Drought Mitigation

FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding for eligible hazard mitigation activities that reduce or eliminate potential disaster losses to state, local, tribal and territorial governments. Fostering resilience against the effects of natural hazards, including slow onset hazards such as drought, is a top priority for the agency. This policy aid provides important information on applying for funding for planning related and drought mitigation activities, including additional resources, such as links to partner websites.

How to Apply for Funding: HMA Grant Programs

FEMA administers HMA grant programs that provide funding for hazard mitigation projects, capability- and capacity-building, technical assistance, and planning and planning-related activities. HMA grant programs that may provide opportunities for funding and assistance to increase drought preparedness and mitigate drought impacts include:

- Hazard Mitigation Grant Program (HMGP)
- Hazard Mitigation Grant Program Post Fire (HMGP Post Fire)
- Building Resilient Infrastructure and Communities (BRIC)
- Flood Mitigation Assistance (FMA)
- Safeguarding Tomorrow Revolving Loan Fund (Safeguarding Tomorrow RLF)

To apply for assistance under FEMA's HMA grant programs, states, federally recognized tribes, and territories (referred to as applicants) submit applications according to each grant programs' policy and guidance. For more information about these requirements, please see the HMA Program and Policy Guide.

To apply for assistance under HMA grant programs, applicants must have a FEMA-approved state, territorial or tribal hazard mitigation plan that has been adopted by the jurisdiction. Applicants facilitate the development of subapplications from subapplicants such as state agencies, local governments, federally recognized tribal governments, and certain private nonprofit organizations. In general, applicants apply on behalf of subapplicants for hazard mitigation assistance under all HMA programs. When assistance is awarded, the applicant then becomes the recipient and a pass-through entity. For more information about applicants and subapplicants, please see the HMA Program and Policy Guide. Local communities can contact their respective hazard mitigation officers for more information.

FEMA

Start with a Plan: Planning and Planning Related Activities

Hazard mitigation planning reduces loss of life and property by minimizing the impact of disasters, including slow onset hazards like drought. All funded hazard mitigation planning activities must result in a new or updated FEMA-approved hazard mitigation plan. Applicants and subapplicants can consider applying for FEMA funding to update their tribal, state or local hazard mitigation plan to address drought hazards. FEMA, through the BRIC program, also provides non-financial direct technical support to help communities get started with the hazard mitigation planning process and related projects. HMA encourages subapplications that explore innovative new ways to mitigate drought and benefit communities.

Drought-related planning activities that are potentially eligible for funding may include, but are not limited to, the following:

- Updates to the **risk and vulnerability assessments** in the state or local hazard mitigation plan based on future conditions information, such as populations patterns, land use, community development, and changes in drought risk due to changing climate conditions.
- Adding or modifying **hazard mitigation actions** to address drought in the Mitigation Strategy section of the relevant Tribal, state, local or territorial hazard mitigation plan. These updates should be based on results from updated risk and vulnerability assessments.
- Community **outreach and education** for adapting to drought to prevent future injury and losses to homes, businesses, and infrastructure and to preserve historic and cultural resources.

All hazard mitigation planning activities must result in a new FEMA-approved hazard mitigation plan or contribute additional information to a FEMA-approved hazard mitigation plan. Hazard mitigation is most effective when used in conjunction with other plans, processes, policies, and decisions. Here are a few potential funding opportunities for integrating other resources into a hazard mitigation plan:

- **Integrated water resource** or watershed management plans.
- **Water shortage** plans and/or demand-reduction measures or plans.
- **Capital improvement** plans that emphasize investment in efficient water systems.
- **Climate adaptation** plans, or resilience plans with adaptive management for integrated water resource management.

Meeting Cost-Effectiveness Requirements for Planning and Planning-Related Activities

Applicants for most FEMA funding opportunities must show that the hazard mitigation measures' benefits exceed the costs. However, hazard mitigation planning and planning-related activities are exempt from the requirement to demonstrate cost-effectiveness. Refer to the Hazard Mitigation Assistance Program and Policy Guide Part 5 for a complete list of exemptions.

Pick a Drought Mitigation Activity: Potential Eligible Projects

FEMA supports a wide variety of drought hazard mitigation projects to build resilience. Here are some of the categories that may qualify for HMA assistance:

- Nature-based Solutions
- Early Warning Systems
- Stabilization
- Floodplain and Stream Restoration
- Flood Diversion and Storage
- Aquifer recharge, storage and recovery

HMA encourages subapplications to explore innovative new ways to mitigate drought and benefit communities. Contact your state hazard mitigation officer if you have questions about a new idea or innovative approach.

MEETING COST-EFFECTIVENESS REQUIREMENTS FOR DROUGHT PROJECTS

Applicants applying for hazard mitigation assistance must show that the hazard mitigation measures' benefits exceed the costs, with some exceptions. Applicants may use FEMA's Benefit-Cost Analysis Toolkit to streamline their calculations. Alternatively, applicants may use a non-FEMA method for calculating the benefits and costs. However, FEMA must pre-approve the alternative method in writing. For more information regarding cost-effectiveness, please see HMA Program and Policy Guide Part 5.

Land cover types, such as forests, beaches, streams, or urban green space, provide various combinations of benefits, often called ecosystem services. FEMA provides a standardized list of monetary values of different land cover types and the ecosystem services they provide. Many of the land cover types correspond to the eligible drought resilience and mitigation project types, such as nature-based solutions and floodplain and stream restoration.

Nature-based solutions

"Nature-based solutions" promote adaptation and resilience by working with nature. They can include sustainable planning, design, environmental management and engineering practices. Nature-based solutions can help reduce the loss of life and property, strengthening resilience against the nation's most common natural hazards, including drought, extreme heat, and wildfire, while supporting economic development and improving the quality of life in communities.

FEMA uses the term "nature-based solutions" to refer to an umbrella of strategies, including green infrastructure, bioengineering, or natural infrastructure. They can vary based on scale, location and type of hazard from small or localized projects, to larger community projects up to a watershed, landscape, or coastal area.

Nature-based solutions can be stand-alone hazard mitigation projects or be incorporated within traditional hazard mitigation projects (e.g., hybrid projects). They can rely entirely on natural features or processes or be combined with engineering or gray infrastructure methods, like cement or metals. When carefully designed, nature-based solutions can address multiple challenges simultaneously. For example, a restored wetland may mitigate drought impacts by

enhancing aquifer recharge. But the restored wetland may also store carbon dioxide, mitigate an urban "heat island," provide recreation and scenic amenities, and enhance biodiversity.

Communities are using nature-based solutions to mitigate drought impacts and extreme heat, while restoring and enhancing the natural functions of floodplains, stream channels and riparian ecosystems. Examples of nature-based solutions for drought mitigation may include projects like:

- Xeriscaping practices to reduce water demand
- Water-smart landscapes
- Stream and wetland restoration
- Underground water retention for infiltration or water recycling
- Water harvesting

For more information on Nature-based Solutions please see the HMA Program and Policy Guide and Nature-Based Solutions | FEMA.gov.

Early warning systems

Early warning and monitoring systems help governments and communities make proactive decisions to minimize socioeconomic, public health, ecosystem and physical impacts associated with drought. An early warning system combined with the slow onset of a drought can provide adequate lead time to local decision makers to mitigate drought threats, for example by arranging for emergency food supply or adaptive planning for water use.

Examples of early warning systems for drought may include, but are not limited to:

- Weather stations or rain gauges such as the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS), a national citizen science network for measuring precipitation.
- Integrated information systems such as the Drought Early Warning System for the Public Health Sector.
    - It is important for applicants and sub-applicants to describe how the system will be used to reduce potential injury and damage from drought as well as other natural disaster (e.g., what actions will be associated with the warning).

For more information on Warning Systems, please see the HMA Program and Policy Guide Part 12, B.12.

Stabilization

Prolonged droughts can harm crops, grasses, trees, and other vegetation that cover and stabilize soils. Without that vegetative cover, wind and water can erode and destabilize the soil and put structures and infrastructure at risk. Drought-induced soil erosion and ground instability can, for example, lead to shifting slopes supporting underground

infrastructure or can fill water bodies with sediment and reduce their storage capacity. FEMA can fund soil stabilization projects through the HMGP, HMGP Post Fire, BRIC, and FMA programs.

Stabilization refers to a project type that reduces or prevents slope failure or ground movement, of a relatively limited extent, which transports earthen debris downhill by sliding, rolling, falling or slumping. Slope failures can involve rock falls and/or debris flow (a mixture of soil, rocks and vegetation) that deposit material at the base of a slope or a slip-out where a portion of a structure or infrastructure fails and falls to a descending slope. Slope failures can occur in either natural ground or human-made fill, such as a highway embankment or canyon fill.

Proposed HMA stabilization projects must meet program eligibility requirements, including mitigation of potential structure or infrastructure damage.

Stabilization projects reduce risk to structures or infrastructure from erosion, ground movement and landslides and may include installing geosynthetics, surface and subsurface drainage, stabilizing sod, and vegetative buffer strips; preserving mature vegetation; decreasing slope angles; and stabilizing with green or gray ripraps and other means of slope anchoring. To be eligible for an HMA grant, these projects must not duplicate the activities of other federal agencies.

For more information on Stabilization, please see Part 12, B.4. of the HMA Program and Policy Guide.

Floodplain and stream restoration

Communities can use floodplain and stream restoration projects to reduce flood risk and erosion by providing stable reaches. Nature-based solutions for floodplain and stream restoration may also mitigate drought impacts and extreme heat, while restoring and enhancing the floodplain, stream channel and riparian ecosystem's natural function.

Floodplain and stream restoration can provide baseflow recharge, water supply augmentation, floodwater storage, terrestrial and aquatic wildlife habitat, and recreation opportunities by restoring the site's soil, hydrology and vegetation conditions that mimic predevelopment channel flow and floodplain connectivity.

Floodplain and stream restoration projects can be scaled as needed to fit the site conditions and goals of the project. Typical goals and objectives include:

- Reduce peak velocities and stream bank erosion.
- Reduce peak flood stages.
- Protect bridge abutments, bridges, road crossings and other infrastructure.
- Protect valuable land and property.
- Increase or improve water supply and capacity.
- Restore ecological habitats for plants and aquatic species such as fish and other wildlife.

- Restore or improve water quality.

Potential projects that can emphasize the role of nature-based solutions to maximize the ecosystem service benefits in addition to risk reduction include:

Floodplain setbacks: The stream can freely meander and flood its overbanks when structures are removed from the floodplain and the channel is restored to its historical configuration. This may include acquiring at-risk structures for removal and establishing levee setbacks.

Multistage channels: Involves an upper channel section(s) to provide flood conveyance with a natural low-flow channel(s) within it to provide habitat enhancement and improved sediment transport capacity.

Relief channels: This technique typically involves restoring the channel to its original configuration and constructing a high-flow channel or relief culvert to provide for additional flood conveyance.

Addition of in-stream structures: Flow-changing structures are a broad category of structures that can be used to divert flows away from eroding banks. The structures can shield banks from eroding flows, build up the toe of the bank, and direct flows to create a stable alignment. Nature-based solutions that can divert stream flow include rocks, logs, and other such materials.

Bank vegetation and seeding: Trees and shrubs can provide lowland habitat, channel shading, soil and bank stabilization, and aesthetic benefits. FEMA strongly encourages using native vegetation to support creation or restoration of habitat and to maintain natural ecosystem conditions.

Flood diversion and storage

These projects can be used to retain water to allow infiltration to groundwater supplies, allowing for a controlled way to mitigate flooding and enhance usable water supply while reducing the effects of drought. Flood diversion and storage projects can also help maintain healthy ecosystems. Flood diversion and storage projects can vary in size and complexity. Proper planning, siting, sizing and construction are required to implement successful flood diversion and storage systems.

Many flood diversion and storage projects are currently eligible for HMA funding as flood risk reduction activities. The HMA Guide focuses on flood diversion and storage projects implemented using nature-based methods as much as possible to address drought mitigation in addition to reducing flood risk building resilience to multiple hazards.

Nature-based solutions involve diverting the water into appropriately sized bioretention or bio-detention basins. Smaller projects can provide localized flood reduction by channeling the diverted water into a bioswale, rain garden, stormwater tree trench or smaller bioretention or bio-detention basin.

For more information on Flood Diversion and Storage, please see the HMA Program and Policy Guide Part 12, B.5.

Aquifer recharge, storage, and recovery

Aquifer recharge, storage and recovery projects serve primarily as drought management tools, but they can also be used to reduce flood risk, mitigate saltwater intrusion and restore overdrafted aquifers.

These projects include increasing surface water infiltration into an aquifer to be stored for a period until it is needed and then recovered for use. This can be done through direct well injection, infiltration pits and basins, or surface spreading. An aquifer resilience project entails:

- Capturing water when there is an abundant supply such as during a rainy season or during spring snowmelts;
- Storing the water in subsurface aquifers; and
- Recovering the water when it is needed.

Storing water underground can help protect it from pollutants, evaporation and weather events as well as maintain stream flow during periods of low flow.

For more information on Aquifer Recharge, Storage and Recovery please see the HMA Program and Policy Guide Part 12, B.13. For more information on an Aquifer Recharge, Storage and Recovery project example please see the Hazard Mitigation Assistance Mitigation Action Portfolio (fema.gov).

Additional FEMA resources

FEMA Ecosystems Service Value Updates (2022) provides guidance on an updated set of land cover categories and ecosystem service values for FEMA's Benefit Cost Analysis (BCA) Toolkit. Additionally, Benefit-Cost Analysis Tools for Drought, Ecosystem Services, and Post-Wildfire Mitigation for Hazard Mitigation Assistance (May 27, 2016), stated that the inclusion of ecosystem service benefits in the BCA was no longer limited to only acquisition or open-space mitigation activities. The clarification authorized the use of ecosystem service benefits for **all hazard mitigation project types** when the mitigation project was calculated to have a BCR of 0.75 or greater using traditional risk-reduction benefits.

For additional drought resources, please see the 2023 HMA Program and Policy Guide, specifically Part 12, and the FEMA Fact Sheet: Planning for Drought Resilience.

Tribal Mitigation Planning Handbook, FEMA https://www.fema.gov/sites/default/files/2020-06/fema-tribal-planning-handbook_05-2019.pdf

FEMA Partner Resources

These links connect communities to FEMA partner websites:

The National Integrated Drought Information System and the U.S. Drought Portal are the federal hubs for drought data, science, and monitoring. http://www.drought.gov

Drought and Infrastructure - A Planning Guide, National Drought Resilience Partnership (NDRP), https://www.cisa.gov/sites/default/files/publications/Drought_and_Infrastructure_A_Planning_Guide_508c.pdf

Drought Mitigation Planning in a Multi-Hazards Context, American Planning Association, https://www.planning.org/nationalcenters/hazards/droughtmitigation/

Drought Response and Recovery: A Basic Guide for Water Utilities, Environmental Protection Agency https://www.epa.gov/sites/default/files/2017-10/documents/drought_guide_final_508compliant_october2017.pdf

State Drought Plans - University of Nebraska National Drought Mitigation Center, https://drought.unl.edu/planning/DroughtPlans/StatePlans.aspx

The U.S. Drought Monitor, http://droughtmonitor.unl.edu/