



# FEMA

## **Incorporating Sea Level Rise (SLR) into Hazard Mitigation Assistance (HMA) Benefit Cost-Analysis Frequently Asked Questions (FAQs)**

### **1. Why is FEMA making the SLR information available, and providing tools for Benefit Cost Analyses?**

As part of the President's Executive Order on Climate Change, the President's Council for Environmental Quality (CEQ) developed "Implementing Instructions for Federal Agency Climate Change Adaptation Planning" to address climate change resiliency. In support of the Instructions, FEMA issued a policy statement, 2011-OPPA-01, "FEMA Climate Change Adaptation Policy", which outlines seven initial actions to help integrate climate change adaptation considerations into our programs, policies and operations. To implement this policy, FEMA is developing a Climate Change Adaptation Implementation Plan. One of the seven initial actions as part of the Plan is to "evaluate how climate change considerations can be incorporated into grant investment strategies with specific focus on infrastructure and evaluation methodologies or tools". Including SLR data into the benefit-cost analysis tool integrates adaptation into our programs.

### **2. Where can I find a copy of FEMA's Climate Change Adaptation Policy 2011-OPPA-01 and how does it impact the Hazard Mitigation Assistance programs?**

A copy of FEMA's Climate Change Adaptation Policy can be found at <http://www.fema.gov/media-library/assets/documents/33082>.

The Hazard Mitigation Assistance programs provide grants to States, Indian Tribal governments, and U.S. Territories to implement long-term hazard mitigation measures after a major disaster declaration. HMA is intended to reduce the loss of life and property resulting from natural hazards and to help States implement mitigation measures during recovery from a disaster. Projects must contribute to a long-term solution to an existing or anticipated hazard. A project's anticipated benefits must be equal to or more than the cost of implementing the project, which is demonstrated through a benefit cost analysis that compares the cost of the project to the benefits anticipated to occur over the lifetime of the project.

Mitigation activities funded by the HMA programs are required by FEMA regulations to be cost-effective. The determination of cost-effectiveness is typically demonstrated by the calculation of a benefit cost ratio, dividing the total annualized project benefits by total annualized project cost. Projects where benefits exceed costs are generally considered cost-effective. Benefits may include avoided damages, loss of function and displacement. Currently, benefits are calculated on existing conditions and past hazard events. This memo will allow communities to use modeling data for future risk such as sea level rise conditions. Written materials and training to help applicants are available at <http://www.fema.gov/benefit-cost-analysis>.

**3. Can the FEMA benefit-cost analysis (BCA) module reflect potential future sea level rise (SLR) when evaluating HMA projects?**

Yes. Relative SLR can be included in flood elevations when conducting BCAs in coastal areas using the full data flood module. SLR can be applied to projects in any U.S. coastal area where relative SLR data is available. This includes areas subject to coastal flooding as identified in the current NFIP flood study, or coastal rivers and streams located as far inland as the extent of estimated tidal influence or storm surge.

Currently, the full data module can incorporate relative SLR for all residential structures. It can also incorporate relative SLR for nonresidential structures where a depth-damage function curve is available. If a depth-damage function curve is not available, the applicant can perform an individual structure- or facility- based risk assessment to determine the depth-damage function for that particular structure or facility.

When performing structure elevation projects or projects that have freeboard requirements, SLR estimates should be added to the freeboard requirements that may have been adopted in local or state building codes. Freeboard is a factor of safety usually expressed in feet above a flood level for the purpose of floodplain management. For more information about freeboard, please visit <http://www.fema.gov/floodplain-management/freeboard>.

**4. Does FEMA mandate including SLR in all HMA applications?**

No. FEMA does not mandate the inclusion of estimated SLR for HMA project applications. The state or local community may use SLR to consider future conditions in mitigating future flood risk.

**5. Who decides whether to include SLR in HMA project applications?**

A State, Territorial or Tribal Emergency Management Agency, in coordination with the State National Flood Insurance Program (NFIP) Coordinator and the local applicant, may decide to include SLR in an HMA project application.

**6. What SLR value(s) or sources of SLR data will FEMA accept for its HMA project applications?**

A Grantee or applicant may use any valid source that is based on recognized SLR estimation methods for SLR. There are several federal government sources for relative SLR data along coastal areas. Some of these sources include:

- NOAA Center for Operational Oceanographic Products and Services' Mean Annual SLR Trend Data <http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml>;
- USACE Climate Change Adaptation Sea Level Change Curves <http://corpsclimate.us/ccaceslcurves.cfm>; and
- Globalchange.gov provides more information specific to New Jersey and New York <http://www.globalchange.gov/what-we-do/assessment/coastal-resilience-resources>

Other published studies conducted or recognized by a State, Territory or Tribe can be utilized but must be provided as part of the project application for verification. Acceptance of other studies produced by non-Federal entities will be reviewed by FEMA for acceptance. While there are several different rates of global (i.e., eustatic) SLR that have been published and recognized by various government entities, these global rates must be adjusted further to reflect "relative" changes in sea level caused by localized

subsidence or emergence along the coast. Accordingly, these “relative” rates of SLR vary along the coast.

**7. How does the user include SLR in the BCA module?**

To include SLR in the BCA module, the user adds the estimated SLR to the 10-, 50-, 100- and 500-year flood elevations. Some sources for SLR predictions include a yearly rise (linear) based on historical trends, while some provide for accelerated rise (exponential) based on predictive science models.

- *Linear Projections of SLR Based on Historical Trends:* For SLR data that is linear, the analyst should look at the yearly anticipated SLR and multiply that value by the project useful life. This value can then be added each of the current flood elevations provided in the FEMA Flood Insurance Study (FIS). An analysis conducted using the adjusted FIS data to include SLR should provide a reasonable estimate of anticipated damages from the increased flooding depths in future events and provide consideration for SLR. Note that linear projections of relative SLR based on historical trends are usually considered baseline, low-rise projections. These projections might be used where communities have a higher tolerance for risk (e.g., projects with a short lifespan or planning areas with flexibility to make alternative choices within the near-term).
- *Accelerated SLR Based on Predictive Science Models:* Most current scientifically recognized data sources include accelerated projections of SLR for various years in the future. When utilizing a study that provides these projection timelines and elevations, the analyst should use the projected SLR for the last year of the project useful life. For example, if an elevation project is being awarded in 2013, the project useful life is 30 years. The projected total SLR in 2043 should be utilized when adjusting the flood elevation data.

**8. What are the associated project design requirements when including SLR in the BCA module?**

For elevation projects, the structure must be elevated in accordance with local or state requirements, including freeboard and SRL.

**9. Does the local jurisdiction have to include SLR in zoning and ordinance development before FEMA will include SLR in HMA applications?**

No. However, if the community has adopted an SLR ordinance, the elevation specified in the ordinance should be the minimum elevation used in the HMA project and BCA calculation.

**10. Can an individual homeowner include SLR rise in its home elevation?**

Yes. A homeowner can choose to mitigate to a future hazard that includes anticipated SLR. However, a homeowner cannot apply directly to FEMA for mitigation assistance. Homeowners must work with their local jurisdiction if they are interested in HMA assistance. Detailed information on how to apply for HMA is available at <http://www.fema.gov/hazard-mitigation-grant-program> or by contacting your local or state emergency management office.