risk;
- assessing risk before and after control measures;
- prioritizing investments;
- lack of authority over source water recharge water quality;
- revising and monitoring operations and compliance with a plan; and
- long-term commitment to the plan and regular plan updates