



# Assessing the Costs and Benefits of Nature-Based Solutions

## Tips for the Non-Economist

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Project decision-making greatly benefits from economic information. But where to start?

Economists usually determine whether a quantitative or qualitative approach is needed, and then select from a range of possible methods that describe costs and benefits to inform decision-making. This handout summarizes three common types (two quantitative and one qualitative) and provides information about when to consider using each. The methods require varying degrees of time, economic expertise, and data inputs. Each can yield information helpful for deciding when, whether, or how to use natural infrastructure. Community values, desired co-benefits, and equity concerns should also be considered.

## COST-BENEFIT ANALYSIS

**What is it?** Cost-benefit analysis compares a project's costs and benefits, allowing an assessment of whether the benefits outweigh the costs. With this approach, costs and benefits are expressed in dollars, or monetized, to the greatest extent possible. But you don't necessarily need to monetize all costs and benefits to successfully perform this type of analysis. Costs and benefits that cannot be monetized may be described qualitatively to inform the decision-making process.

**When should I use it?** Expressing costs and benefits in dollars provides the most robust and comprehensive economic information. Use this approach if you have, or can derive, cost and benefit estimates, and need to know net benefits. A cost-benefit analysis is required for some projects that use federal funding sources. The approach can be used to compare the costs and benefits of a natural infrastructure project, and to compare alternative projects. For example, do the avoided costs of flood damage exceed the cost of a bioswale installation? Do green roofs or street trees have a better cost-benefit ratio?

**What should I be cautious about?** While a cost-benefit analysis offers the most detailed result, it also often requires the most effort and expertise. Also, when monetizing some benefits, it may be difficult to keep sight of the qualitative benefits that were not monetized.

## COST-EFFECTIVENESS ANALYSIS

**What is it?** Like the aforementioned, a cost-effectiveness analysis requires monetizing costs; unlike a cost-benefit analysis, benefits are not monetized, but instead are expressed in other quantifiable units. A cost-effectiveness analysis compares projects by quantitatively calculating monetary cost per unit of anticipated benefit. This analysis is a helpful tool for decision-making when there are multiple ways to achieve the same benefit, goal, or level of results, and it is impossible, impractical, or undesirable to monetize the benefits.

**When should I use it?** A cost-effectiveness analysis is useful when selecting from among multiple natural infrastructure projects that are expected to yield similar benefits. When performing this method, consider the scale of the alternatives to make sure costs are truly comparable. A cost-effectiveness analysis could help a landowner or community, for instance, decide whether a bulkhead, riprap, or living shoreline would be most cost effective, per linear foot, for delivering shoreline stabilization. The process should consider the ecological and community co-benefits the living shoreline option also offers.

**What should I be cautious about?** Because benefits are not monetized, cost effectiveness will *not* provide information on whether the benefits outweigh costs. Care should be taken to correctly interpret the results, expressed as a ratio of cost per some non-monetary unit of benefit, when comparing projects to ensure that the relative scale of each project (and anticipated associated benefits) is similar. For example, a project that benefits 10 households may have a higher cost-effectiveness ratio than a project that benefits 1,000, but the differing scales do not allow for direct comparison of the ratios.

## QUALITATIVE ANALYSIS

**What is it?** Qualitative analysis involves telling a strong story that places the project in context and describes how the project will provide a benefit. If this type of information resonates with the target audience, do not shy away from using this approach.

**When should I use it?** If faced with limited ability to conduct an economic analysis, qualitative analysis can be used to identify and describe the costs and benefits of a proposed project. This method will not provide quantitative values (dollars) or determine whether benefits outweigh costs, nor be as useful as the other approaches when it comes to selecting among options. However, this approach can provide a compelling narrative about conceptual costs and benefits. This narrative might be enough to implement (or abandon) a project.

For example, when deciding to conserve or restore mangrove forests to reduce storm damages, a community might begin by telling the story of what types of costs would be incurred to protect and expand the mangroves and the types of benefits that would accrue. (This persuasive qualitative analysis may also garner interest and support for one of the more in-depth analyses described earlier.) Many studies are available that have assessed the effectiveness of various natural infrastructure techniques; these can also be used to build a strong benefits story. NOAA's *Green Infrastructure Effectiveness Database* can help.

**What should I be cautious about?** Because this method does not provide monetary results, this approach will not tell you if a project's benefits outweigh its costs, nor allow for a quantitative comparison among different options. Still, qualitative analysis offers a critical context that helps people better understand potential project benefits and costs.

## CHOOSING THE RIGHT ECONOMIC ANALYSIS

When determining which method to use, consider

1. access to economic expertise;
2. availability, type, and quality of data; and
3. amount of time and effort that can be allocated to the analysis.

Use the following decision tree to help select between the three approaches discussed in this handout.

### What kind of information are you looking for?

