

CA7 - Drought Tolerance

Gold Leaf Challenge Award	Gold Leaf Challenge Action	Leaf Recognition Criteria
Leaf (Action completed)	Drought Tolerance: Newly implement a strategy to minimize the impacts of drought and/or recharge groundwater storage with projects such as: incentives to use water conserving fixtures, harvesting rainwater, reusing water, restricting the use of water for non-essential uses, infiltrating stormwater, etc.	Per project at each site (1/lifetime); 1+/year
Gold Leaf (Goal met)	Gold Leaf Award Goals from the Minnesota Climate Action Framework: • By 2030, 100% of Minnesotans live in communities with plans that identify climate risks and actions to build resiliency. (MN CAF, pg 42.) • By 2026, at least 25 adaptation projects that increase community resiliency are fully funded. (MN CAF, pg 42.) • By 2025, ensure at least 40% of the benefits of certain state and federal climate investments are in disadvantaged communities. (MN CAF, pg 57.) Gold Leaf Award Goals from Your Community: Find your community/ organization's sustainability goals relevant to this action. Check the Welcome Guide's section on Integrated Goals for more information. You can track these goals on your work plan.	

Related Actions	• Gold Leaf Actions: ◦ CA8 - Resilient Public Water Systems • Minnesota Climate Action Framework Sub-Initiatives: ◦ 3.1.1: Provide needed technical assistance, tools, and data. ◦ 3.2.1: Expand tree planting and preservation. ◦ 3.3.2: Fund resilient infrastructure and critical facilities. ◦ 3.3.3: Expand green infrastructure and stormwater management. • GreenStep Cities & Tribal Nations BPA: ◦ BPA 2.5: Conserve/protect drinking/groundwater resources by creating a water-wise landscaping ordinance/guidance, WaterSense purchasing program, or guidance on rainwater harvesting and home water softener use. ◦ BPA 20.6: Implement a wastewater plant efficiency project (co-generation, water reuse) or a program for local private business operations (water conservation, water reuse, business co-location).
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	○ BPA 20.7: Create a demand-side pricing program to reduce demands on water and wastewater systems. ● GreenStep Schools: ○ 1.11 Climate Adaptation and Community Resilience
Related Goals & Metrics	● GreenStep Cities & Tribal Nations Metrics: ○ 8.4 Percent canopy coverage ○ 8.7 Percent of 8.6 trees that are "likely to thrive" ○ 9.2 Climate Adaption Stormwater Score ○ 10.1 Residential gallons used per person per day ○ 10.2 Non-residential gallons used per job per day ○ 10.3 Annual city operations gallons ○ 10.4 Ratio of maximum day use to average daily use ○ 10.7 Percent of annual losses in drinking water system ○ 10.8 Trend of source water levels ○ 12.2a Percent of water bodies in the city showing at least good clarity readings ○ 12.2b Number of citizen lake/river monitors ● LEED Certification: ○ For Cities & Communities - Taking this action can support the following criteria: ■ NS Prerequisite: Ecosystem Assessment ■ NS Credit: Resilience Planning ■ IP Credit: Green Building Policy and Incentives ■ WE Prerequisite: Water Performance ■ WE Credit: Integrated Water Management ■ WE Credit: Stormwater Management ■ WE Credit: Smart Water Systems ● B3 Benchmarking and other tracking programs can be used to track water use over time and can help set benchmarks and goals.
Potential Outcomes and Co-Benefits	● Health: ○ Drought can cause long-term public health problems, including: ■ Shortages of drinking water and poor quality drinking water ■ Impacts on air quality, sanitation and hygiene, and food and nutrition ■ More disease, such as West Nile Virus carried by mosquitoes breeding in stagnant water can impact safe drinking water supplies ■ Poor air quality from dry, dusty conditions ■ Increased risk of wildfires ○ Preparing for and educating your community about the health impacts of these conditions will reduce ER visits. ● Water Quality and Quantity: ○ Droughts reduce water quality and the amount available to the community. Minnesota gets 75% of its drinking water from groundwater. If this resource is not replenished, communities will have to resort to costly measures to obtain drinking water. ○ Industry and agriculture depend on large amounts of consistent available water. Sustainable water resources will support these industries. ○ Groundwater is not an inexhaustible supply. Protecting it now will preserve it for our communities to rely on. ○ Groundwater can be a difficult topic because it is a limited supply and it pits various community needs and interests against each other. One

	way to resolve these conflicts is to conserve water and use it more efficiently. ○ Groundwater is also susceptible to contaminants such as road salt, fertilizer, and other pollutants leaking into it. ● Financial Savings: Proper planning for water preservation will reduce the cost of droughts to your organization and community. ○ Saving water saves money. For example, between 2007 and 2015, Twin Cities metropolitan cities have spent over \$157 million to reduce inflow and infiltration (I&I). These investments are ensuring that the region can avoid the unnecessary expense, estimated at \$1 billion, to build excess capacity in the regional water and wastewater collection system and in the treatment capacity. ● Community Resilience: ○ Flood and Drought will (and are) increasing as climate change worsens. Minnesota is experiencing this cycle already. Preparing for both events will allow your community to address the risks to local areas and minimize the damage. ■ Long-term climate trends can be harder to perceive than day-to-day or even seasonal weather. Even though Minnesota's climate trends predict more precipitation, we can also expect longer, more severe, and more frequent periods of drought. ■ People notice changes to their local weather. Winter of 2024 is obviously very unusual and a good starting point to discuss how weather is changing and how our local communities can prepare and adapt for future changes. ○ Droughts have wide-ranging impacts. For example, California's 2012 drought, "significantly impacted food production, reduced hydropower generation, and caused severe environmental issues (e.g., groundwater depletion, wildfires, tree mortality, land subsidence)." Understanding how these community-wide impacts could hurt your community is important. ○ Resilient communities have the strength to withstand, respond to, and adapt more readily to acute shocks (such as flooding from extreme precipitation) and chronic stresses (such as ongoing effects of the changing climate on the local tourist economy). ○ Minnesota already is experiencing changes to its highly variable climate with shorter winters, fewer cold extremes, and more heavy and extreme precipitation resulting in repeated freeze-thaw cycles, a longer growing season, and new invasive species. Based on climate modeling, it is expected that in the future Minnesota additionally will face heat extremes and drought, with diminished air quality from increased wildfire smoke, higher levels of ozone, more pollen, etc. Implementing best practice actions to plan and prepare for such events and trends will strengthen cities for greater resilience to the changing climate.
Estimated Project Implementation Details	● Time and Cost: Some water saving projects are extremely low-cost and can potentially help you save money over time. Infrastructure improvement projects may require higher costs and time to plan for. However, conserving water now will elongate the amount of time before needing to invest in alternative solutions. ● Pre-conditions & Considerations: ○ Many drought resilience projects are about the priorities of your community and who gets to use water. These are difficult

	conversations, especially in areas that are economically dependent on groundwater use such as in agricultural communities. Think about how you will need to engage your community around these issues. ○ One of the purposes of having a Green Team, if they are internal to your organization, is to facilitate planning for projects like this.
Resources and Technical Assistance	● Resiliency Advisor: Laura Millberg, Climate Change Resilience Coordinator, MN Pollution Control Agency ○ 651/757-2568, laura.millberg@state.mn.us ● Water Advisor: Gabrielle Martin, Assoc. Engineer, Minnesota Technical Assistance Program: ○ 980.329.2647, gamartin@umn.edu ● Conditions and Impacts: ○ Minnesota Drought Conditions Overview ○ Overview of expected climate impacts in Minnesota. ○ The U of MN developed a Minnesota future climate projection tool. ○ Think about the impacts of drought on your population and health systems and critical infrastructure. ● Planning: ○ US climate Resilience Toolkit, which has MN specific resources, and the Ready-to-Fund toolkit for small and midsize governments and organizations. ○ Basic solutions for municipalities and communities to save water. ○ Drought - ready toolkit and guide for communities. ● Education: ○ U of MN Extension Drought Resources ○ A Water Footprint Calculator and educational resources for individuals that helps show both your local water use and national/ international use that goes into making the things we buy and eat. ○ EPA resources for ■ drought resilience and water conservation, ■ water resiliency for communities, ■ best practices for water conservation instead of expanding the water supply; and ■ sustainable water infrastructure home page. ○ The American Water Works Association's climate adaptation resource for effective communications in droughts. ○ Work internally at your organization and with the community to ensure water conservation practices are being used during droughts. For example, change how you are watering new trees. ○ Water management resources for property owners and municipalities for water efficiency and savings. ● Infrastructure: ○ Basics of Rainwater catchment and storage systems for buildings. ○ How green and gray infrastructure can contribute to both flood and drought resilience. ○ Minnesota Stormwater technical guide on rainwater harvest and reuse. ○ Water efficiency is a part of building sustainably. ○ Integrating constructed wetlands into building design. ○ How solar and wind energy can enhance drought resilience and sustainable groundwater. ● Groundwater Recharge: ○ Groundwater recharge study from the U of MN on Minnesota aquifers. ○ Tools for using wetlands for groundwater recharge from the DNR.

	○ Water storage and climate resilience from BWSR. ○ EPA guide and resources on aquifer recharge, storage, and recovery. ○ Groundwater Protections Recommendations Report (MPCA, 2016) and The Water Underground: Stretching Supplies (Freshwater Society, 2017) ○ Protect groundwater (and other water supplies) from salt pollutants by implementing Smart Salting practices. ○ Groundwater and wetland quality in Minnesota. ● Water Conservation and Quality: ○ See Minnesota's water conservation score. The Alliance for Water Efficiency also has numerous plans and research on water conservation. ○ MnTAP has resources for water conservation and can provide technical assistance for industries, water treatment and wastewater treatment facilities, and more. ○ EPA WaterSense Program WaterSense at Work. ○ Water conservation and quality in agriculture is an important and difficult issue. The U of MN has programs that address irrigation. ○ Learn about how drought can impact a range of industries and local systems and think about how to protect these local assets from drought. ○ Drought cycle management for food systems and agriculture. ○ Basic overview of drought and water management programs for agriculture. ○ Protect groundwater quality with the Minnesota Minnesota Agricultural Water Quality Certification Program.
Examples	● Eden Prairie uses smart meter technology and an app to help residents save money and monitor their water use. ● Water conservation techniques in Minnesota have been hugely successful and should serve as inspiration to show how small changes over time in building code, habits, and efficiency measures can solve seemingly intractable problems. ● A car wash in New Hope uses rainwater. ● Minnesota is used to having ample water, but we don't anymore. Check out these innovative water reuse projects around the state. ● This case study has examples of groundwater recharge projects in MN and around the county. ● Metropolitan Council water supply planning projects. ● How San Antonio reduced its daily water use by 85 gallons per person.
Reporting & Recognition (See reporting instructions in the Welcome Guide)	Leaf Recognition Criteria: 1 Leaf is awarded per each new project completed at a site (once per lifetime of the project). Multiple leaves can be awarded in one year for separate projects. Gold Leaf Goals: Document the completion of one or more goals related to this action at any time. 1 Gold Leaf is awarded per goal met.
FAQs	The Gold Leaf Challenge is open to many community types. Because of this, the actions are meant to be adjusted to ensure the program works for all participants. Please email us feedback or suggestions so we can continuously improve our Gold Leaf Challenge considerations. Aren't there already regulations in place to advance drought resiliency?

While there are some state or community-wide programs in place like fire bans or suspending water permits during droughts, there are many other actions communities can take. This Action is targeted at those “above-and-beyond” preparations that will help your community better endure extreme droughts. Additionally, water conservation, while a special concern during droughts, is applicable at all times as we are using groundwater faster than it can recharge.

What is “green infrastructure”?

Basically, [green infrastructure](#) filters and absorbs stormwater where it falls. In 2019, Congress enacted the [Water Infrastructure Improvement Act](#), which defines green infrastructure as “the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspire stormwater and reduce flows to sewer systems or to surface waters.” Projects can include:

- [Downspout Disconnection](#)
- [Rainwater Harvesting](#)
- [Rain Gardens](#)
- [Planter Boxes](#)
- [Bioswales](#)
- [Permeable Pavements](#)
- [Green Streets and Alleys](#)
- [Green Parking](#)
- [Green Roofs](#)
- [Urban Tree Canopy](#)
- [Land Conservation](#)

What is “natural infrastructure”?

The term “[natural infrastructure](#)” refers to naturally occurring landscape features and/or nature-based solutions that promote, use, restore or emulate natural ecological processes. Projects can include:

- Coasts: Healthy natural features — such as mangrove forests, living shorelines, restored wetlands, reefs and barrier islands — can absorb the shock of storm surge and better protect communities from sea level rise.
- Rivers and floodplains: Restored wetlands and reconnected floodplains can slow and retain water to reduce flooding, while filtering pollutants and providing wildlife habitat.
- Aquifers: Aquifers, which contain over 95% of Earth’s freshwater, serve as a natural underground water storage solution. For areas prone to drought or climate variability, storing water in aquifers can build a more resilient water supply. Healthy aquifers also support flows to rivers and streams, helping to create important habitat for wildlife.
- Working lands: Two-stage ditches, groundwater recharge basins and buffer strips built near and within working lands can retain water, improve water quality and limit the impact of flooding.

What are some ways to make buildings more resilient to drought?

- Harvest rainwater from rooftops
- Create onsite water storage for reuse
- Plant native trees and plants that help draw water into the ground and can recharge aquifers
- Plant species that are drought tolerant and don’t require watering or irrigation
- Install low-flow faucets, toilets, and other fixtures

Feedback or Questions? Contact GreenStep@state.mn.us

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