

PREPARING FOR THE HEALTH EFFECTS OF DROUGHT

A RESOURCE GUIDE
FOR PUBLIC HEALTH PROFESSIONALS



**Centers for Disease
Control and Prevention**
National Center for
Environmental Health



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GUIDE INTRODUCTION



North America has experienced drought cycles for the last 10,000 years, a trend that is expected to continue.^[1] From 2000 to 2015, at least 20% of the United States was in drought, and in some of those years that increased to as much as 70% according to the U.S. Drought Monitor.^[2] During the latter part of 2012, more than half of the United States experienced moderate or worse drought.^[2] This was the worst drought in the United States, measured by moderate to extreme drought coverage, since the 1950s.^[3]

For most of 2000 to 2016, the U.S. West endured the most persistent drought ever recorded.^[4] California experienced its third driest year on record in 2014, resulting in more than 17,000 full- and part-time jobs lost and over \$2 billion in damage, economic loss, and mitigation and recovery costs.^[5]

The public health effects of drought can be severe, but they are often hard to observe or measure directly.^[6] They can include increases in vector-borne diseases and infections, poor air quality, and worsening of chronic illnesses and mental health conditions. The probability of drought-related health effects occurring varies widely and largely depends on drought severity, local population vulnerability, existing health infrastructure, and available resources to mitigate effects as they occur.^[6] As a result, public health preparedness efforts may differ significantly for different communities.^[7]

In 2010, the Centers for Disease Control and Prevention (CDC) published *When Every Drop Counts: Protecting Public Health During Drought Conditions—A Guide for Public Health Professionals* (WEDC). WEDC advocated inclusion of public health in drought preparedness and response and highlighted the many potential effects of drought on human health.

CDC developed this document, *Preparing for the Health Effects of Drought: A Resource Guide for Public Health Professionals*, to supplement WEDC. This resource guide is based on the results of a qualitative analysis of in-depth interviews with public health professionals, a review of state drought plans, and a literature review on the health effects of drought.



GUIDE INTRODUCTION



This guide includes five modules and two handouts.

The modules provide information on steps to success, tips, best practices, and resources relevant to public health professionals to help you in your efforts to prepare for drought. We list the modules and a brief descriptions of what they include below.

Five modules provide information and resources to support drought-related public health efforts:

- **What You Need to Conduct or Contribute to a Hazard and Vulnerability Assessment** has information and resources to help conduct public health vulnerability assessments related to drought and to contribute public health information effectively to jurisdiction-wide hazard and vulnerability assessments.
- **How to Communicate Drought Preparedness and Response Strategies** provides examples, tips, and resources to develop strategies to communicate to target audiences before and during drought.
- **How to Collaborate With and Educate Key Partners on Drought Efforts** provides strategies and key ideas to ensure public health is represented and plays an active role in drought planning and response efforts.
- **Where to Find Drought Data and How to Use It** provides links to and information on tools that can help you find and use drought-related data.
- **How to Find Funding and Resources** identifies some potential funding sources for drought preparedness and response programs.

Two handouts can be printed individually and distributed as needed:

- **Drought Preparedness and Response: Why You Need Your Public Health Department's Support** introduces non-public health professionals to the role public health departments can play in preparing and responding to drought. We provide space for you to customize the handout with your jurisdiction or agency's contact information and logo.
- **Saving Time, Money, and Lives—the Benefits of Drought Preparation** informs policy makers about the possible adverse health and economic impacts of drought and the benefits of funding drought preparedness activities. We provide space for you to customize the handout with your jurisdiction or agency's contact information and logo.



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WHAT YOU NEED TO CONDUCT OR CONTRIBUTE TO A HAZARD AND VULNERABILITY ASSESSMENT



WHAT YOU NEED TO CONDUCT OR CONTRIBUTE TO A HAZARD AND VULNERABILITY ASSESSMENT

Preparing for the Health Effects of Drought: A Resource Guide for Public Health Professionals includes five modules and two handouts. The modules provide information on steps to success, tips, best practices, and resources relevant to public health professionals to help you in your efforts to prepare for drought. For an overview of the resource guide and the modules, please see the Guide Introduction.

As public health professionals, you can play key roles in minimizing the adverse health effects of drought by helping your community plan ahead.^[1] One way to do that is to conduct or participate in vulnerability assessments. Such assessments evaluate the strengths and weaknesses of preparedness in your community, determine the likely effects of drought on the community, and identify the populations most likely to be affected.^[1] Conducting quantitative and qualitative vulnerability assessments helps you identify resources and plan specific actions.

This module provides information and resources to help you contribute public health information effectively to jurisdiction-wide hazard and vulnerability assessments and conduct public health vulnerability assessments related to drought. The module supplements the Centers for Disease Control and Prevention's (CDC) *When Every Drop Counts: Protecting Public Health During Drought Conditions—A Guide for Public Health Professionals*.

JURISDICTION-WIDE HAZARD AND VULNERABILITY ASSESSMENTS (JHVAs)

To respond to and recover from a disaster, your community needs to understand its relevant strengths and weaknesses. A JHVA provides this kind of advance knowledge. Traditionally, emergency management officials have led these assessments, but the lead agency varies by jurisdiction. As a public health professional, you can help ensure that the assessment considers the public health needs of the entire community and that its public health components are complete and accurate. You may want to talk with environmental or conservation experts who are knowledgeable about the effects of the environment on public health.

A regional drought planning task force could organize and facilitate a JHVA by bringing together stakeholders, including key community, nonprofit, governmental, and business groups to plan for and carry out the assessment.



WHAT WORKS

CDC's Building Resilience Against Climate Effects (BRACE) program has given some states a framework to identify priority areas for planning. Arizona used a BRACE grant to develop a climate health profile of vulnerable populations, with projections about changes in disease incidence. It identified potential interventions for the vulnerable populations and included this assessment in its climate health adaptation plan. Arizona also used a framework developed by the University of South Carolina to develop a social vulnerability index. Using census tract data, they merged data on social variables with data on exposure to drought-like conditions. They could then assess if certain populations were at high risk for health problems now and under future climate scenarios.



WHAT YOU NEED TO CONDUCT OR CONTRIBUTE TO A HAZARD AND VULNERABILITY ASSESSMENT

A JHVA provides a basis for determining the demands a disaster, such as drought or wildfires, may place on emergency resources and for assessing the improvements needed to ensure an effective response.^[2] It can capture the wide-ranging factors that contribute to disasters such as drought. As policymakers become more knowledgeable about vulnerability assessments, they realize the importance of

- understanding the resiliency of all community members and other stakeholders in their region,
- defining and characterizing the adaptive capacity for every event, and
- characterizing that capacity as specifically as possible, including for different sectors.

Other names for a JHVA include jurisdictional risk assessment, threat and hazard identification and risk assessment (THIRA), focused risk vulnerability analysis, and health hazard assessment and prioritization.^[3]

PUBLIC HEALTH VULNERABILITY ASSESSMENTS (PHVAs)

To be prepared to contribute to your area's JHVA, conduct a PHVA for your jurisdiction, including a drought assessment. The PHVA will help identify the hazards your community faces, assess the likelihood of those hazards occurring, and quantify their effect on public health. A PHVA enables you to take action to protect people.^[4]

For example, in its assessment of public health vulnerability, the Oregon Health Authority reviewed potential disasters and their consequences for people's health and the public health sector. They reviewed 43 hazards and prioritized those most likely to occur. Drought was highlighted as having a major role in the rise of wildfires, one of the highest priority hazards in Oregon. The assessment described the indirect role of drought in people's deaths through disruptions of agriculture and water systems, poor air quality, and increased heat-related and respiratory illnesses. The assessment identified drought as a high-probability hazard, but not one likely to have catastrophic effects. However, drought would increase the demand for services to vulnerable populations.^[5]



WHAT WORKS

The Florida Department of Health incorporated medical and social vulnerability into the state's all-hazards assessment. Differences in risks and hazards in different geographic areas are based on the interaction between natural risks and hazards in the areas and the people who live there. Variables such as age, race/ethnicity, wealth, and urban/rural differences affect the social vulnerability of various parts of the state. The report notes that only a limited portion of the state faces drought hazards and that most of the vulnerable counties have relatively low populations.



WHAT YOU NEED TO CONDUCT OR CONTRIBUTE TO A HAZARD AND VULNERABILITY ASSESSMENT

STEPS TO SUCCESS

Conducting assessments is an interactive, multiple-phase process. You should bring together and review all existing data, including community concerns and scientific information; solicit information from government agencies and other stakeholders; and share the assessment with all parties who contributed, as well as with those who are the subjects of your assessment, to ensure that data are accurate and current. Make sure, if possible, that public comments are addressed in the final report. Distribute the final report of the assessment to the public as well.^[6]

Many assessment tools are available. Most follow the basic steps described below and outlined in the *Hazard Risk Assessment Instrument* developed by the UCLA Center for Public Health and Disasters. The Federal Emergency Management Agency's (FEMA) *Threat and Hazard Identification and Risk Assessment Guide* outlines a similar sequence of activities.^[3]

STEPS FOR CONDUCTING A VULNERABILITY ASSESSMENT^[7]

The following five steps walk you through assessing what hazards are likely to happen in your community to deciding how your community should prepare.

1. Probability of a mishap

Make a list of possible drought-related hazards and rank them according to the probability they will occur in your community. You can work with drought experts in your jurisdiction or others in public health who may have dealt with drought to help identify these risks.

2. Severity of consequences

When something happens, how bad will it be?

Assess the vulnerability of your community according to the severity of the hazard. Factors to consider include its effects on individuals, the community, the public health agency infrastructure, transportation infrastructure, food and water access, and the provision of healthcare services.



WHAT WORKS

Oregon uses an all-hazards planning approach. When the state conducted a public health system risk assessment, it sought input from local health departments regarding what hazards (including drought) could occur within their jurisdictions. This information was incorporated into the Oregon Natural Hazards Mitigation Plan.



FOR MORE INFORMATION

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WHAT YOU NEED TO CONDUCT OR CONTRIBUTE TO A HAZARD AND VULNERABILITY ASSESSMENT

3. Scoring the consequences

When something happens, can we respond to it?

Score the severity of the consequences identified in the previous step. The UCLA instrument includes examples of severity scores, which provide qualitative comparisons between the added effect of the hazard and a community's ability to meet the needs generated; severity = magnitude – mitigation.

4. Risk analysis

Where does this assessment take me?

The final step in a community vulnerability assessment combines the probability information given in Step 1 (the likelihood of hazards occurring) with the severity data determined in Step 2 (how severe the consequences will be if the hazard occurs).

5. Translating the assessment into practice

What's next?

The assessment process should provide insights into inherent strengths and weaknesses in your community, including your public health system, which will help you identify deficiencies and decide what actions to take. Those actions may include the following:

- Reallocating material resources and financing
- Establishing mutual aid agreements
- Training and education for staff and public
- Developing a communication plan

After you make the changes, consider establishing an ongoing system for evaluating the results. As changes occur in the community, new vulnerabilities may arise and new resources may become available, which will change the outcome of the community's hazard risk assessment over time.

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TOOLS AND EXAMPLES OF ASSESSMENTS AND PLANS

Tools

- › Community Assessment Tool (CAT) for Public Health Emergencies Including Pandemic Influenza (CDC)
- › Pennsylvania Public Health Risk Assessment Tool (Drexel University School of Public Health, Center for Public Health Readiness and Communication, Pennsylvania Department of Health)
- › Comprehensive Preparedness Guide 201: Threat and Hazard Identification and Risk Assessment Guide (FEMA)
- › Reducing Drought Risk: Bridging Theory and Practice (*Journal of Natural Hazards Review*)
- › Hazard Risk Assessment Instrument (UCLA Center for Public Health and Disasters)
- › Assessing Health Vulnerability to Climate Change: A Guide for Health Departments (U.S. Climate Resilience Toolkit)
- › Hazard Vulnerability and Risk Assessment web portal (Florida Department of Health)

Examples of assessments and plans

- › Climate Science and Drought Planning: the Arizona Experience (*Journal of the American Water Resources Association*)
- › Colorado Drought Mitigation and Response Plan (Colorado Water Conservation Board, Department of Natural Resources)
- › Incorporating Medical and Social Vulnerability into an All-Hazards Assessment for the State of Florida (Florida Department of Health)
- › Pre-Disaster Mitigation Plan for Lake County, Montana (Lake County Office of Emergency Management, Helena, Montana: Tetra Tech Inc.)
- › Public Health Hazard Vulnerability Assessment (Oregon Health Authority)

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HOW TO COMMUNICATE DROUGHT PREPAREDNESS AND RESPONSE STRATEGIES





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Effective communication about the effects of drought on people's health is key to maintaining the welfare of communities. As a public health professional, you can inform your community about the effects of drought on health and the importance of planning for and mitigating those effects. It is important that you put a drought communication plan in place. Using your communication plan will help ensure that decision-makers, emergency managers, and the public get the information they need when and how they need it.^[1] Timely and effective messages keep the public and officials informed^[2] and help everyone prepare for or respond to a drought.^[1]

This module provides communication strategies, tips on reaching different audiences, advice on clear communication, and more. It supplements the Centers for Disease Control and Prevention's (CDC) *When Every Drop Counts: Protecting Public Health During Drought Conditions—A Guide for Public Health Professionals*, which has a detailed guide to developing an effective communication plan.

TIPS FOR SUCCESS

The following are tips for successful communication before, during, and after droughts. Remember that communication experts are not the only people who can help get the word out about mitigating the health effects of drought.

1. Be an active participant in creating or updating your region's drought communication plan.

Having an updated, regional communication plan helps to ensure that relevant information is shared inside your own agency, with partner agencies, and with the public during a drought. You should begin planning for drought communications long before a drought takes place.^[1]





The plan should include the following functions:

- › Describe when, how, what, and to whom drought information will be distributed.
- › Ensure that local decision-makers and emergency managers are in the information loop and that state and national authorities are updated as needed.
- › Outline provisions for communicating with the general public and the media, including responding to inquiries.
- › Ensure that local health partners, such as hospitals and community health centers, receive risk communication training and materials.
- › Provide information on a timely basis and use appropriate language for the target audience.^[1]

You can find more information on developing communication plans in the *When Every Drop Counts* guide.

2. Before and during a drought, get the community engaged early and often.

- › Develop messages that a wide audience understands. For example, to promote water conservation you can develop tools that show consumers how much water individuals and communities are using. Open and effective communication can help the public be more receptive to interventions, such as water restrictions.^[3]
- › Decision-making during a drought may involve compromises; invite the community to provide their input on decisions that will affect their lives.
- › Effective citizen engagement helps ensure that decisions reflect community preferences and that the community supports those decisions.^[3]
- › Even when there is not a drought, help prepare and distribute drought information to a core group of people responsible for safeguarding the public. Include local media and any others who indicate interest. Maintain regular outreach even in non-dry years so that during a drought the community will already know where to get information and how to interpret it.^[1]





3. Use a variety of outlets.

We get our news and information from multiple channels, and messages about drought should take advantage of those channels.^[4] Also, consider how the public and public officials want to receive information: website, social media, texts, radio, television, or traditional publications such as pamphlets, billboards, newspaper advertisements, or inserts.^[1]

- **Try text messaging.** Work with local utility districts that already have text/SMS update/alert systems you could use. The Texas Commission on Environmental Quality sends drought updates in texts and emails to anyone who signs up for them.
- **Make use of social media.** The National Weather Service uses Facebook and Twitter to share drought information. The Metropolitan North Georgia Water Planning District has Facebook, Twitter, and Instagram accounts to provide news, tips, and information on drought.
- **Consider creating a website or portal page on drought.** Some state drought programs have websites that have tools you may consider for your own campaign.
 - The California Drought website has information for the public and professionals on all aspects of drought including assistance programs, a video on managing drought, updates on how much water California residents have saved in the previous month, information on water prohibitions, photographs of drought conditions, and more.
 - California’s Save Our Water program, the state’s official water conservation program, has many water saving tips for the public and messaging tools for water agencies and others. Its Water Agency & Partner Toolkit has radio spots, videos, posters, and other resources. Its Kids Corner has videos, interactive coloring books, and more.
 - Through Colorado’s Drought Response Portal, you can search for water restrictions by ZIP code and request a “drought meter” for your area. The meter links to the state’s monthly drought reports, reservoir and snowpack summaries, and the U.S. Drought Monitor.



WHAT WORKS

Education and promotion in Australia

During Australia’s Millennium Drought (1997–2009), the public generally complied with water restrictions thanks to a comprehensive educational and promotional campaign. Special notices about the drought were included in residents’ water bills. Water storage and consumption levels were publicized on websites, television news broadcasts, billboards, phone apps, and through other media. Information about water conservation and recycling was similarly distributed.^[3] Australia’s communication strategies and other information on its programs are detailed in the 2016 report *Managing Drought: Learning from Australia* and in the 2015 article *What Australia Can Teach the World about Surviving Drought*.





- The New Jersey Department of Environmental Protection’s Drought Information website updates stakeholders about drought status, defines drought terms (such as the difference between a drought watch and drought emergency), provides tips on water conservation, maps out drought regions in the state, and more.
- The Maryland Department of the Environment’s Drought Information and Current Status web page provides information on drought conditions, water restrictions, and more, primarily for a professional audience. Its Water Conservation web page serves a broader audience, and includes tips for households, businesses, industries, and utilities on conserving water.
- The Texas Commission on Environmental Quality’s Drought in Texas website has information on how the commission responds to a drought, water rights during a drought, water conservation, a map of current conditions, and more.
- The South Carolina State Climatology Office’s Drought Program has information that health professionals can share with the public, such as water saving tips. It also has technical information, information on regulations, and a model of a drought management plan for water utilities.
- Two (of many available) examples of drought status web pages include:
 - ✓ Metropolitan North Georgia Water Planning District
 - ✓ Arizona Department of Water Resources Drought Management Program

4. Meet the needs of your audience.

Target your messages to different groups based on the information they need. For example, people with chronic respiratory conditions may need information about how drought affects local air quality.^[4] On the other hand, well owners may need information about testing wells more frequently when there is less water to dilute contaminants.^[1]



WHAT WORKS

Storytelling in Oregon

The Oregon Climate and Health Program collected stories and images to illustrate how climate affects community health in Oregon and included a selection in its *2014 Climate and Health Profile Report*. In addition to being an effective tool for including and engaging stakeholders, storytelling can spread key messages and motivate people to action. To help communities create their own stories, Oregon developed a Story Project Tool that includes different models of story and listening projects.



5. Watch the tone and timing of your messages.

Ensure that your messages are consistent, accurate, straightforward, and timely. Consider attending a training on how to create effective health messaging.

- Communicate about drought status in terms people can relate to easily. For example, instead of talking about water system capacity or water consumption in absolute terms, such as millions of gallons per day, use relative terms such as the equivalent number of showers, the percentage of the municipal water supply available, or water use compared with previous years.
- To make sure your message is clear and understood by a broad audience, use the federal plain language guidelines and CDC's Clear Communication Index when creating materials.
- Keep the following points in mind:
 - Communicate information quickly.
 - Be accurate.
 - Be trustworthy and believable.
 - Express empathy.
 - Promote action.
 - Respect your audience.^[2]

ADDITIONAL RESOURCES

From CDC

- The Drought Communication Toolbox is loaded with resources about the public health effects of drought. Its Be Prepared, Be Aware, and Be Safe sections have resources for the public and for institutions, such as hospitals. The website also has information targeted to homeowners, recreational facilities, industry, and vulnerable populations. The Watch for Signs and Symptoms of Drought chart lists physical symptoms that can result from extreme heat, spoiled food, poor air quality, limited water, and emotional stress.
- The Drinking Water Advisory Communication Toolbox has information for water utilities on how to plan for, develop, implement, and evaluate communication with the public and stakeholders during drinking water notifications and advisories.



HOW TO COMMUNICATE DROUGHT PREPAREDNESS AND RESPONSE STRATEGIES

- The Crisis and Emergency Risk Communication (CERC) program provides trainings, tools, and resources to help health communicators, emergency responders, and leaders of organizations communicate effectively during emergencies. Its CERC Manual describes crisis and emergency risk communication principles. CERC Templates and Tools help agencies prepare and communicate before, during, and after an emergency.

Drought communication plans

- The British Columbia Ministry of Forests, Lands and Natural Resource Operations in Canada created a *Drought Communication & Response Plan* to support effective and timely responses during periods of low streamflow levels.
- *Communication Plan for Low Flows in the Nicola Watershed* coordinates drought response and builds awareness and understanding of the roles of government agencies (federal, regional, and local), local stewardship groups, and others in responding to drought.

For ranchers and their families

- The University of Nebraska's National Drought Mitigation Center has information on reducing emotional stress, protecting your health and your finances, working together as a family during a drought, and more. The website includes links to mental health resources, including hotlines.

For coping with drought-related mental stress

- The Missouri Department of Mental Health, University of Missouri Extension has a one-page handout on *Tips for Coping with Drought-related Stress*.
- The federal government's Substance Abuse and Mental Health Services Administration has a web page on drought, which describes who is most at risk for emotional distress from a drought, the signs of such distress, where to find help, and other resources.

Water conservation tips, including for schools and businesses

- The Department of Homeland Security's drought page offers consumers tips on how to save water in their homes and yards before and during a drought.



FOR MORE INFORMATION

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- The Metropolitan North Georgia Water Planning District’s water conservation program, My Drop Counts, has numerous programs to engage consumers, including the option to Take the Pledge to reduce water, a tool for calculating your water use, a Water-wise Landscape Guide, information about water and water conservation, and more.
- Save Our Water is a California water conservation program created in 2009 by the Association of California Water Agencies and the California Department of Water Resources. In addition to consumer information on water conservation and rebate offers, it has a toolkit on water conservation for water agencies.
- The federal government’s Environmental Protection Agency runs the WaterSense program, which recognizes water-efficient products. Its website also has resources for homeowners and businesses on saving water.

For drought and water conservation communications

- The American Water Works Association has a short *Water Conservation Communications Guide* for water agencies. It covers topics such as conservation vs. drought response, avoiding conservation backlash, the importance of quantitative research, and more.
- The Wisconsin Division of Public Health’s Wisconsin Climate and Health Program created a *Drought Toolkit* to help local governments, health departments, and consumers in Wisconsin. It has background information, strategies, media releases, talking points, definitions, reference materials, and more.

For residents with private well water on protecting their water during a drought

- The Wisconsin Department of Natural Resources has information on how often consumers should have their wells tested, how to get them tested, contaminants found in wells, and more.
- The PennState Extension’s Managing Your Well During Drought web page discusses how droughts affect wells, how to monitor your well, how to conserve water, and what to do if your well runs dry.
- The State of New Hampshire Department of Environmental Services’ *Drought Guidance for Homeowners on Private Wells* discusses water conservation, indications that a well is going dry, making improvements to a well, and more.

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HOW TO COLLABORATE WITH AND EDUCATE KEY PARTNERS ON DROUGHT EFFORTS





HOW TO COLLABORATE WITH AND EDUCATE KEY PARTNERS ON DROUGHT EFFORTS

Preparing for the Health Effects of Drought: A Resource Guide for Public Health Professionals includes five modules and two handouts. The modules provide information on steps to success, tips, best practices, and resources relevant to public health professionals to help you in your efforts to prepare for drought. For an overview of the resource guide and the modules, please see the Guide Introduction.

Drought can harm people’s health.^[1] A proactive risk management approach that involves close collaboration with partners helps to reduce that threat. This module helps you identify and work with partners and stakeholders to reduce the public health effects of drought by getting involved with your regional drought planning task force and other collaborative efforts. This module supplements the Centers for Disease Control and Prevention’s (CDC) *When Every Drop Counts: Protecting Public Health During Drought Conditions—A Guide for Public Health Professionals*.

A community-based approach to drought preparedness involves convening groups to solve problems, raising funds, and then implementing solutions together. Given the limited resources and multiple demands on people’s time, collaborative approaches can be an equitable way to sustain community groups.

STEPS TO SUCCESS

Here are some of the specific steps you can take to ensure that drought planning and response efforts in your community address public health concerns.

1. Join your regional drought planning task force

Many states^[2-4] or regions^[5-6] have a drought task force, drought council, or similar group representing a range of interests. By joining such a group in your area, you can ensure that public health concerns are on the agenda as well. The responsibilities of these groups differ, but may include the following:

- Creating a drought preparedness plan for the state or region^[7]
- Providing direction on water- and drought-related issues^[8]
- Coordinating responses to droughts^[9]
- Leading community education and outreach efforts^[8]
- Providing a central information source for the news media^[10]



WHAT WORKS

The Illinois Department of Public Health surveyed local health agencies about their knowledge of the health effects of drought. It then developed a summer heat toolkit to educate health agencies about drought and on preparing for extreme weather conditions. It also funded these agencies to conduct risk assessments for their local communities to plan for the consequences of drought.





HOW TO COLLABORATE WITH AND EDUCATE KEY PARTNERS ON DROUGHT EFFORTS

2. Get involved early

Public health professionals are not always involved early in drought preparedness and response activities. By getting involved early you can help other agencies understand the range of activities in which public health professionals can play a role, including

- developing drought plans,
- providing water monitoring data,
- conducting health surveillance and vulnerability assessments,
- educating local agencies,
- assisting with response activities, and
- evaluating drought-related effects on public health.

Planning

At the planning stage, you can work on public education, either directly or by assisting local communities and partners in the following ways:

- Collaborate with local health departments to learn about their knowledge base and educate them about the health effects of drought. Health departments may also need risk communication messages they can provide to the public.
- Educate the public during nondrought periods about important steps they can take to conserve water. For example, they could replace old toilets and clothes washers with new, high-efficiency models. They could also cut lawns higher in hot months to conserve soil moisture and avoid watering vegetation during the heat of the day.^[7]
- Help communities prepare for drought by
 - identifying vulnerable populations,
 - making disease projections,
 - performing an intervention assessment, and
 - planning for specific health effects, (e.g., those resulting from fires during droughts).



WHAT WORKS

Regional cooperation can improve the response to drought. North Carolina, which shares water and other resources with neighboring states, was able to coordinate its drought response more effectively by sharing its drought plans with the other states and by networking through a coalition for health and medical activities in the region.



WHAT WORKS

In California, the governor's office coordinated the efforts of multiple agencies on the state's drought plan.



HOW TO COLLABORATE WITH AND EDUCATE KEY PARTNERS ON DROUGHT EFFORTS

During the planning stage, you may also provide guidance on health risks in the following ways:

- Conducting or contributing to vulnerability assessments, including social vulnerability assessments to find out which populations are at particularly high risk for adverse health effects from drought
- Ensuring that other members of the task force are aware of specific population groups who are particularly vulnerable to public health effects from drought, including the following:
 - Children, older adults, pregnant women, and low-income people
 - Families who need safe water to prepare infant formula
 - Businesses that rely on water, such as farms, ranches, restaurants, and hair salons
 - People doing outdoor water activities
 - People who rely on water from private wells
- Working with CDC to analyze the effects of drought on vulnerable populations, outside of municipal drinking water concerns
- Providing data and disease surveillance that can help states and communities address questions about drought and plan for it

You and your public health colleagues may not be able to get as involved in drought planning as you would like because of limited resources. However, you should participate when you can so that others will be aware of your public health expertise and your willingness to help with drought preparedness.

Response

Some key roles you may play in drought emergency response planning include the following:

- Monitoring water quality and informing the public of water contamination risks
- Assessing the dryness of soil during dust storms
- Monitoring the effects of wildfires
- Tracking harmful algal blooms
- Participating in surveillance of drought-related health conditions



WHAT WORKS

State agencies have successfully collaborated with local health departments to provide them with risk communication messages for the public.



WHAT WORKS

The Oregon Health Authority updated its public health drought web page with resources and messages, provided educational materials on wildfires to county health departments, and made recommendations through interagency participation and outreach to stakeholders and the public about how the agency could respond in the future. These types of long-term outreach and education can play important roles in drought planning.



HOW TO COLLABORATE WITH AND EDUCATE KEY PARTNERS ON DROUGHT EFFORTS

- Conducting media outreach regarding drought conditions
- Working with other agencies to recommend or require conservation measures during a drought
- Assessing the water quality from privately owned sources, and informing the public that you perform this service
- Helping other agencies with tasks such as delivering water to vulnerable populations, delivering food boxes, and helping people whose wells have gone dry^[7]

3. Educate others

You can help keep task force members and key partners engaged by educating them about the health effects of drought, ways to mitigate the effects, and the roles different agencies and groups play in responding to the risks of drought.

- **Find out what task force members and partner agencies know.** This could mean holding a meeting or webinar, establishing a workgroup, or conducting a survey of local health agencies.
- **Educate task force members and others who have responsibilities in disaster response and water-related issues.** This could include educating non-public health partner agencies, such as departments of agriculture or water and soil resources,^[10] about adverse health effects that can result from drought. You can also show how public health agencies respond to drought-related health concerns, explain how agencies can work together and the roles of each agency, educate municipal water providers about water conservation, and create drought exercises to train stakeholders.^[8]
- **Keep people engaged during nondrought periods.** Collaboration and interagency coordination are important to make sure people understand what their agency’s responsibilities are during a drought and to encourage other agencies to involve public health early in a future drought response. Continuing to attend task force meetings and maintaining regular communication with other agencies can help keep them engaged.

FOR MORE INFORMATION

Centers for Disease Control and Prevention

National Center for Environmental Health
Division of Environmental Hazards and Health Effects Health Studies Branch
 4770 Buford Highway, MS F-60
 Chamblee, GA 30341
 Phone: 770-488-3410



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4. Collaborate with others beyond regional task forces

Consider collaborating across multiple agencies, nongovernmental organizations, and communities in preparing for and responding to the health effects of drought. Join efforts already underway in the community.

- Consortiums that address drought can work closely with government agencies to tailor plans so they are appropriate for their specific communities.
- In rural areas, you may collaborate with groups you do not normally work with on public health concerns, such as the U.S. Department of Agriculture's Forest Service, the U.S. Environmental Protection Agency, the National Park Service, the U.S. Department of the Interior's Bureau of Land Management, and state resources and park departments.

RESOURCES

Collaboration Resources. National Forest Foundation. <https://www.nationalforests.org/collaboration-resources>.

Collaboration Resources. Red Lodge Clearinghouse. <http://www.rlch.org/content/collaboration-resources>.

Collaboration Toolkit: How to Build and Maintain Effective Partnerships to Protect Sources of Drinking Water. Source Water Collaborative. <http://sourcewatercollaborative.org/how-to-collaborate-toolkit/>.

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WHERE TO FIND DROUGHT DATA AND HOW TO USE IT





WHERE TO FIND DROUGHT DATA AND HOW TO USE IT

Preparing for the Health Effects of Drought: A Resource Guide for Public Health Professionals includes five modules and two handouts. The modules provide information on steps to success, tips, best practices, and resources relevant to public health professionals to help you in your efforts to prepare for drought. For an overview of the resource guide and the modules, please see the Guide Introduction.

As a public health professional, you need accurate and appropriate data to assess how drought affects health, prepare for a drought, and respond to a drought and drought-related disasters and emergencies. However, obtaining, interpreting, and using the data to make a difference in people’s lives is difficult without the appropriate tools, staff, and training.^[1-2]

This module provides information on tools that can help you find and use drought data. It provides links to and information about sources of data on drought trends and about the effect of drought on public health. It also includes links to online tools that will help you plan for and navigate drought conditions. The module supplements the Center for Disease Control and Prevention’s (CDC) *When Every Drop Counts: Protecting Public Health During Drought Conditions—A Guide for Public Health Professionals*.

RESOURCES

The following data resources are categorized into three areas:

1. effects of drought,
2. drought trends, and
3. planning tools and frameworks.

However, some of the resources span the different categories.

Effects of drought

U.S. Drought Portal

The National Oceanic and Atmospheric Administration’s (NOAA) National Integrated Drought Information System (NIDIS) runs the expansive U.S. Drought Portal. The information and tools within the portal can help you assess the potential effects of drought, and prepare for and lessen those effects. The portal includes local, regional, and national statistics and a variety of sources of information, such as the following:



WHAT WORKS

A BRACE grantee in Arizona identified vulnerable populations, diseases that could pose a risk to those groups during different climate events, and possible interventions. The profile is being used as part of Arizona’s current and future Climate and Health Adaptation Plan.^[5] To identify vulnerable populations, Arizona merged data on social variables such as income and education levels with drought data to assess whether certain populations were at high risk for adverse health effects in different climate scenarios.





WHERE TO FIND DROUGHT DATA AND HOW TO USE IT

- Links to the U.S. Drought Monitor, NIDIS Regional Drought Early Warning Systems (DEWS), and NOAA’s Regional Climate Centers
- Information on how drought is affecting agriculture, water supplies, wildfires, and other sectors; groundwater and surface water monitoring; and stream flows, surface water measurements, snowpack data, and evaporative stress indices
- Links to interactive sites where you can customize information by designating locations, date ranges, and comparisons among events and conditions
- Applications that can create charts or maps specific to your conditions

National Weather Service Drought Portal

The National Weather Service’s drought portal has information on drought-related safety measures, monitoring, and forecasts; taking action; the effects of drought; and types of drought. It links to numerous resources, including the U.S. Drought Monitor, U.S. Drought Monitor Explained, U.S. Seasonal Drought Outlook, Drought Impact Report, Drought Basics and Education, and more.

Climate Change and Human Health Literature Portal

Developed by the National Institute of Environmental Health Sciences, this portal can help you locate published research studies on the health implications of drought and other related topics. Search filters include geographic area, audience, type of material, and time-span.

U.S. Global Change Research Program (USGCRP)

Congress created the USGCRP in 1989 to develop and coordinate a U.S. research program to explain, assess, predict, and respond to climate-related events such as droughts. USGCRP coordinates climate and health-related research and monitoring, vulnerability and risk assessments, and communication, education, and engagement efforts across the federal government, in partnership with organizations in the United States and around the world. One of its resources includes the following tool:

The Metadata Access Tool for Climate and Health (MATCH)

MATCH is a publicly accessible, online tool that offers centralized access to metadata about thousands of government-held datasets related to health, the environment, and climate-science.



WHAT WORKS

Researchers with the Carolinas Integrated Sciences and Assessments (CISA) program, based at the University of South Carolina, used tools developed by the Community Collaborative Rain, Hail, and Snow Network to recruit volunteers to collect and record daily precipitation measurements and weekly status reports about local conditions. CISA interviewed decision-makers to learn how that data can best be used to respond to drought.



WHERE TO FIND DROUGHT DATA AND HOW TO USE IT

Drought trends

U.S. Drought Monitor

The U.S. Drought Monitor is a website that features a map, updated weekly, of the location and intensity of droughts across the United States. The map incorporates climatologic, hydrologic, and condition data from multiple federal and state agencies and local observers. Some drought disaster declarations are now triggered automatically by the U.S. Drought Monitor status. The site includes links to many other sources of drought monitoring data, including historical and forecast data.

North American Drought Monitor (NADM)

NADM is a cooperative effort between drought experts in Canada, Mexico, and the United States to monitor drought across the North American continent on an ongoing basis. NADM synthesizes multiple indices, outlooks, and reports of local conditions into an assessment that best represents current drought conditions. It includes maps, narratives, indicators (e.g., precipitation, temperature, streamflow), and data depicting areas of drought and abnormally dry conditions across the continent, compiled from national analyses prepared in the United States, Canada, and Mexico.

National Weather Service Climate Prediction Center: Drought Monitoring

The Drought Monitoring web page houses the Palmer Drought Severity Index and the Crop Moisture Index. These are indices of the relative dryness or wetness affecting water-sensitive economies. The data are provided in graphical and tabular formats for the contiguous United States.

- Current Palmer Drought Severity Index (by Climate Divisions)
- Current Palmer Drought Severity Index Percentiles (by Climate Divisions)
- Current Palmer Drought Severity Index Percentiles (by State)
- Additional Precipitation Needed to Bring Palmer Drought Index to -0.5



WHAT WORKS

State data can be very useful to local health departments. In Illinois, one community that collects data on well permits saw an increase in permits to deepen wells during drought conditions. The data proved useful to local health departments who serve as delegates to a private water program.^[6]



WHERE TO FIND DROUGHT DATA AND HOW TO USE IT

National Drought Mitigation Center (NDMC)

Established at the University of Nebraska-Lincoln in 1995, NDMC helps people and institutions develop and implement measures to reduce societal vulnerability to drought, stressing preparedness and risk management rather than crisis management. It offers a wide selection of data tools and resources. (The Planning Tools and Frameworks section has additional links to the NDMC website.)

U.S. Drought Risk Atlas

The U.S. Drought Risk Atlas provides historical drought information and a web-based tool to visualize and assess a community's risk for drought. You can find the station closest to your area of interest and a cluster of stations with similar precipitation attributes. NOAA's Climate Program Office funds the program.

Vegetation Drought Response Index (VegDRI)

The VegDRI map, updated weekly, shows the effects of drought on vegetation.

Drought Impact Reporter

An archive of drought effects, the Drought Impact Reporter can help planners, climate researchers, and the public understand the past effects of drought for specific locations. It is updated in near-real-time from media, government, and individual observers' reports. It categorizes reports and effects by sectors, such as agriculture, water supply and quality, and society and public health. NDMC developed the tool with support from NOAA and the U.S. Department of Agriculture.

NOAA's National Centers for Environmental Information (NCEI)

NCEI preserves, monitors, assesses, and provides public access to climate and historical weather data and information. Some of its resources include the following:

State of the Climate

The State of the Climate site provides a collection of monthly summaries recapping climate-related occurrences, including drought, on a global and a national scale. The drought report includes the following sections:

- Temperature, Precipitation, and Drought
- U.S. Percentage Areas (Very Warm/Cold, Very Wet/Dry)



WHAT WORKS

Convergence is a collaboration among climatologists, public health researchers and professionals, environmental scientists, social science researchers, and community stakeholders to identify and address the effects of extreme climate events on communities in the Carolinas. Its Heat-Health Vulnerability Tool predicts the daily number of emergency department visits for heat-related illness across North Carolina. The tool helps identify what groups, such as the elderly and those who work outdoors or live in trailers, are most vulnerable to the heat.



WHERE TO FIND DROUGHT DATA AND HOW TO USE IT

Regional Climate Center (RCC) Program

The RCC Program website lists six regional climate centers. These regional centers—High Plains (see sidebar), Midwestern, Northeast, Southeast, Southern, Western—develop sector-specific data products and services, provide a computer-based infrastructure for climate information, and integrate and store non-NOAA climate data with traditional NOAA data sources. Each center also provides a variety of tools and resources. Some of the center's resources and information are applicable to regions outside of the RCC Program.

NOAA's Climate.gov

The Climate.gov website has tools for accessing data on drought and other climate-related conditions. Its Dataset Gallery is a visual catalog with filtering options and instructions for navigating data access tools. It links to a weekly drought map, drought risk atlas, and more. Its Climate Data Primer has links to the data sources that ranchers, farmers, and outdoor-recreation businesses regularly use to monitor drought conditions.

Data Basin

Data Basin is a mapping and analysis platform created by a team of scientists, software engineers, and educators at the Conservation Biology Institute. It supports learning, research, and sustainable environmental stewardship. The platform allows users to explore and organize data and information, create custom visualizations and analyses, use collaborative tools in groups, publish datasets and maps, and develop decision-support and other custom tools.

Critical Zone Observatories

The National Science Foundation-supported Critical Zone Observatory program has nine environmental observatories that study the Earth's outer surface—where water, atmosphere, ecosystems, soil, and rock interact. The program serves the international scientific community through research, infrastructure, data, and models. It has national datasets on a variety of topics, including groundwater depth, precipitation, soil moisture, well water levels, and more.

HIGH PLAINS REGIONAL CLIMATE CENTER (HPRCC)

Part of the University of Nebraska-Lincoln's School of Natural Resources, HPRCC works to increase the use and availability of climate data and information. Its six-state region covers Kansas, Colorado, Nebraska, Wyoming, South Dakota, and North Dakota.

Applied Climate Information System (ACIS) Climate Maps

NCEI's Regional Climate Centers developed and maintain ACIS to manage the complex flow of climate data from climate data collectors to the end users. ACIS data are used to create national daily and seasonal climate maps.

Automated Weather Data Network (AWDN)

AWDN gathers observational data on the High Plains region for stakeholders in agriculture and related fields.

County Level Data

This dataset provides countywide, 30-year averages for temperature and precipitation for all counties in the High Plains region.

Station Tool

This tool allows users to search for weather stations across the United States and download temperature and precipitation graphs.

30-Year Climate Normals

This link provides a variety of monthly and annual maps of historical, normal precipitation in the High Plains region.

WHERE TO FIND DROUGHT DATA AND HOW TO USE IT

U.S. Geological Survey's (USGS) Groundwater Information Pages

The USGS's Office of Groundwater website has information, studies, and data about groundwater throughout the country, grouped as follows:

- › Groundwater Levels
- › Aquifers
- › Groundwater Flow and Transport Models
- › Water Use
- › Groundwater Quality Data
- › Local Groundwater Data
- › Other Sources of Water Data

USGS's WaterWatch

The WaterWatch website has maps, graphs, and tables that show real-time, recent, and past streamflow conditions for the United States. The maps have the locations of more than 3,000 long-term (30 years or more) USGS stream gauges, streamflow conditions compared with historical streamflow, locations where floods and droughts are occurring, and more.

Western Region Climate Service Providers Database

The Western Region Climate Service Providers database is a directory of climate service providers in the western United States. It has information on workshops, decision-support tools, vulnerability assessments, training and education, and more. The information is searchable by geographic area or sector served.

California Landscape Conservation Cooperative's Climate Commons

The Climate Commons provides climate-related data, information about the science that produced it, and guidance for applying climate science to conservation in California. Through its library, you can access climate datasets, research papers, and web resources; compare tools for accessing the impact of climate; and more. The site also has tools for scenario planning and vulnerability assessment and examples of climate adaptation strategies.





WHERE TO FIND DROUGHT DATA AND HOW TO USE IT

WestWide Drought Tracker (WWDT)

WWDT provides access to fine-scale drought monitoring. Its climate datasets, drought indices, and maps are updated monthly using data from the PRISM Climate Mapping Program at Oregon State University.

California Climate Console

The Climate Console is a web application designed for exploring climate projections for a selected area of interest in California.

California Climate Change Assessments

The California Climate Change Assessments web page (part of the state's website on climate) posts the state's periodic scientific assessments on the potential effects of climate in California.

Planning tools and frameworks

CDC's Climate-Ready States and Cities Initiative

The Climate-Ready States and Cities Initiative is helping states and cities prepare for adverse climate effects through steps such as the following:

- Collaborate with local and national climate scientists to understand what and how climate-related conditions, such as drought, may affect their regions.
- Develop and use models such as the following to predict and monitor potential health effects, and to identify the areas most vulnerable to drought and other conditions.
 - **Building Resilience Against Climate Effects (BRACE)**
BRACE grants can help public health officials develop strategies and programs that incorporate complex atmospheric data and short- and long-range climate projections into their drought-related planning.
 - **Climate Models and the Use of Climate Projections: A Brief Overview for Health Departments**
Climate Models and the Use of Climate Projections defines and describes climate outlooks and climate models that can help public health professionals plan for the health effects of climate events such as drought. It also includes a topic overview and some suggested initial approaches for state and local health departments.





CDC Drought Communication Toolkit

Experts from CDC, the Center for Environmental Health (a nonprofit organization), and the National Public Health Information Coalition (an independent group of public health communication professionals) developed the Drought Communication Toolkit to provide information about the public health effects of drought. Some of the information is for consumers, but you will also find planning tools for public health officials. For example, the toolkit links to the U.S. Environmental Protection Agency's (EPA) website on drinking water protection, which has links to resources, including the Source Water Collaborative and EPA source water protection coordinators in your area.

CDC's Community Assessment for Public Health Emergency Response (CASPER)

CASPER is a technique for surveying households to assess public health needs in a community. It can also be used to help communities prepare for disasters, assess public health perceptions, and estimate new or changing needs. CASPER can be used in disaster and non-disaster settings. The information generated can be used to initiate public health action and facilitate planning. For example, in 2015 and 2016, in Mariposa County, California, and in 2017, in Crook County, Oregon, CASPER was used to address the ongoing effects of drought within these communities, conduct a descriptive analysis of the health effects associated with drought, and provide suggestions to improve public health response to drought and other emergencies.^[3] CASPER has also been used to collect information on household water practices before, during, and after a "Do Not Use" order and to determine the general and mental health needs of a community after chemical spills and contamination of water sources.^[4]

The National Center for Environmental Health (NCEH) at CDC provides CASPER technical assistance and training to state, tribal, local, and territorial health departments, emergency management agencies, and others interested in conducting CASPER. NCEH also created a CASPER website that has guidelines on questionnaire development, methodology, sample selection, training, data collection, analysis, and report writing.^[4]





WHERE TO FIND DROUGHT DATA AND HOW TO USE IT

CDC's Drought and Health Analysis Guide

This guide describes how to assess the health effects of drought. It includes recommended approaches and best practices for doing a quantitative analysis of the possible links between drought and people's health. It also includes a review of the literature and sources of data on the topic. Scenarios described in the guide explore approaches for using available data to analyze the effects of drought on selected health conditions.

The Federal Emergency Management Agency (FEMA): Mitigating Flood and Drought Conditions Under Hazard Mitigation Assistance

FEMA helps fund mitigation projects that reduce losses from droughts and floods. Projects include aquifer storage and recovery, floodplain and stream restoration, flood diversion and storage, and green infrastructure methods. The website has a host of resources for planners, such as the following:

- Benefit Cost Analysis tools for calculating the benefits of drought mitigation projects
- Fact sheets with high-level technical information and requirements for Hazard Mitigation Assistance programs
- Webinars providing additional guidance on conducting a benefit cost analysis for restoration and drought mitigation projects

Drought-Ready Communities

The Drought-Ready Communities website of the University of Nebraska's National Drought Mitigation Center has detailed information on drought planning. It defines drought planning, describes how drought monitoring fits into planning, and describes planning and monitoring activities conducted by states, tribes, and various local and regional agencies.

The U.S. Climate Resilience Toolkit

The U.S. Climate Resilience Toolkit has tools, information, and case studies collected from across the federal government that are geared toward building resilience to drought and other climate events.



FOR MORE INFORMATION

Centers for Disease Control and Prevention

National Center for
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*Division of Environmental
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4770 Buford Highway, MS F-60
Chamblee, GA 30341
Phone: 770-488-3410



California's Department of Water Resources

The California Department of Water Resources website describes the department's efforts to protect drinking water and other resources from climate effects through mitigation and adaptation measures. Its *Climate Change Handbook for Regional Water Planning* provides a framework for considering climate in water management planning.

USGCRP's Scenarios for the National Climate Assessment

The USGCRP's Scenarios for the National Climate Assessment are scenarios for different regions of the United States showing how the future may evolve given varying climate conditions. They help experts assess potential climate risks and possible responses to those risks. The scenarios include graphics, references to datasets, and other resources. Scenarios are available for the Northeast, Southeast, Midwest, Great Plains, Northwest, Southwest, Alaska, and Hawaii/Pacific Islands.

TIPS FOR SUCCESS

- Collaborate with a state-level climatologist who can help translate climate and precipitation data for public health professionals. For example, climatologists can use climate and precipitation data from geographic information systems to help answer questions about the degree and timing of drought events that may pose a health risk.^[7] Public health departments can get data from healthcare facilities they license, such as hospitals and nursing homes, to see if there are any notable increases in emergencies or medical or mental health conditions during a drought.
- Having data from long-term surveillance, such as on the quantity or quality of drinking water and health conditions, is essential for health departments to assess the relationship between drought and health.

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HOW TO FIND FUNDING AND RESOURCES



HOW TO FIND FUNDING AND RESOURCES

Preparing for the Health Effects of Drought: A Resource Guide for Public Health Professionals includes five modules and two handouts. The modules provide information on steps to success, tips, best practices, and resources relevant to public health professionals to help you in your efforts to prepare for drought. For an overview of the resource guide and the modules, please see the Guide Introduction.

When drought becomes a crisis, emergency funding is often available. However, funding for planning and mitigation efforts before a drought can be hard to find. Among the various potential funding sources, none offer a single, comprehensive program for funding drought preparedness and response programs. Finding funding that is available for your region or for your project could take research. This module, which supplements the Centers for Disease Control and Prevention's (CDC) *When Every Drop Counts: Protecting Public Health During Drought Conditions—A Guide for Public Health Professionals*, provides resources and ideas to help you identify funding for your project.

STEPS TO SUCCESS

DEVELOP A NEEDS-BASED FUNDRAISING PLAN

- Start by identifying **your** community's needs. Communities differ in the types of needs they have. For example, you may be looking for funding to analyze data from hospital records, to map vulnerable areas, to develop health effect and vulnerability assessments, or to identify the health effects of drought.
- Identify your financial needs and create a realistic budget.

RESEARCH AND IDENTIFY FUNDERS

A variety of government agencies, foundations, and community organizations, such as the ones presented here, fund drought preparedness programs. However their focus, funding amounts, timing of gifts and grants, and terms of giving differ. Before investing a significant amount of time developing a proposal, you should contact the potential funder to discuss your needs and determine if their program will meet your needs. Also, find out how long it will take to receive your funds. In the case of federal government funding, the wait may be many months.^[1]



HOW TO FIND FUNDING AND RESOURCES

Federal government

Certain federal programs help fund local governments' and communities' drought planning efforts.^[1] The following are programs that specifically target drought:

Grants.gov

This federal government website allows you to search and apply for federal grants. Enter the keyword “drought” or “drought and health,” then click on the additional search criteria listed on the left of the page to narrow your results.

Bureau of Reclamation

This bureau has a variety of grant programs to help areas in the West plan for and respond to drought.^[2] The bureau provides help during droughts and with drought contingency planning, including water management improvement.

- WaterSMART Grants help fund projects that save water, increase energy efficiency and the use of renewable energy in water management, protect endangered species, among others. Projects are selected through a competitive process. The focus is on projects that can be completed within 24 months.^[3]
- Small-Scale Water Efficiency Projects funds projects such as the installation of flow measurement or automation in a specific part of a water delivery system, lining of a section of a canal to address seepage, or small rebate programs to reduce residential water use.
- Water Marketing Grants help with planning activities to establish or expand water markets or water marketing transactions.
- Drought Response Program Contingency Planning supports the development or update of a drought contingency plan.
- Drought Resiliency Projects help communities prepare for and respond to drought. Typically, these types of projects are called “mitigation actions” in a drought contingency plan.
- Emergency Response Actions can help with limited activities during a drought emergency, including the construction of temporary facilities and purchasing, conveying, and storing water.



HOW TO FIND FUNDING AND RESOURCES

U.S. Army Corps of Engineers

During droughts, the U.S. Army Corps of Engineers focuses on maintaining waterways, including cautioning swimmers and boaters to watch for hazards when the water level is low. It also provides emergency drinking water assistance.

CDC's National Center for Environmental Health (NCEH)

The Health Studies Branch within NCEH provides emergency assistance if the safety of a community's drinking water is a concern. For example, public health officials in Nevada were concerned about the public health effects of a cyanobacteria bloom, likely driven by a regional drought. The Health Studies Branch worked to educate the medical communities and the public and helped to consolidate bloom-related illness surveillance.^[4]

CDC's Climate-Ready States & Cities Initiative (CRSCI)

CRSCI grants help states and cities partner with local and national climate scientists to understand potential climate effects in their areas as part of their climate adaptation and mitigation plans. For example, Arizona's Extreme Weather and Public Health Program received a grant to address heat-related illnesses and other climate-related events, such as drought, vector-borne diseases, wildfires, flash flooding, and air quality.^[5] The North Carolina Climate and Health Program's CRSCI grant helped the state identify heat-related illness and wildfire smoke as the greatest climate-related health concerns in the state.^[6]

U.S. Department of Agriculture (USDA) Drought Programs and Assistance

USDA has a variety of grant programs to help farmers, ranchers, and small businesses deal with persistent drought. The Secretary of Agriculture can also designate counties as disaster areas, which lets farmers apply for emergency loans.^[7]

U.S. Environmental Protection Agency's Federal Funding for Water and Wastewater Utilities in National Disasters (Fed FUNDS)

Fed FUNDS has information on federal grants that are available before, during, or after a disaster. In its "Which Funding is Right for You" section, fill out the online form about your needs and you will be linked to a list of funding sources. For example, if you represent a public water or wastewater utility seeking funding for



FOR MORE INFORMATION

Centers for Disease Control and Prevention

National Center for
Environmental Health
*Division of Environmental
Hazards and Health Effects
Health Studies Branch*
4770 Buford Highway, MS F-60
Chamblee, GA 30341
Phone: 770-488-3410

HOW TO FIND FUNDING AND RESOURCES

mitigation activities, the site directs you to the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance grants.

- The Fed FUNDS Prepare Your Water or Wastewater Utility for Funding page provides information and tips on how to secure funding. It recommends, for example, working closely with other local and state officials when applying for funding, developing an emergency procurement policy and overtime policy, and more.

National Oceanic and Atmospheric Administration's Climate Program Office (CPO)

CPO's Climate and Societal Interactions program supports competitive research on drought and other climate-related events. For example, it funded research on climate risks and vulnerabilities for coastal communities and on the impact of fluctuations in tropical weather on seasonal forecasts.

Other Funding Sources

State and local government resources and community groups can be important sources of funding. However, drought does not fall to any one state program. You should identify appropriate contacts at all levels of government who have regulatory duties for surface and groundwater quality and quantity for possible help with the following:

- Resource material for public awareness and education campaigns
- Funding sources for safeguarding your water supply
- Funding or assistance with the development of a drought plan^[8]

Some organizations that will keep you and your community up-to-date with funding opportunities include the following:

- National Association of Conservation Districts
- National Water Resources Association
- National Ground Water Association^[8]

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1. New Mexico Office of the State Engineer/ Interstate Stream Commission. 2004. Funding sources for drought planning, preparedness, and mitigation. Appendix 12.13.5. Attachment E4. Drought funding sources. Middle Rio Grande Regional water plan, 2000-2050 [accessed 2017 November 10]. Available from: http://www.ose.state.nm.us/Planning/RWP/Regions/region_12prior.php.
2. U.S. Department of the Interior. Bureau of Reclamation. 2014. Drought declarations and contingency plans [accessed 2017 November 10]. Available from: <https://www.usbr.gov/drought/docs/website-eligible-entities.pdf>.
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4. Centers for Disease Control and Prevention. Health Studies Branch - Promoting Clean Water for Health. Technical assistance in state and local response to harmful algal blooms [accessed 2017 November 21]. Available from: https://www.cdc.gov/nceh/hsb/cwh/technical_hab.htm.
5. Chuang W-C, Karner A, Selover N, Hondula D, Chhetri N, Middel A, et al. 2015. Building resilience against climate effects: Arizona extreme weather, climate and health profile report. Arizona Department of Health Services; CDC Climate-Ready States and Cities Initiative. Available from: <https://d3dqsm2futmewz.cloudfront.net/docs/brace/Building-Resilience-Against-Climate-Effects.pdf?x37838>.
6. North Carolina Health and Human Services. Epidemiology. Occupational & environmental epidemiology. Climate & health. [accessed 2017 November 10]. Available from: <http://epi.publichealth.nc.gov/oe/programs/climate.html>.

HOW TO FIND FUNDING AND RESOURCES

State programs

Check with your state to see if funding is available for projects that enhance water conservation or drought mitigation. Two examples include the following:

- The Colorado Water Conservation Board offers loans and grants to water providers and other entities statewide for a variety of water-related projects, awareness campaigns, and other projects.
- The California state government's California Drought website links to assistance programs, such as the California Department of Public Health's Safe Drinking Water State Revolving Fund.

Collaborations

Source Water Collaborative (SWC)

Comprised of federal, state, and local partners, the SWC helps to protect drinking water sources and provides various online resources:

- Find Funding Ideas links to various funding sources.
- The Collaboration Toolkit has pointers on finding initial project funding, leveraging existing funding opportunities, and securing long-term funding sources.
- The Source Water Protection Cost/Benefit Tool, funded by the Water Research Foundation, is an online calculator that estimates the costs and benefits of different protections for source water.

Foundations

- During California's drought, assistance came through community foundations, such as The San Diego Foundation. These organizations are becoming much more focused on water resources and related issues.
- The Water Foundation supports efforts to improve water management in the West, including drought contingency planning, storm water capture, water recycling, and more.
- The Robert Wood Johnson Foundation's Evidence for Action program supports innovative health studies, including some on the potential health effects of drought. It gives preference to colleges and universities and tax-exempt public entities or nonprofit organizations.

REFERENCES (CONTINUED)

7. U.S. Department of Agriculture. USDA drought programs and assistance [accessed 2017 November 21]. Available from: <https://www.usda.gov/topics/disaster/drought/usda-drought-programs-and-assistance>.
8. University of Nebraska. National Drought Mitigation Center. 2011. Drought-ready communities: a guide to community drought preparedness. Available from: http://drought.unl.edu/portals/0/docs/DRC_Guide.pdf.
9. Community Water Center. El Centro Comunitario por el Agua [accessed 2017 November 10]. Available from: <http://www.communitywatercenter.org/>.

HOW TO FIND FUNDING AND RESOURCES

- The Kresge Foundation funds a wide variety of health and environmental projects, including projects related to drought. For example, in 2015 it awarded a 3-year, \$660,000 grant to the Los Angeles Alliance for a New Economy to help communities most affected by climate stressors, such as extreme heat and drought. In 2017, the foundation awarded \$300,000 to American Rivers to help city leaders, community-based organizations, regulatory agencies, and service providers work together to improve urban resilience to climate events, including drought.

Community organizations

- Community organizations can act as catalysts for community-driven water solutions.^[9] For example, California's Community Water Center trains residents, including those affected by drought, to be advocates for clean water in the San Joaquin Valley. It also provides technical and legal assistance to local water boards and community-based organizations.

LEARN ABOUT FUNDERS, FOUNDATIONS, AND PHILANTHROPISTS

The following resources have information on credible funders and different options for funding in a variety of fields (not just public health). You may be able to work with these funders to support drought-related projects in your communities.

- ✓ Guidestar has information about every Internal Revenue Service-registered nonprofit organization, including its mission, reputation, finances, programs, transparency, governance, and more.
- ✓ The Foundation Center, a nonprofit, has an extensive database of 140,000 foundations and other donors and does research, education, and training programs on philanthropy.
- ✓ The Chronicle of Philanthropy is an independent news organization for fundraisers, grant makers, and others involved in philanthropy.
- ✓ The NonProfit Times provides news and analysis on nonprofits, including charities, associations, medical groups, and religious organizations.
- ✓ Inside Philanthropy has a grant finder and guides to fundraising, including the article Latest Concern for a Major Health Funder: Drought and Extreme Temps.
 - The Gatekeepers profiles foundation program officers and executives.
 - Tech Philanthropists profiles Silicon Valley philanthropists.



DROUGHT PREPAREDNESS AND RESPONSE: Why You Need Your Public Health Department's Support

Economic Effects of Drought



Droughts are among the most harmful and costly of all natural disasters.

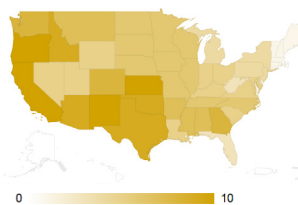


The frequency, intensity, and duration of droughts are increasing in many areas of the country, a trend that is expected to continue.



From 2000 to 2017, **14 drought events** occurred across the United States, resulting in more than **\$120 billion** in property and infrastructure damage; asset, time, and other economic loss; and mitigation and recovery costs.

2000-2017* Billion-Dollar Drought Disasters By State



Please note that the map reflects a summation of billion-dollar events for each state affected (i.e., it does not mean that each state shown suffered at least \$1 billion in losses for each event).

*as of July 7, 2017

Source: NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2017). <https://www.ncdc.noaa.gov/billions>

Health Effects of Drought



Dusty, dry weather not only increases risk of wildfires, but can also aggravate lung conditions such as asthma, bronchitis, and bacterial pneumonia.



Stagnant water, from reduced levels in water bodies, provides a breeding ground for disease-carrying mosquitoes and other insects.



Decreased water for crops and livestock can lead to food shortages, and using recycled water to irrigate fields can result in *E. coli* and *Salmonella* contamination, causing severe illness.



As water levels fall, bacteria and other harmful contaminants can build up in private wells or in areas where people boat, swim, and fish.



People whose livelihoods depend on water may experience financial loss, leading to mental health issues such as stress, anxiety, or depression.



Lack of water can halt power plant operations and cause shortages in electricity, endangering at-risk populations such as those in hospitals, nursing homes, and other healthcare facilities.

A public health department's preparation for and response to drought can save money, time, and lives.

We can help you by



Planning

- > Determine if critical resources are in place to address public health needs.
- > Develop mitigation strategies, such as ways to conserve water supplies.
- > Work with the community and key partners to ensure coordinated preparedness and response efforts.
- > Educate key partners about harmful health effects and ways to prevent them.



Responding

- > Share strategies and recommendations with the community and key partners.
- > Coordinate response activities with key partners to reduce adverse health effects.
- > Participate in incident management systems and structures.
- > Document and evaluate public health impacts and response activities.

Contact Us For More Information

Phone:

E-mail:





Saving Time, Money, and Lives—THE BENEFITS OF DROUGHT PREPARATION

Economic Effects of Drought



Droughts are among the most harmful and costly of all natural disasters.

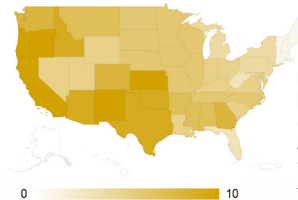


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Lack of water can halt power plant operations and cause shortages in electricity, endangering at-risk populations such as those in hospitals, nursing homes, and other healthcare facilities.

Public health departments' role in drought preparation can save money, time, and lives

- ✓ Determining if critical resources are in place to address public health needs during drought
- ✓ Developing drought mitigation strategies, such as ways to conserve water supplies
- ✓ Working with the community and key partners to ensure coordinated preparedness and response efforts
- ✓ Educating key partners about the detrimental health effects of drought and ways to prevent them
- ✓ Sharing drought preparedness strategies and recommendations with the community and key partners

How You Can Help

Funding for drought preparedness saves response time and money when drought occurs.

Public health departments need funding to provide critical assistance during drought. This funding will help to

- ✓ Gather and examine data to prepare for drought
- ✓ Engage with the public to increase community resilience
- ✓ Implement critical programs to protect communities
- ✓ Hire staff to provide essential services during crises
- ✓ Establish long-term intervention strategies

Contact Us For More Information

Phone:
E-mail:

For every \$1 spent
on preparing for
drought, you save \$4

SPEND NOW SAVE LATER



Centers for Disease
Control and Prevention
National Center for
Environmental Health



