Building Climate Resilience for Small Wastewater Systems

September 29th , 2022

WATER PROGRAMS Sacramento State

ENVIRONMENTAL FINANCE CENTER AT SACRAMENTO STATE

Environmental Finance Center Network (EFCN)

Network of university-based centers across the U.S. building local capacity to address environmental management needs

https://efcnetwork.org

- Adaptation & Resiliency Planning
- Asset Management
- Community Engagement
- Data Collection & Analysis
- Maintenance Practices
- Disseminating Information
- Fiscal Planning
- GIS Programming/Planning
- Infrastructure Funding & Planning
- Infrastructure Planning & Design
- Operator Training & Certification
- Management/Board Support
- Rate Payer/Citizen support
- Sustainability & Resiliency
- Partnerships & Collaboration
- Water Efficiency & Reuse
- Work Force Development

The EPA Region 9 EFC

- Housed in the Office of Water Programs (OWP) at Sac State
  - Manager & Operator Training, 50+ years
  - Applied Research & Tech & Managerial Support, 20+years
- Providing TMF expertise and tools to the water industry

https://www.owp.csus.edu/

https://www.efc.csus.edu/

Links

EFC at Sacramento State:

http://www.efc.csus.edu

Contact:

Maureen.Kerner@owp.csus.edu

EFC Network:

https://efcnetwork.org/

Technical Assistance Requests

https://efcnetwork.org/assistance/request-assistance/

Defining Resiliency

- What does it mean for a wastewater system to be climate resilient?
- Continuing to do the following as climate conditions change:
  - Produce effluent that protects public and environmental health
  - Meet changing effluent regulations
  - Have robust plan for facility upgrades and workforce development

Challenges Facing Wastewater Systems

- Climate change
- Aging infrastructure
- Stricter effluent standards
- Lack of funding

Challenges Facing Wastewater Systems

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All made more challenging by small systems'

- Limited financial capacity
- Lack of resources/staff to acquire funding
- Limited staff capacity
- Staff acquisition and retention

Impacts of Climate Change on Wastewater Systems

- More severe storms
- More frequent storms
- Reduced flows due to water conservation
- Warmer temperatures
- Groundwater table rise
- Sea level rise

Impacts of Climate Change on Wastewater Systems

What are the specific impacts on each of the main components?

- Collection Systems
- Pumping Stations
- Treatment Facilities

Impacts on Collection Systems

Increased Storm Severity and Frequency	Reduced Flows/ Drought	Rise of Sea-level or Groundwater Table	Increased Temperature
• Increased SSOs • Increased breakages and blockages	• Increased corrosion and odor due to increased concentrations and longer retention times • Increased blockages and deposition • Root intrusion damaging pipes	• Floating pipes causing cracking • Infrastructure damage due to corrosion, erosion and inundation	• Increased odors due to increased biological and chemical transformations

Impacts on Pumping Stations

Increased Storm Severity and Frequency	Reduced flows due to Drought	Rise of Sea-level or Groundwater Table	Increased Temperature
• Increased overflows	• Increased corrosion and odor due to increased concentrations and longer retention times	• Infrastructure damage due to corrosion and inundation • Reduction of service area from flooding	• Blockages due to behavior changes (flushable wipes)

What Are The Implications?

- Increase O&M spending
  - Flushing, inspection, SSOs, odor complaints
- Increased pumping energy and chemical costs
- Infrastructure repairs and replacements
  - Pipes, manholes, pump stations

What Can You Do?

- Increase O&M spending
  - Flushing, inspection, SSOs, odor complaints
- Increased pumping energy and chemical costs
- Infrastructure repairs and replacements
  - Pipes, manholes, pump stations

- Fund Infrastructure Improvement
- Staff Capacity
- Develop Efficient O&M Plan

Impacts on Wastewater Treatment Plants

Increased Storm Severity and Frequency	Reduced flows due to Drought	Rise of Sea-level or Groundwater Table	Increased Temperature
• More frequent bypassing • Stresses design capacity • Fluctuation in key process elements (e.g. retention times) • Washout of biomass in biological treatment systems	• Increased influent strength upsets biological processes • More difficult to treat to effluent quality standards	• Infrastructure damage due to flooding • Increases difficulty of sludge management and dewatering • Increased pumping to outfall heads	• Alters performance of biological processes • Increased odor production

What Are The Implications?

- Stresses aging infrastructure
- Need for additional infrastructure
  - overflow storage, bypass
- Periodic or permanent process adjustments
- Increased pumping energy costs

What Can You Do?

- Stresses aging infrastructure
- Need for additional infrastructure
  - overflow storage, bypass
- Periodic or permanent process adjustments
- Increased pumping energy costs

- Fund Infrastructure Improvement
- Facility Upgrades/New Treatment Technologies
- Operator Training
- Develop robust O&M plan

Building Resiliency

All of these actions can be incorporated into a climate resiliency plan:

- Fund infrastructure improvement
- Fund facility upgrades and new treatment technologies
- Develop efficient, flexible O&M plans
- Operator Training
- Improve staff capacity

Developing a Climate Resiliency Plan

What Impacts Can Your Facility Expect?

- Climate change impacts will be location dependent
- Severity of risk will also depend on:
  - Age of your system
  - Financial Capacity
  - Staff Capacity

Developing a Climate Resiliency Plan

Step 1: Identify and Understand the specific challenges your facility will face

Step 2: Understanding the risk of climate impacts

Step 3: Identify adaptation actions and develop a plan

Available Resources

- Creating Resilient Water Utilities (CRWU) Initiative – EPA tool that provides utilities with tools, training, and technical assistance needed to increase resilience to climate change
  - Resilient Strategies Guide
  - Climate Resilience and Awareness Tool (CREAT)
  - Case Study Map
  - Data Services and Map
  - Training
  - Technical Assistance

EPA United States Environmental Protection Agency

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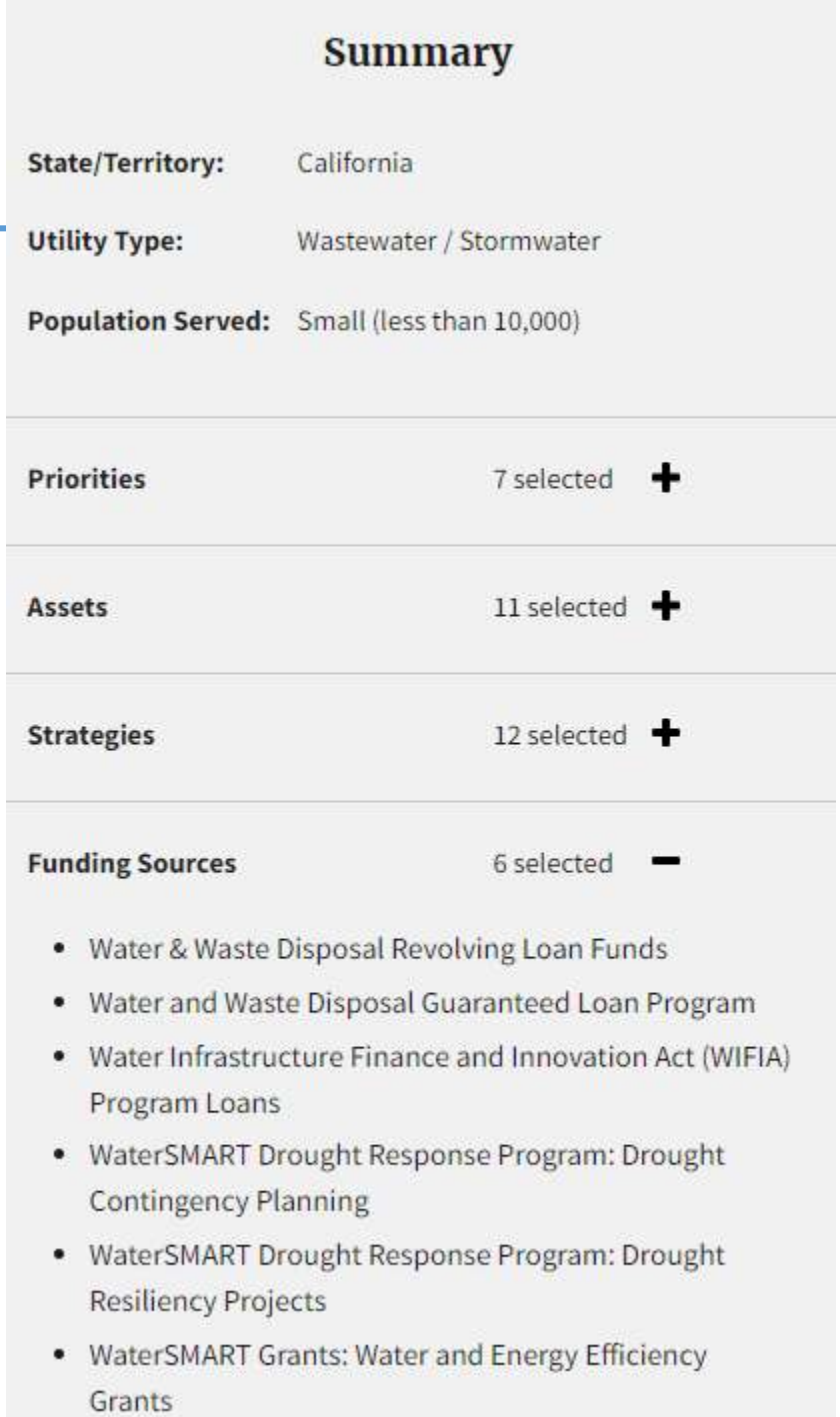
Resources to help with all steps from developing to implementing a climate resiliency plan!

EPA United States Environmental Protection Agency

Getting Started

- Resilient Strategies Guide: Introduces utilities to the adaptation planning process. Based on the experiences of other utilities adapting to climate change.
- Helps to identify the following:
  - planning priorities
  - vulnerable assets
  - potential adaptation strategies
  - available funding sources



Summary

State/Territory: California

Utility Type: Wastewater / Stormwater

Population Served: Small (less than 10,000)

Priorities 7 selected +

Assets 11 selected +

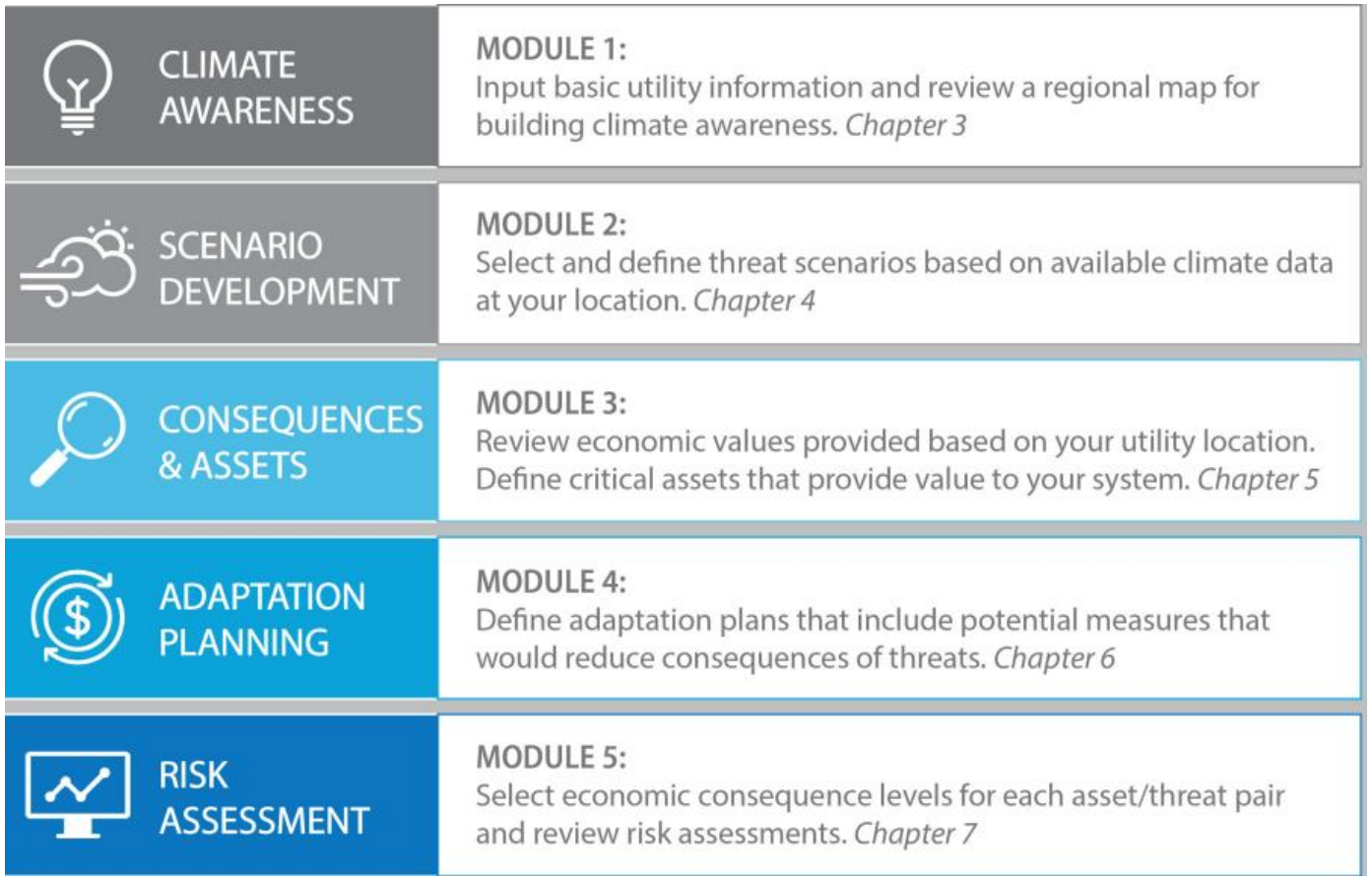
Strategies 12 selected +

Funding Sources 6 selected −

- Water & Waste Disposal Revolving Loan Funds
- Water and Waste Disposal Guaranteed Loan Program
- Water Infrastructure Finance and Innovation Act (WIFIA) Program Loans
- WaterSMART Drought Response Program: Drought Contingency Planning
- WaterSMART Drought Response Program: Drought Resiliency Projects
- WaterSMART Grants: Water and Energy Efficiency Grants

Climate Resilience Evaluation and Awareness Tool (CREAT)

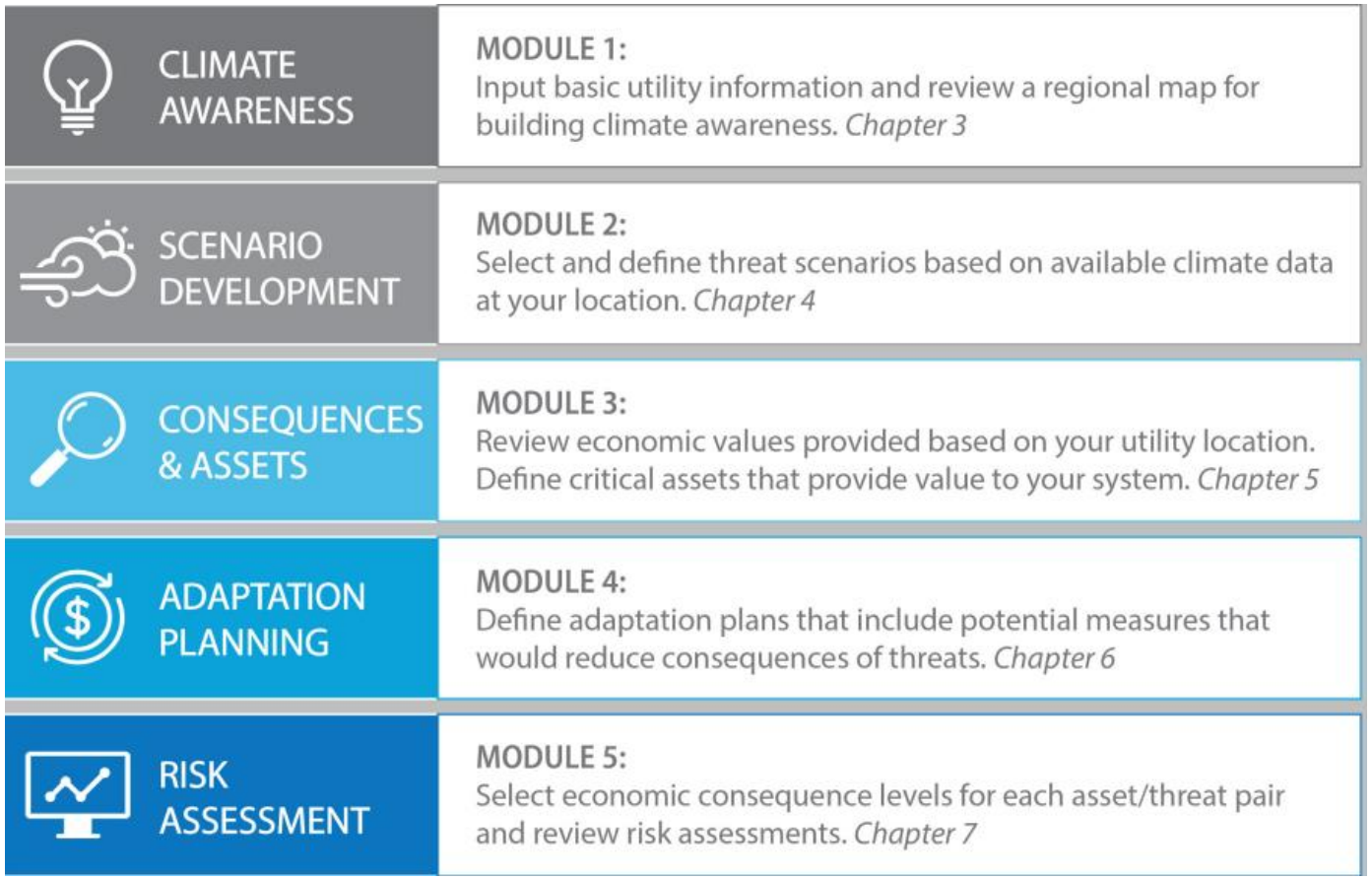
- CREAT assists water sector utilities in assessing climate-related risks to utility assets and operations.
- Five modules help users consider climate impacts and identify adaptation options



Climate Resilience Evaluation and Awareness Tool (CREAT)

- User Inputs:
  - Basic utility information
  - Asset inventory

*You can look at one asset/threat combination at a time by doing a streamlined analysis outlined in the user guide



Climate Resilience Evaluation and Awareness Tool (CREAT)

Outputs of CREAT's analysis:

- Climate Awareness Report – summarizes potential future climate conditions and impacts
- Scenario Development Report – lists each scenario and the associated threats as defined in the assessment
- Consequences and Assets Report – includes economic consequences matrix, a list of the assets defined, and summary information on the regional economic and public health consequences
- Adaptation Planning Report – details each adaptation plan with the cost of each adaptive measure included in the plans
- Plan Report – includes the results of the risk assessment for each specific adaptation plan

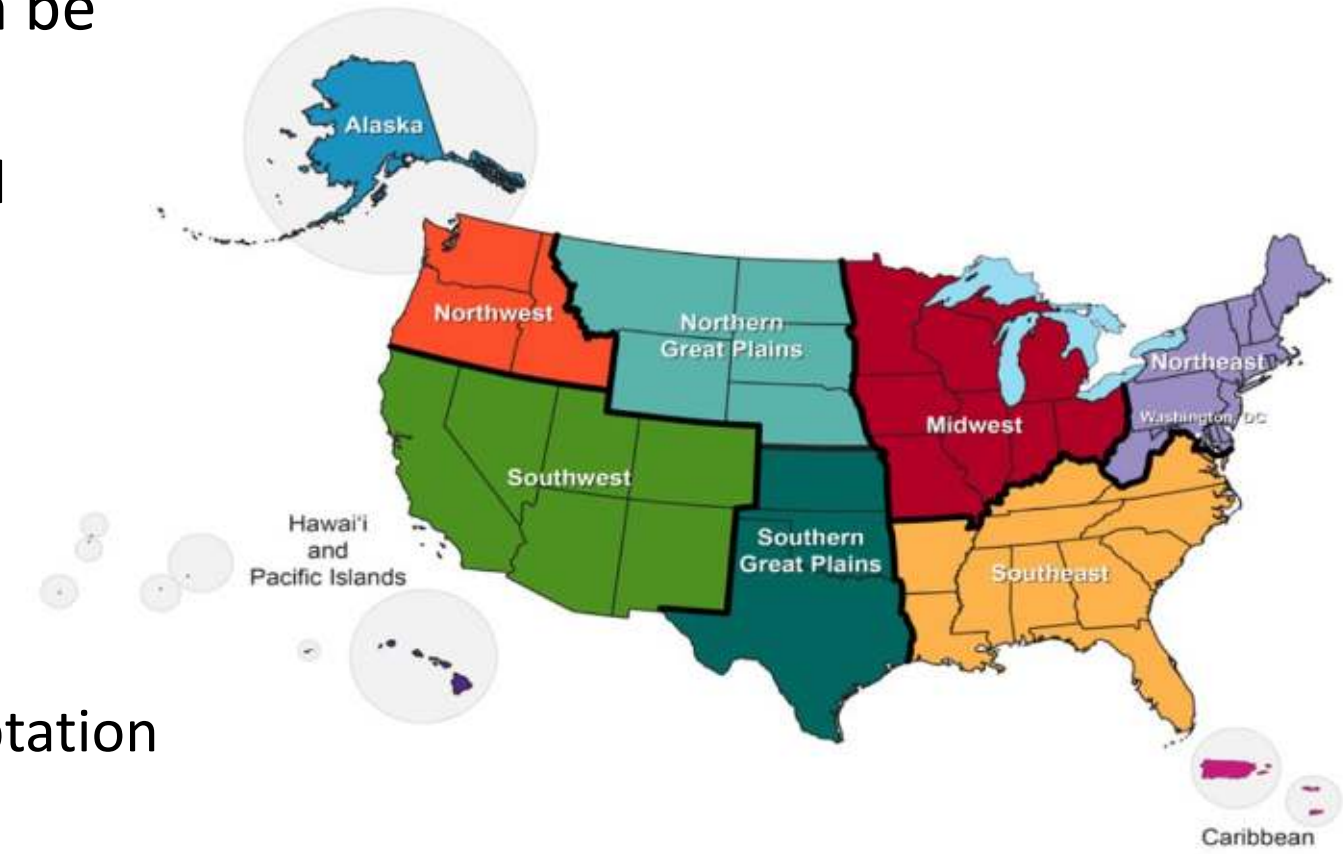
Climate Resilience Evaluation and Awareness Tool (CREAT)

Goals of CREAT's analysis:

- Increase operator awareness of potential climate change impacts on utility operations
- Determine threshold levels for asset failures and resulting consequences
- Quantify potential consequences from climate-related or other threats
- Inform adaptation decision-making based on identified threats to reduce associated impacts
- Examine the cost adaptation options in comparison to the cost associated with consequences of climate change threats

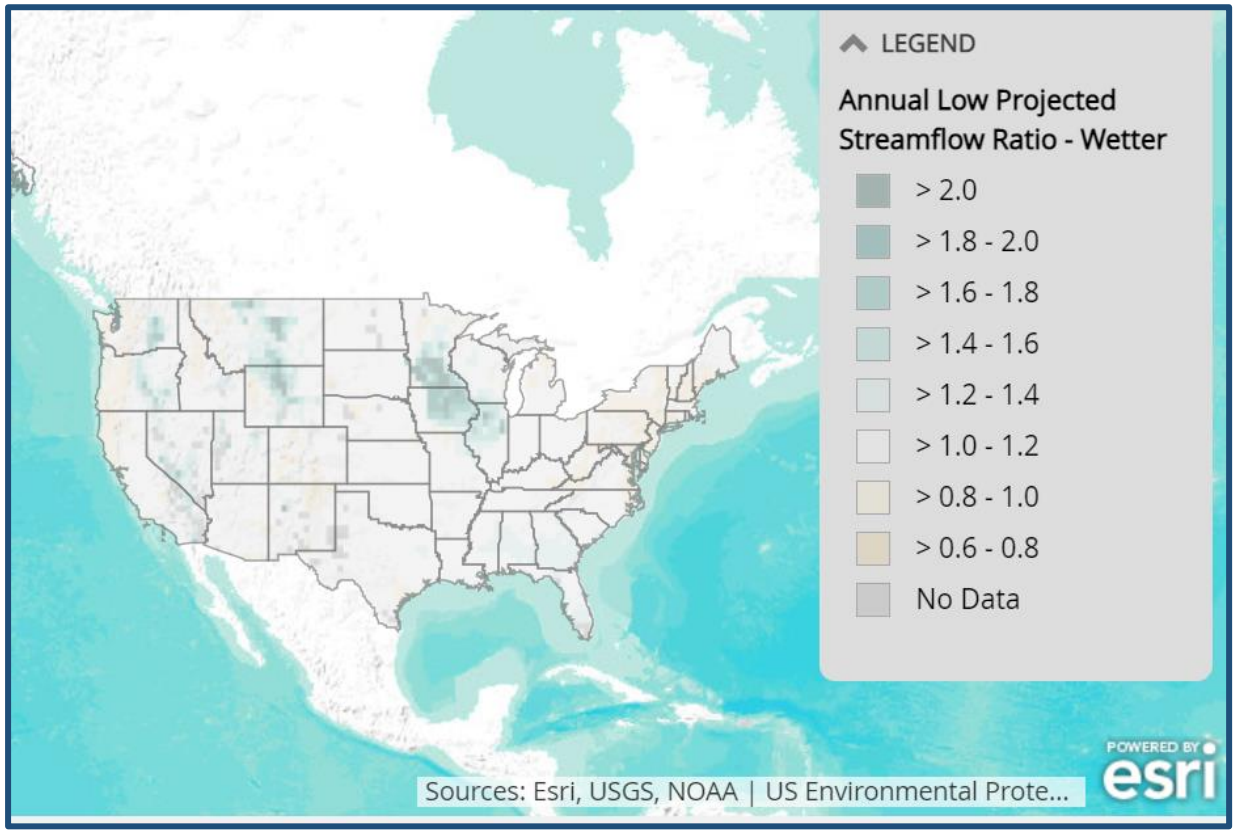
Training Center

- Region specific training modules that cover the following topics can be found here
  - Overview of CRWU tools and resources
  - Climate Awareness
  - Scenario Development
  - Adaptation Plan
  - Risk Assessment
  - Resources for financing adaptation options



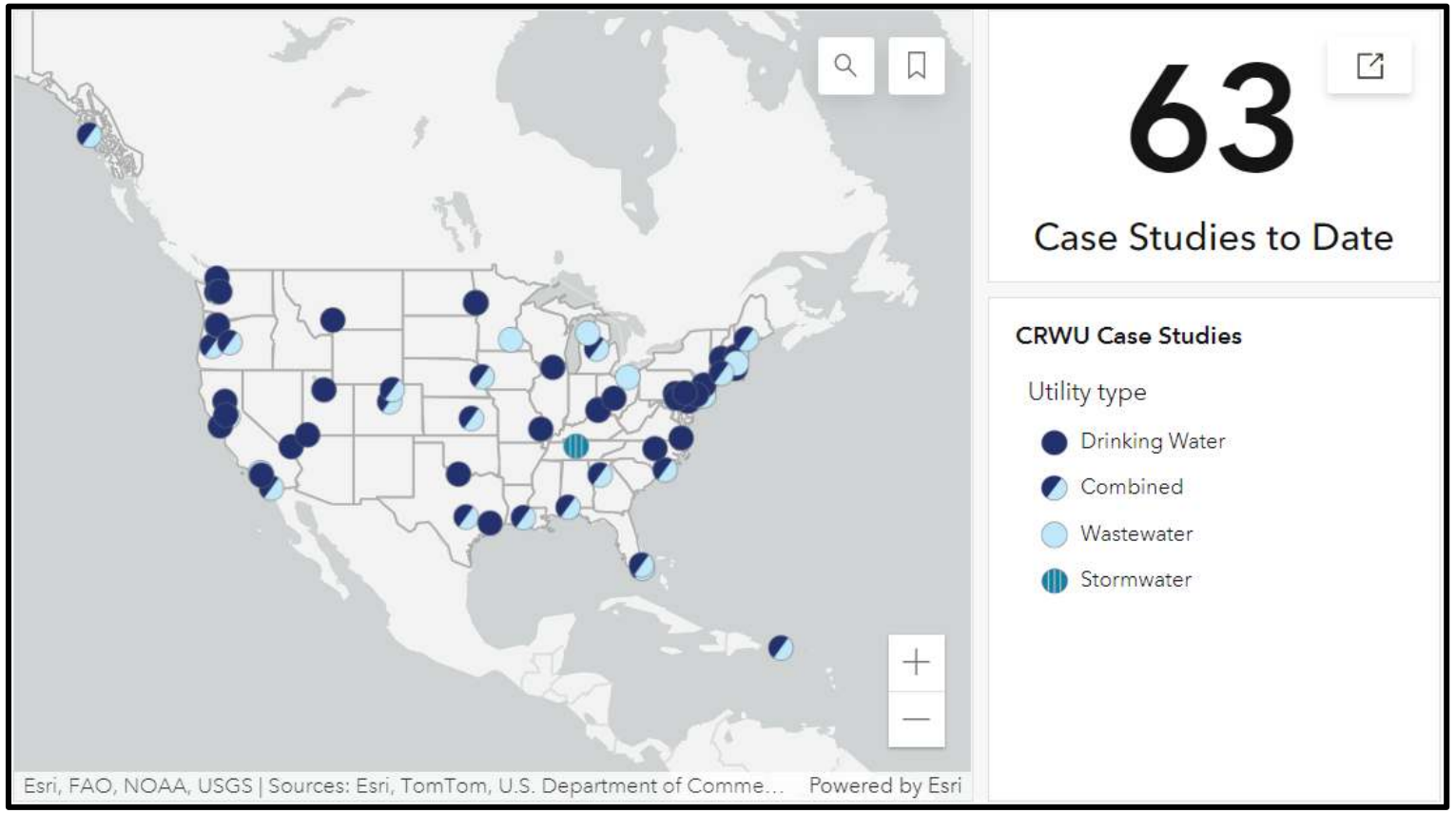
Climate Data Maps

- Interactive maps that help bring help you assess your utilities risk for:
  - Climate Change Scenarios
  - Coastal Floods and Hurricanes
  - Streamflow Projections
  - Wildfire Conditions and Risk
  - Snowpack Change



Case Study Maps

- Link to interactive map
- Case studies for how other water systems adapted to climate change



U.S. Climate Resiliency Tool Kit

- Less specific to water
- Additional resources for risk assessment, climate data, training, and technical assistance

U.S. Climate Resilience Toolkit

U.S. Climate Resiliency Tool Kit

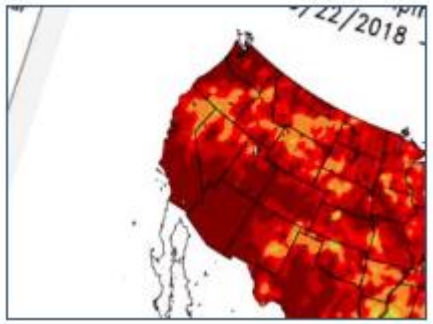
- Steps to resilience: five short modules that help you:
  - Document climate hazards
  - Decide which situations you most want to avoid
  - Come up with solutions to reduce climate-related risk

U.S. Climate Resiliency Tool Kit

- Interactive map
- Can filter by:
  - Climate threat
  - Topic (e.g. water)
  - Region
  - Steps to resilience

U.S. Climate Resiliency Tool Kit

- Offer a “tool box”
- Can filter by:
  - Climate threat
  - Topic (e.g. water)
  - Region
  - Steps to resilience



ACIS Climate Maps

Quickly generate maps of temperature and precipitation variables over various periods for states or regions of the United States.

Coastal Change Analysis Program (C-CAP) Land Cover Atlas

Examine land cover classifications within coastal regions and how they changed from 1996 to 2010.

Read more ›

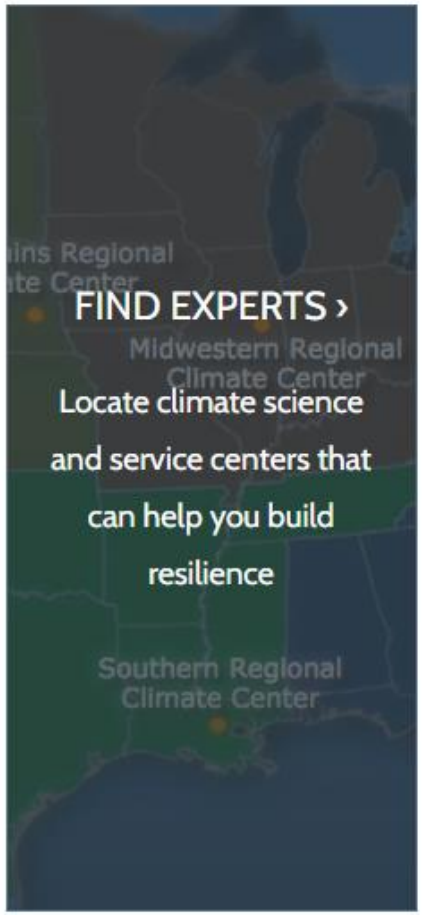
Coastal Inundation Dashboard

This dashboard brings water level data—including real-time, forecasts, storm surge, and historic flooding information—from over 200 coastal stations to your desktop.

Read more ›

U.S. Climate Resiliency Tool Kit

- Technical and education resources



Implementing a Climate Resiliency Plan

Helping You Put Your Plan In Action

Securing Funding

Technical Assistance

Workforce Development

Finding Funding

- Most comprehensive list of sources identified by CRWU Resilient Strategies Guide
  - State/region specific
- An overview of national funding sources to follow

Clean Water State Revolving Fund

FEMA

WIFIA PROGRAM

NRWA NATIONAL RURAL WATER ASSOCIATION *America's Largest Utility Membership*

USDA Rural Development U.S. DEPARTMENT OF AGRICULTURE

Funding

Source	Description	Funding Type
Clean Water State Revolving Fund	Wide-range of eligible projects to improve resiliency, strengthen and protect water infrastructure, energy and water efficiency upgrades. More information can be found here.	Low-rate loan
Water Infrastructure Financing and Innovation Authority (WIFIA) Funding	Federal credit program administered by EPA for eligible water and wastewater infrastructure projects. Any project eligible through CWSRF is also eligible through WIFIA. More information can be found here.	Low-rate loan
Federal Emergency Management Agency (FEMA) – Building Resilient Infrastructure and Communities	Eligible projects include hazard mitigation projects to reduce risks from disasters and natural hazards. More information can be found here. Application period for FY 2022 opens September 30th	Grant

Funding

For rural systems:

Source	Description	Funding Type
National Rural Water Association (NRWA) – Rural Water Loan Fund	Federal credit program administered by EPA for eligible water and wastewater infrastructure projects. Any project eligible through CWSRF is also eligible through WIFIA. More information can be found here.	Low-rate loan
U.S Department of Agriculture (USDA) Rural Development Grants	Did not find currently open funding, but always a good place to check. Partnering with EPA for Closing America's Wastewater Access Gap Community Initiative. Still in pilot phase but more opportunities may come.	Grant

Technical Assistance

- The EFCN Network!
  - Can help you address all aspects of resiliency: climate, financial planning, operator training, etc.
  - A request for TA can be filled out on the EFCN website

Technical Assistance

- Rural Community Assistance Corporation (RCAC)
- Training, technical assistance, and financial assistance to small, low-income communities in rural areas and tribes
- Assistance in building, improving, managing, and operating wastewater systems
- More information here.

Workforce Development

- Operator training offered through the EFCN network
- Training for rural communities via RCAC
- Bank of free online training materials for operators and managers from the U.S. Climate Resiliency Toolkit

EFCN
environmental finance center network

RCAC

U.S. Climate Resilience Toolkit

Other EPA Training Resources

- Water Utility Workshops and Webinars – register for upcoming trainings and view past recordings
- Water and Wastewater Utility All-Hazards Bootcamp – Training course designed for water and wastewater employees responsible for emergency response and recovery activities
- Community-Based Water Resiliency Training – Resources to conduct a water resiliency workshop in your community with a focus on integrating drinking water, wastewater, and stormwater systems

Questions

Contact us:

EFC at Sacramento State:
http://www.efc.csus.edu

Caitlyn Leo
caitlyn.leo@owp.csus.edu