

# GREEN INFRASTRUCTURE VALUES IN FEMA'S HAZARD MITIGATION PROGRAM

EARTH ECONOMICS  JULY 2023

The Federal Emergency Management Agency (FEMA) is the US federal agency tasked with assisting communities as they prepare for, respond to, or recover from, natural disasters. The agency provides billions of dollars each year in disaster mitigation project funding to communities through several Hazard Mitigation Assistance (HMA) programs. The 1998 Stafford Act requires that all mitigation projects must be cost-effective to the federal government, which simply means that benefits outweigh costs. Cost-effectiveness must be demonstrated through Benefit-Cost Analyses (BCAs) that compare the discounted net present value of a project's future benefits and costs. Because the quality and extent of natural ecosystems can influence the likelihood and magnitude of natural disasters, benefits provided by nature can be crucial to supporting disaster mitigation, as well as community resilience and wellbeing.

In recent years, FEMA has recognized the value of investing in Nature-Based Solutions (NBS) to mitigate the impacts of floods, wildfires, droughts, and other natural hazards by including ecosystem service values of natural and restored lands into its BCA Toolkit, the main tool by which FEMA ensures that applicants follow best practices when reporting project benefits and costs.

## HMA PROGRAMS INCLUDE

the **Hazard Mitigation Grant Program (HMGP)**, **Building Resilient Infrastructure and Communities (BRIC)**, and **Flood Mitigation Assistance (FMA)**. FEMA also provides hazard mitigation funding through the **Public Assistance (PA)** program, sometimes referred to as **406 Hazard Mitigation**.



## GREEN INFRASTRUCTURE (GI)

is a category of NBS that mimics natural systems to manage stormwater runoff in urban settings. In contrast with other NBS, such as the restoration of wetlands, GI features are often highly engineered, with relatively smaller, distributed footprints to maximize stormwater management and other co-benefits. GI is easily scalable, adaptable, and tends to have lower maintenance costs, all while complementing grey infrastructure solutions.



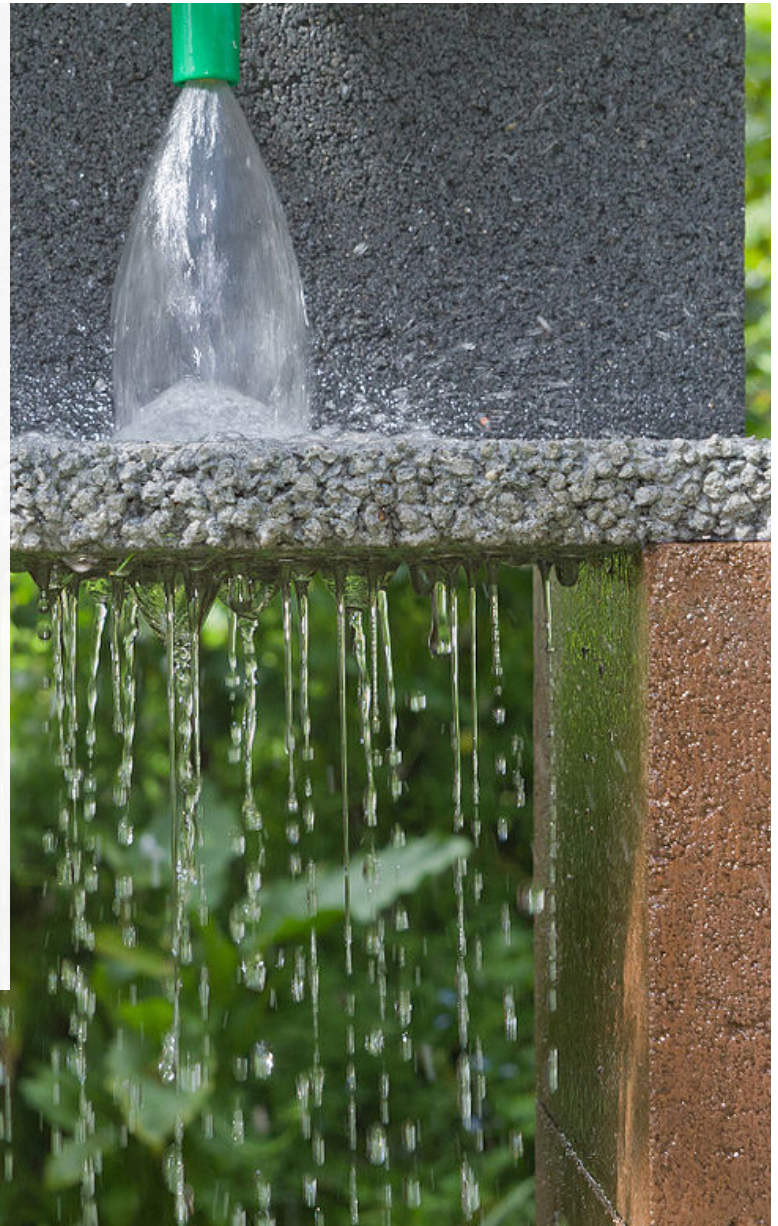
# GREEN INFRASTRUCTURE CATEGORIES ADDED TO FEMA'S BCA TOOLKIT

In 2022, Earth Economics worked with FEMA to also include benefits of other NBS like green infrastructure. These values can facilitate BCA of hazard mitigation projects that incorporate green infrastructure elements, thereby reducing the burden on subapplicants and ensuring that such projects are being evaluated in the BCA using a consistent set of values and assumptions. See the [full update here](#).



## SUMMARY OF 2022 ECOSYSTEM SERVICES VALUE UPDATES:

- ✓ Includes four green infrastructure categories: bioretention, permeable pavements, green roofs, and urban trees
- ✓ Includes nine economic benefits: avoided carbon emissions, energy cost savings, carbon sequestration, reduced drought risk, wildlife habitat, reduced heat risk, property value improvement, air pollutant removal, and stormwater capture and quality
- ✓ Not every combination of green infrastructure category and benefit could be valued—a total of 23 values are included in FEMA's BCA Toolkit



# TIMELINE OF ECOSYSTEM SERVICES-RELATED UPDATES TO FEMA'S BCA TOOLKIT

## Landcover Types: 9 | Number of Values: 59

Earth Economics supported a third update to the BCA Toolkit values. These updates included the new land covers coral reefs, shellfish reefs, and beaches and dunes; modified existing land covers into urban and rural green open space, and inland and coastal wetlands; added 22 new individual ecosystem service values across all land cover types; and increased many of the landcovers' \$/acre values.

2022



## Green Infrastructure Types: 4 Number of Values: 23

Earth Economics worked with FEMA to include nine economic benefits for four green infrastructure types (street trees, pervious pavement, bioretention, and green roofs).

2020



## Landcover Types: 5 | Number of Values: 29

FEMA released a significant policy update (FP-108-024-02) which removed the 0.75 benefit-cost ratio threshold requirement for allowing ecosystem service values to be used in a BCA, meaning nature-based hazard mitigation projects could now be considered cost-effective based on the balance of costs and ecosystem services benefits alone.

## Landcover Types: 5 | Number of Values: 29

Earth Economics developed values for three new land cover categories ("wetlands," "forest," and "marine and estuary") and updated values for existing land cover categories in the BCA Toolkit under subcontract to CDM Federal Programs Corporation. FEMA adds the following eligible activities: floodplain and stream restoration, green infrastructure, post-wildfire mitigation and aquifer storage and recovery.

2016



## Landcover Types: 2 | Number of Values: 17

FEMA issues its first ecosystem services policy (FP-108-024-01), allowing the use of ecosystem service benefits in acquisition projects with a BCR of 0.75 or greater. Earth Economics developed the framework and ecosystem service values for "riparian" and "green open space" land cover categories in the BCA toolkit under subcontract to Ideation, Inc.

2013

