

# Ecosystem Services & Resilience



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Innovative Science for a Sustainable Future

## **IMPROVING COMMUNITY RESILIENCE BY PRIORITIZING ECOSYSTEM GOODS AND SERVICES**

### **Ecosystem Services and Resilience**

Community resilience is the capacity of a community to withstand and recover quickly from environmental impacts, like storms, droughts, and floods.

Ecosystem services are the human benefits of the natural system, which include protection from floods and other natural disasters. Every day, communities are faced with competing priorities for limited resources, including educational facilities, public utilities, parks and recreation, green space, and human capital.

When presented with the potential future impacts of climate change and its associated threats, those decisions are made more complex. Community leaders who recognize the need for investment in sustainability and resilience must carefully weigh the benefits and costs.

When considering the options available to increase their community resilience against impacts such as floods or storms, communities weigh the benefits and costs of structural investments (e.g., flood walls, levees, dams) versus environmental investment (e.g., restoring wetlands, greenspace projects). Both types of investments can increase long-term community resilience, but including consideration of ecosystem goods and services (EGS) can often provide additional value to the community by increasing community cohesion, recreational opportunities, or other benefits. Communities planning to invest in resilience projects must consider both the built environment and the naturally occurring benefits of the environment or EGS.

### **To Learn More**

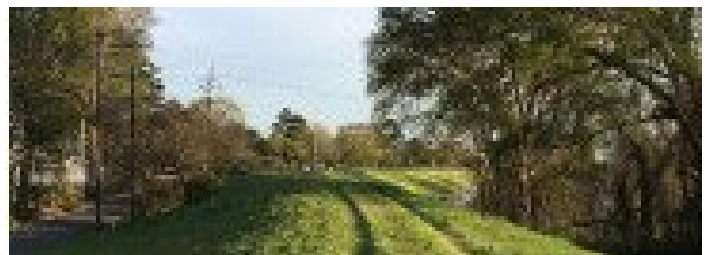
*Enhancing Flood Resilience along the Ouachita River*

[www.epa.gov/healthresearch/enhancing-flood-resilience-along-ouachita-river](http://www.epa.gov/healthresearch/enhancing-flood-resilience-along-ouachita-river)

### **Why Resilience?**

Planning for resilience in the face of potential damage to EGS has an outsized impact on their collective future, compared with projects focused on structural changes or the built environment. Dr. Pamela Matson, in presenting at the 2014 workshop, “Transitioning Toward Sustainability,” raised the issue that current models underestimate the economic costs of climate change by neglecting consideration of EGS (Brose, et al 2014). Communities can increase resiliency by maintaining ecological features like wetlands and avoid the expense of restoration or potential permanent loss.

In the case of flooding, community resilience means taking measures to reduce vulnerability to flooding and supporting long-term recovery after a flood (EPA 2014). In focusing on final ecosystem goods and services (FEGS), those ecological features of the community that directly benefit residents, communities can evaluate planning and land use options to prioritize those options that conserve land, reduce development in vulnerable areas, reduce future flooding risk to built environments, and maintain unique features of the community that lead to community cohesion and sense of belonging. True community resilience requires investment in both FEGS and built infrastructure.



The levee in Ouachita Parish provides public green space and flood protection.

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## Ouachita Parish, Louisiana Sustainability and Resilience

Ouachita Parish, Louisiana, includes some of the most flood-affected areas in the state. Through a 2019 community decision making effort, stakeholders met to prioritize flood mitigation projects based on FEGS and their impacts on human well-being. In the end, the community decided to prioritize balanced actions expected to have the greatest benefit to human well-being, including levee maintenance and creation of greenspace adjacent to the river. The workshop participants determined that levees “create open space, which can be used as publicly available land, river access, or as habitat for flora and fauna” (Fulford et al 2020). Greenspace projects also increase or preserve public access to parks, natural habitats, and wildlife. A future phase of this study will determine the resilience outcomes of the selected projects, as the community is able to enjoy both the improved ecosystem goods and services in their community in addition to the benefits of improved resilience against future floods.

## Sustainability Measures in Action

The historic, waterfront community of Freeport, New York, hosted a community workshop in 2014 to discuss the ways that their decisions about sustainability projects are impacted by their community values and goals. In discussing the tangible and intangible features of their community that they value, workshop participants focused on specific actions that tie directly to their values. They considered actions, such as preserving their water utility as public open space, moving public works out of the flood zone, protecting the power utility from flood and other hazards, and enabling buoyant architecture. Their discussions directly tied specific, future community decisions to their goals and values centered on sustainability and resiliency. An important element of this approach is stakeholder engagement that promotes community cohesion and ties all actions to well-supported community objectives.



The “nautical mile” is home to community activities where residents can directly benefit from ecosystem services.

## Resilience through Community Bonds

One of the principles of enhancing community resilience is improved governance (Biggs et al 2012). In Thibodaux, Louisiana, where the historic downtown is lined with shops, restaurants, and historic and cultural attractions, residents met to talk about their values and challenges in the face of declining revenue. In recognizing the value of good governance to their long-term resilience to climate change, 2014 workshop participants prioritized their future investments based on core values, which included education, safety, and community cohesion. Instead of making hasty spending cuts, the town worked together to determine the true value of investments in infrastructure and community services that aligned with their core values. This emphasis on strengthening their governance is a step forward in improving their community resilience through engagement.



During the workshop, community members focused on increasing community resilience through improved governance, social cohesion, environmental justice, and climate readiness.

### For Additional Information

U.S. EPA. 2014. *Planning for Flood Recovery and Long-Term Resilience in Vermont: Smart Growth Approaches for Disaster-Resilient Communities*. EPA-231/R-14/003.

Biggs, R., M. Schluter, D. Biggs, E. L. Bohensky, et al. *Toward Principles for Enhancing the Resilience of Ecosystem Services*. [www.annualreviews.org/doi/pdf/10.1146/annurev-environ-051211-123836](http://www.annualreviews.org/doi/pdf/10.1146/annurev-environ-051211-123836). August 7, 2012.

Brose, D, Romitti, Y., Anderson, R., Macalady, A. et al. *Transitioning Toward Sustainability: Advancing the Scientific Foundation*. National Academy of Sciences. 2016. <https://doi.org/10.17226/23533>

Fulford, R., W. Michaud, J. Stubblefield, J. Harvey, AND L. Sharpe. *Deeper Look at the Ouachita River: How investment in Ouachita River infrastructure sustains human well-being in Ouachita Parish, Louisiana*. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-20/146, 2020. [www.epa.gov/healthresearch/enhancing-flood-resilience-along-ouachita-river](http://www.epa.gov/healthresearch/enhancing-flood-resilience-along-ouachita-river)

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