



Benefits Valuation Method:

DAMAGES AVOIDED AND REPLACEMENT COSTS

Overview

In a benefit-cost analysis, decreasing the costs or increasing the benefits side of the equation can ultimately shape the final results. With natural infrastructure, a conceptual way to think about capturing benefits is to assess whether the feature will decrease anticipated costs for maintaining the project, for example after a disaster.

When valuing natural infrastructure using decreased costs as a substitute for a benefit, at least two methods can be employed: damages avoided and replacement costs. The damages avoided method uses either the value of property affected or the cost of actions taken to avoid damages as a measure of the benefits provided by an ecosystem. The replacement cost method, sometimes referred to as replacement value, refers to the amount that an entity would have to pay to replace an asset at the present time, according to its current worth.

Example

- Avoided flood damages – Many types of natural infrastructure can prevent flooding. These avoided flood damages can be valued using tax assessment values. Generally, this benefit is assessed using a software program such as the [Hydrologic Engineering Center's Flood Damage Analysis \(HEC-FDA\)](#), the [Hydrologic Engineering Center's Flood Impact Analysis \(HEC-FIA\)](#), or [FEMA Hazus Multi Hazard](#). For more information on avoided flood costs see [What Will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure](#) and [A Guide to Assessing Green Infrastructure Costs and Benefits for Flood Reduction](#).
- Reduced stormwater management costs – Natural infrastructure can both reduce the quantity of stormwater that needs to be processed and reduce costs of processing the stormwater by providing filtration. Thus, stormwater management costs are avoided and can be used to value the natural infrastructure.
- Reduced heating or cooling costs – Certain types of natural infrastructure, in particular green roofs, can provide insulation that reduces heating and cooling costs.
- Reduced roof replacement costs – Green roofs can extend the lifespan of a roof. The avoided replacement costs can be monetized by using market prices for roof replacements and estimates of the increased roof longevity.

Strengths

When feasible, avoided damages and replacement cost methods are good choices. Similar to market price methodology, this method has a sound basis on which prices are estimated.

Challenges

Avoided and reduced cost methodologies only quantify part of the benefit of the natural infrastructure. Other benefits must be assessed with different methodologies in order to estimate total value.

Tips

Seek expertise. Contract with an economist experienced in avoided and reduced cost methods. An experienced economist will ensure that the results are defensible.

Additional Resources

Getting Help

- Reach out to our team (econguidance@noaa.gov) for specific questions on damages avoided and replacement cost studies.
- Hire a private consultant or request support from academic partners. Researchers, graduate students, and academic scholars may be able to provide guidance or work directly on your damages avoided and replacement cost analyses.

Other Resources

- Sun, Fanglin, and Richard Carson. 2020. "Coastal Wetlands Reduce Property Damage during Tropical Cyclones." *Proceedings of the National Academy of Sciences*. Volume 117, Number 11. Pages 5719-5725. <https://www.pnas.org/content/117/11/5719>.
- Environmental Protection Agency. "Replacement Cost" (Science Advisory Board report excerpt). [yosemite.epa.gov/Sab/Sabproduct.nsf/WebFiles/Replacement/\\$File/Replacement%20cost-03-09-09.pdf](https://www.epa.gov/Sab/Sabproduct.nsf/WebFiles/Replacement/$File/Replacement%20cost-03-09-09.pdf).