

Mitigation cost-based valuation

Introduction

Mitigation cost-based valuation methods are a group of 'exchange-based' techniques that use the cost of actual measures to maintain ecosystem service provision as a proxy for the value of avoiding, mitigating or restoring the loss of services ecosystems provide. As costs are estimated based on observable market-prices it is a group of methods that is also accepted in guidelines on experimental ecosystem accounting (EEA) within the system for economic and environmental accounting (SEEA)(UN 2014). Cost-based methods give a conservative estimate of the value of ecosystem services provided that the most cost-effective actions for avoiding, mitigating, restoring, compensating and offsetting environmental damages have been undertaken. Actions may be specifically designed to address a particular ecosystem service, but costs are often representative of bundles of ecosystem services. Mitigation cost-based valuation methods are associated with steps of the "mitigation hierarchy" (BBOP 2009a) (Figure 1).

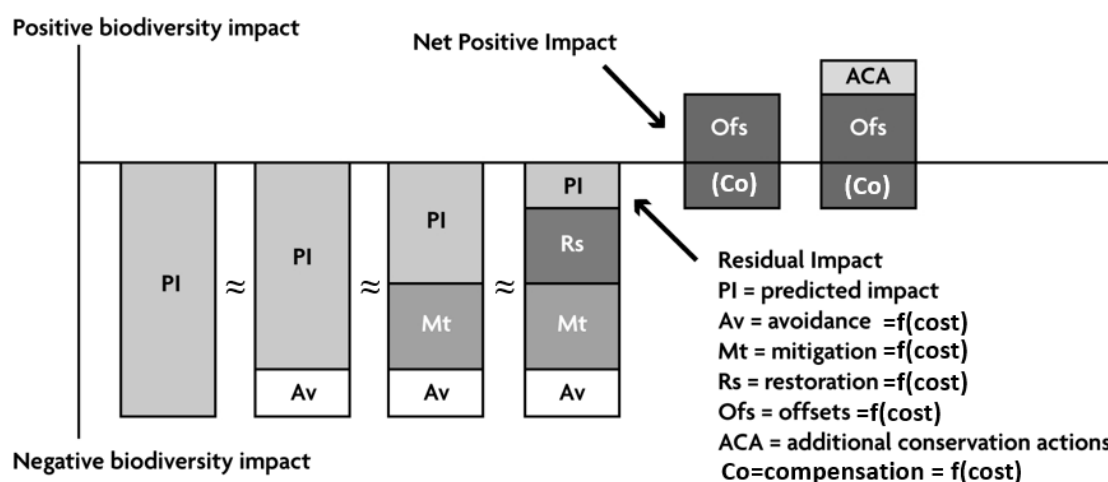


Figure 1. The mitigation hierarchy. Source: adapted from BBOP (2009a)

While the aim of avoidance, mitigation, restoration, compensation or offsetting actions is 'no net loss' to ecosystem services, the sum of action costs is not necessarily equal to the economic impacts if no actions had been undertaken. In other words, the costs of actions do not necessarily equal the welfare effects of impacts. The assumption is that if actions have been undertaken their costs are less than the expected damages to ecosystem services. In practice, actual avoidance, mitigation, restoration, compensation costs incurred may be inflated by ineffective actions. The cost of actions depends on the regulatory standards for environmental liability in the particular jurisdiction of the project (Vatn et al. 2014). Monetary compensation (Co) for damages may in some jurisdictions be required because of negligence (no averting, mitigating or restoration actions have been undertaken).

Keywords

Avoidance costs; Mitigating costs; Restoration costs; Offset costs; Compensation costs.

Why would I chose this approach?

Cost-based methods are accepted for SEEA purposes. They are seen as more reliable than other approaches because they are based on observed market-prices. Ideally, costs are 'operational' in that they are the result of observed actions as part of environmental planning, impact assessment and management. The valuation objective is to determine the sum of costs imposed by environmental regulatory standards, under the assumption that they are a proxy for social value of the ecosystem services protected by the standards. Broadly speaking, cost-based methods are often proxies for multiple ecosystem services - averting and restoring actions target ecosystem condition, rather than specific services. Some mitigation actions and compensation costs may be aimed at particular ecosystem services.

Cost-based methods are landscape and project specific, local scale and high-resolution. They are recommended for SEEA purposes and have been applied across a number of decision contexts – awareness-raising, priority-setting in benefit-cost analysis of project alternatives and the design of biodiversity offsets as well as providing the basis for economic liability.

What are the main advantages of the approach?

Methodological

- Ease of use;
- Speed of use;
- Draws on existing data;
- Covers wide range of ES.

Governance

- Regulatory compatibility;
- Recognised and established accounting approach.

What are the constraints/limitations of the approach?

Methodological constraints

- Does not include welfare measures;
- Uncertain effectiveness of mitigation, restoration and offsetting actions are not possible to quantify ex ante (see appendix). The less effective a measure the more valuable the ecosystem services appear;
- When applied without basis in actual projects, ad hoc assumptions regarding environmental liability standards and potentially feasible actions are required (generating hypothetical costs). When exploring cost-effectiveness of actions the method has commonalities with 'shadow pricing';
- Environmental modelling may be required to assess effectiveness of averting, mitigating and restoring actions on ecosystem service provision (modelling costs).

Governance constraints

- May not reflect environmental liability legislation;

What types of value can the approach help me understand?

Mitigation cost-based methods are highly appropriate to value ecological values and intrinsic values of nature, as well as to elicit option values. They are less suitable to unfold socio-cultural values and relational values, and not appropriate to capture existence value.

How does the approach address uncertainty?

When aiming to apply cost-based methods, it is important to take into account that these methods are conservative and uncertain proxies for the value of avoiding variable future ecosystem service losses.

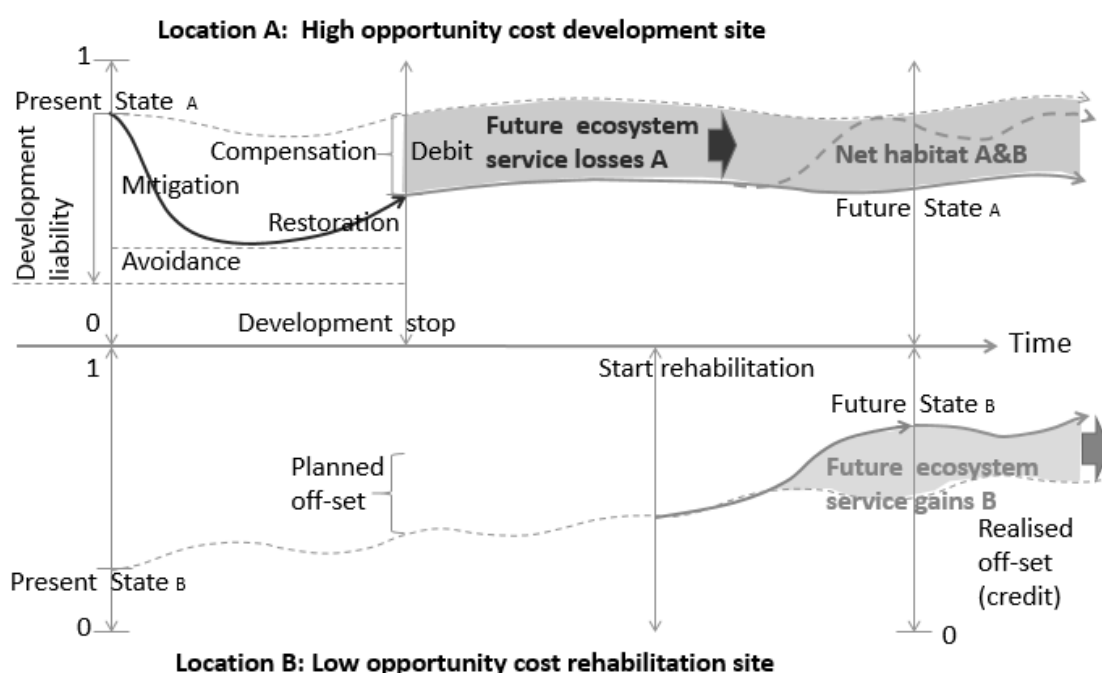


Figure 2. Uncertainty in the application of mitigation cost based methods. Source: adapted from Barton et al. (2011)

As demonstrated in the figure above (Figure 2), avoiding, mitigation and restoration actions are substitutes for one another and should be subject to cost-effectiveness analysis. As a rule of thumb in the mitigation hierarchy, avoidance is preferred to mitigation, which is preferred to restoration and offsetting – following the principle that early precautionary measures are preferable to ex-post reparation. In some regulatory contexts monetary compensation for environmental liability may be required in cases of wilful negligence (lack of avoidance). Off-site offsetting provides the potential for a more cost-effective approach to no net loss of ecosystem services. The equivalence and cost-effectiveness of offset measures over time is more uncertain than on site measures. In summary, the more cost-effective the design of actions, the lower the inferred value of ecosystem services.

How do I apply the approach?

Figure 3. A stepwise approach to the application of mitigation-cost based methods.



Requirements

Requirements		Comments
Data collection requirement	X Data is available <ul style="list-style-type: none"> □ Need to collect some new data (e.g. participatory valuation) □ Need to collect lots of new data (e.g. valuation based on surveys) 	If based on actual or potentially feasible measures
Type of data required	X Quantitative <ul style="list-style-type: none"> □ Qualitative 	
Expertise and production of knowledge needed	X Working with researchers within your own field <ul style="list-style-type: none"> □ Working with researchers from other fields □ Working of non-academic stakeholders 	Working with project managers
Software requirements	X Freely available <ul style="list-style-type: none"> □ License required □ Advanced software knowledge required 	Spreadsheet
Time requirements	X Short-term (less than 1 year) <ul style="list-style-type: none"> □ Medium-term (1-2 years) □ Long-term (more than 2 years) 	
Economic resources	X Low-demanding (less than 6 PMs) <ul style="list-style-type: none"> □ Medium-demanding (6-12 PMs) 	

	<input type="checkbox"/> High-demanding (more than 12 PMs)	
Other requirements		

Where do I go for more information?

Contact: david.barton@nina.no

BBOP (2009a). Business, Biodiversity Offsets and BBOP: An Overview. Business and Biodiversity Offsets Programme (BBOP)., Washington, D.C.

This publication explains the principles of the mitigation hierarchy.

Factsheet prepared by David N. Barton