FEMA Fact Sheet

Federal Insurance and Mitigation Administration

Floodplain and Stream Restoration

Purpose

The President's 2015 Opportunity, Growth, and Security Initiative (OGSI); Executive Order 13653 Preparing the United States for the Impacts of Climate Change; the President's 2013 Climate Action Plan; FEMA's Climate Change Adaptation Policy; and the 2014-2018 FEMA Strategic Plan, all identify the risks and impacts associated with climate change on community resilience to natural hazards, and direct Federal agencies to support climate resilient infrastructure.

FEMA is encouraging communities to incorporate methods to mitigate the impacts of climate change into eligible Hazard Mitigation Assistance (HMA) funded risk reduction activities by providing guidance on mitigating flood and drought conditions. FEMA has developed initial guidance on mitigating flood and drought actions including green infrastructure methods, expanded ecosystem service benefits, and three flood reduction and drought mitigation activities: Aquifer Storage and Recovery (ASR), Floodplain and Stream Restoration (FSR), and Flood Diversion and Storage (FDS).

FEMA encourages communities to use this information in developing eligible HMA project applications that leverage risk reduction actions and increase resilience to the impacts of climate change.

Project Description

Floodplain and Stream Restoration is the reestablishment of the structure and function of ecosystems and floodplains to return the ecosystem as closely as possible to its natural conditions and functions prior to being developed. Ecosystems are naturally dynamic and it would not be possible to replicate the system to the exact pre-development conditions. Rather, the restoration process reestablishes the general structure, function, and dynamic, self-sustaining behavior of the ecosystem. FSR projects are already eligible for HMA funding and typically mitigate erosion and flood risk. This guidance focuses on FSR projects implemented using green infrastructure methods as much as possible to address drought mitigation and climate change resilience, in addition to reducing flood risk. FSR projects lend themselves readily to design and implementation using green infrastructure methods.

Coastal and riverine floodplain and stream restoration (and stabilization) can be successful methods in providing benefits of flood risk reduction and improving water quality and habitat for fish and wildlife, recreational opportunities, and erosion control. Restoration of adversely impacted, flood prone river systems is accomplished by restoring floodplains and associated wetlands through connectivity and storage, and by modifying the physical stability, hydrology, and biological functions of the impaired river banks to that of a natural stable river with periodic overbank flow. The floodplain of a riverine or stream system provides capacity for storing storm water runoff, reducing the number and severity of floods, and minimizing non-point source pollution. Restoring floodplains and wetlands and their native vegetation are integral components of stream restoration efforts.

Project Design and Implementation Considerations

FSR 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, aquatic species like fish, and other wildlife
- Restore or improve water quality

FSR projects readily lend themselves to green infrastructure methods to achieve the desired impact. Some potential projects that can emphasize the role of green infrastructure to maximize the ecosystem benefits in addition to risk reduction are:

- Flood setbacks: Removing structures from the floodplain and restoring the channel to its historic configuration. The stream is left to freely meander and flood its overbanks. This may include acquiring at-risk structures for removal.
- Two stage channels: Involves an upper channel section to provide flood conveyance with a natural low-flow channel 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. The restored channel provides habitat benefits while the high-flow channel can be designed to divert excess flows, providing wetland or lowland habitat or for recreational benefits.
- Addition of in-stream structures: Flow changing devices are a broad category of structures that can be used to divert flows away from eroding banks. They are often used to shield banks from eroding flows, build up the toe of the bank, and direct flows to create a stable alignment.
- Bank vegetation and seeding: Trees and shrubs can provide lowland habitat, channel shading, soil and bank stabilization, and aesthetic benefits. The use of native vegetation is strongly encouraged to support creation or restoration of habitat, and to maintain natural ecosystem conditions.

Project Benefits and Cost Effectiveness

An FSR project can provide flood risk reduction benefits that can be calculated using the existing FEMA BCA Tool. In some cases, the flood risk reduction benefits may even be sufficient to demonstrate the project is cost effective before considering benefits for drought mitigation and ecosystem services. However, any additional benefits for ecosystem services provided by green infrastructure methods can be included when appropriate.

FSR projects can provide drought mitigation by facilitating groundwater re-charge and increasing water supply. At a minimum, the project application would need to identify the increased water supply capacity the FSR project would provide in relation to the population that will be supported in a drought and during the project's useful life. A recurrence interval for drought periods will need to be identified to use the FEMA BCA Tool. Estimating the probability of a drought can be difficult due to historical data gaps and variance in annual weather patterns/precipitation. There is not currently a single methodology to establish a recurrence interval for drought. Rather, FEMA encourages communities to use the best available data to document a recurrence interval. In addition to regional or local sources of historical drought periods, federal agency resources that

provide drought related resources with information that could support a recurrence interval are listed in the Climate Data, Drought Information, and HMA Resources section.

An FSR project that results in new or restored wetlands, estuaries, riparian or green, open space, may consider the total annual benefits for these categories in the cost effectiveness evaluation. For these benefits, it would be necessary to quantify the total restored ecosystem area (in acres), define the land use type, and quantify the additional water supply provided by the project in relation to the population that will be supported in a drought, and identify the project's useful life.

Ecosystem services are beneficial goods and services provided by nature for people. Every landscape yields a variety of ecosystem services, presenting an opportunity for mitigation actions that provide multiple ecosystem services benefits. FEMA is building on the existing ecosystem services that can be used for acquisition/open space projects to allow more ecosystem service benefits for climate resilient activities. FSR projects can make extensive use of green infrastructure methods and are likely to provide several or more ecosystem services. FEMA will be providing more guidance on the ecosystem service benefits that can be used in evaluating the cost effectiveness of these mitigation projects in 2016.

Environmental and Historic Preservation Considerations

As part of eligibility review, FEMA is required to ensure that all HMA projects are compliant with environmental and historic preservation (EHP) requirements. This includes, but is not limited to, the processes and requirements established by the National Environmental Policy Act, Endangered Species Act, National Historic Preservation Act, Coastal Barrier Resources Act, and any other applicable laws, Executive Orders, Federal regulations or requirements. More detailed information on the EHP review process and requirements can be found in the HMA Guidance in the FEMA Library.

The size and scale of the FSR project and presence of potentially sensitive environmental and/or cultural resources may impact the level of complexity of the EHP review. A small scale floodplain restoration project that involves removal of at-risk structures, and planting native vegetation for bank stabilization may not require as complex EHP review as a large scale project. Extremely large projects such as at the overall watershed scale will likely require a complex and lengthy EHP review.

Project applications must include the necessary data and information for FEMA to conduct the appropriate EHP review. FEMA, in consultation with appropriate Federal and State agencies, will use the information provided in the application to ensure compliance with EHP requirements. This may include demonstrating methods to incorporate public participation in the review process and/or mitigate any EHP impacts resulting from the mitigation action.

Climate Data, Drought Information, and HMA Resources

The National Integrated Drought Information System (NIDIS) website, the U.S. Drought Portal
http://www.drought.gov/drought

The U.S. Drought Monitor weekly map delineates drought conditions throughout the Nation
http://droughtmonitor.unl.edu/

NASA Gravity Recovery and Climate Experiment (GRACE) provides satellite data on aquifer water levels

http://www.nasa.gov/mission_pages/Grace

U.S. Department of Agriculture Disaster and Drought Information
http://www.usda.gov/wps/portal/usda/usdahome?navid=DISASTER_ASSISTANCE

Hazard Mitigation Assistance Guidance and Addendum (February 27, 2015)
https://www.fema.gov/media-library/assets/documents/103279

U.S. Global Change Research Program conducts a National Climate Assessment every four years
http://www.globalchange.gov

NOAA Climate.gov provides science and information for a climate-smart Nation
https://www.climate.gov

Information Requests and Questions

FEMA encourages communities to work with their State or Tribal Hazard Mitigation Office in identifying and developing flood and drought mitigation projects. States and federally-recognized tribes should contact their FEMA Region Office with questions. Questions can also be submitted by email to FEMA-HMA-Grants-Policy@fema.dhs.gov.