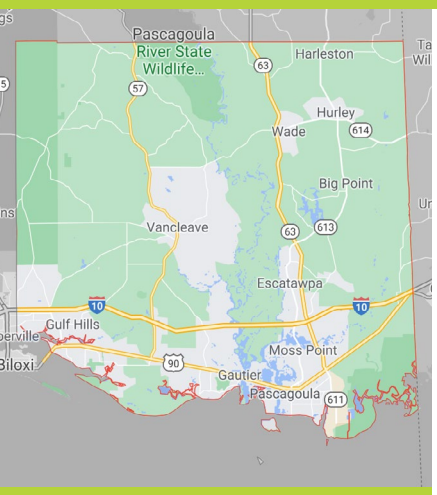


JACKSON COUNTY, *MISSISSIPPI*

Steps to Conduct Benefit-Cost Analysis for Resilient Solutions

1. Select Candidate Strategies
2. Define Investment Objective & Scope
3. Identify Benefits & Costs
4. Identify Non-Market (Non-Economic) Considerations
5. Define Analysis Parameters
6. Perform Economic Evaluation
7. Rank Strategies

Community Resilience

NIST National Institute of Standards and Technology U.S. Department of Commerce

October 2021

EDGe$

Economic Decision Guide Software Online Tool

Easy to use community resilience benefit-cost analysis tool

Success Story

> *"One of the main benefits of EDGe$ is the inclusion of community benefits. Other benefit-cost analysis tools do not consider community benefits, which is problematic because that is what resilience is all about. EDGe$ helps straightforward projects show their full benefit."*
>
> *- Renee Collini, Mississippi State University Coastal Research and Extension Program*

Situation

The Jackson County Utility Authority (JCUA), Mississippi, plans to replace three wastewater facilities with one consolidated water reclamation facility that will serve communities from 2030 to 2080. These three wastewater facilities were heavily impacted by Hurricane Katrina in 2005 and JCUA is proactivly mitigating future risk. Flooding is the primary hazard concern, especially considering the effects of sea level rise (SLR). The new facility will be located in the current 500-year floodplain and partially within the 100-year floodplain. JCUA also opted to plan for a high SLR projection in 2080 to accommodate their low risk tolerance. The water reclamation facility will provide a critical service to Jackson County residents and a nearby large oil refinery. The upgrades are expected to reduce service interruptions that would result in cascading impacts on households and community institutions. Based on these conditions, planners wanted to compare two alternative flood protection solutions for the facility.

Process

JCUA wanted to understand the benefits of building a berm around the site of the new water reclamation facility. Two berm heights were evaluated using EDGe$: (1) one built for a 500-year flood elevation for 2020 conditions (21 ft/6.4 m); or (2) one for the projected 500-year flood elevation including SLR at the site in 2080 (25 ft/7.6 m). JCUA worked with the Program for Local Adaptation to Climate Effects: Sea-Level Rise (PLACE:SLR), a Mississippi State University and Sea Grant supported program, to assess these options. Members of PLACE:SLR used EDGe$ to determine whether two proposed berm heights would be cost-effective over a 50-year service period. A benefit-cost analysis (BCA) was conducted for each of the flood events using the following assumptions:

- *The benefits included disaster-related annual avoided costs. For example, a $10,000,000 avoided cost was computed as a $100,000 annual benefit for 1% annual chance of flood (or 100-year flood).*
- *A discount rate of 7% was used.*

The Benefit Cost Ratio (BCR) and Net Present Value (NPV) for both options were computed with and without benefits that accrue to the wider community. This helped the JCUA better consider the potential berm construction plans. Benefits that could not be measured, such as impacts to community capacity to recover, and insurance availability and cost were described.

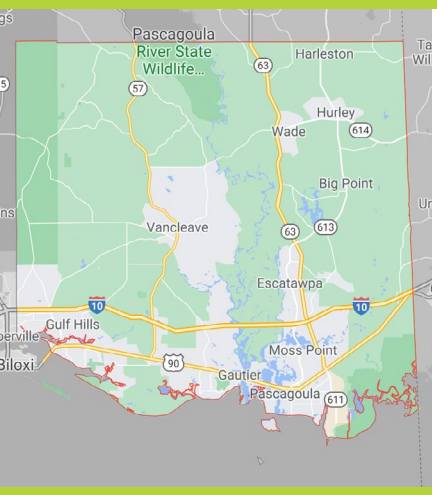
Contact Information & Resources

EDGe$ Online Tool Landing Page
https://edges.nist.gov/

For more information about EDGe$
https://www.nist.gov/services-resources/software/edge-economic-decision-guide-software-online-tool

NIST Community Resilience Program
https://www.nist.gov/topics/community-resilience

NIST Contact
edges@nist.gov



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Success Story (cont.)

Outcomes

The PLACE:SLR team found that EDGe$ was easy to use for those with limited economics training and are conducting a BCA for the first time.

The EDGe$ analysis showed that the short berm is slightly more cost-effective than the tall berm given initial parameters. However, both berms are cost effective, compared to a "do-nothing" option, even before considering community benefits. The inclusion of community benefits in the BCA improved the BCR for both berm options by a factor of two and had an even larger impact on the NPV.

The short berm is projected to be overtopped by a 500-year flood using 2050 SLR conditions, and a 100-year flood using 2070 SLR conditions. The tall berm provides protection for the projected 500-year flood in 2080.

Advantage of Using EDGe$

EDGe$ allows for inclusion of community benefits and co-benefits that accrue outside of a flood event. These capabilities were well-suited for this alternatives analysis because EDGe$ allowed for assumptions related to project benefits that accrue to a wider range of stakeholders served by the infrastructure rather than only the owner and operator. Community benefits were limited to disaster-related annual avoided costs for this study. This included loss of revenue to the cities served by the facility and loss of production by the major oil refinery.

The flexibility of EDGe$ made it easy for the team to run multiple BCAs that consider different scenarios and alternatives and to adjust how benefits accrued over time, better reflecting the impacts of SLR, a critical component of the study.

The relative cost of insurance, a history of storms exceeding a 500-year flood, and costs associated with delays due to dependencies on other organizations are additional factors that contribute to the tall berm's overall economic attractiveness. However, these factors were not included in the analysis because exact cost and benefit values could not be readily obtained at the time of the study.

This study demonstrates that EDGe$:

- *Can be used to perform BCAs by a range of users with limited to extensive economic training;*
- *Allows users to quantify co-benefits to the wider community, not only to the project's developer or primary stakeholders;*
- *Is flexible enough to handle various scenarios, contributing to better informed decision-making.*

Find Out More on the EDGe$ Online Tool