BRIEFING 5 NOTE

Developing the economic case for EbA

It is often suggested that ecosystem-based adaptation (EbA) can be more cost-effective, provide both the desired adaptation benefits and multiple co-benefits, and be more sustainable than engineered adaptation measures in the long term. Assembling the evidence to present this case, however, remains a challenge in practical terms.

This briefing note highlights the range of information that should be incorporated in making an economic case for EbA, and the relevance of compiling it for all adaptation solutions to help ensure that EbA options are fairly compared with other adaptation approaches.

The challenge

Climate change adaptation should be financially sustainable in all cases. EbA has the potential for generating larger economic returns because of the co-benefits that EbA measures generate. Increasingly, EbA projects around the world are confirming some economic advantages of EbA, in particular that EbA can be more cost-effective.[1] However, a recent review of EbA-relevant valuation methods[2] highlighted a key challenge being the lack of 'hard' evidence of the physical effectiveness of EbA measures in responding to climate hazards and meeting adaptation goals. Most studies simply assume that conserving or restoring a particular natural habitat will secure benefits, and do not investigate the effectiveness of specific actions in delivering adaptation benefits. There is also limited information about the exact processes through which EbA can generate wider co-benefits.

These evidence gaps can make it difficult to build a business case to convince planners and decision makers that EbA will yield a worthwhile return on investment and should therefore be integrated into wider adaptation strategies. Investing in building such evidence can help planners understand the potential impacts of different options and trade-offs among them, and integrate any necessary mitigation measures into the design process.

In addition to evidence gaps, deeper analysis of EbA options may also reveal political economy challenges. EbA solutions are less likely to be supplied by markets, or by suppliers currently offering conventional engineering approaches, and are more likely to generate benefits that are more dispersed and 'public' in nature. This can increase the complexity of choices for decision makers and result in EbA options being judged as more risky or less beneficial than they really are.

UN environment programme

Developing more holistic cost-benefit evidence

Ensuring that a fuller and more consistent range of costs and benefits of all adaptation measures are captured in analysis of options is important. A recently developed framework categorises benefits, costs and impacts arising from EbA implementation (Figure 1) and highlights that analysis must be accompanied by effective communication if evidence is to impact choices.[3]

Comparing adaptation options, of course, requires considering primary adaptation benefits, which are the main focus of both engineered solutions and EbA measures. The wider potential of EbA measures includes possible adaptation benefits beyond the primary issue targeted and also co-benefits, which may not be connected to adaptation but still deliver benefits to people. These include provisioning services that have financial values, such as wood fuel and non-timber forest products, and a range of social co-benefits. The latter are usually unvalued and therefore unrecognised by policy-makers, a key barrier to scaling up EbA. Engineered or hybrid solutions may also provide wider benefits; for comparability, these should be assessed for all options.

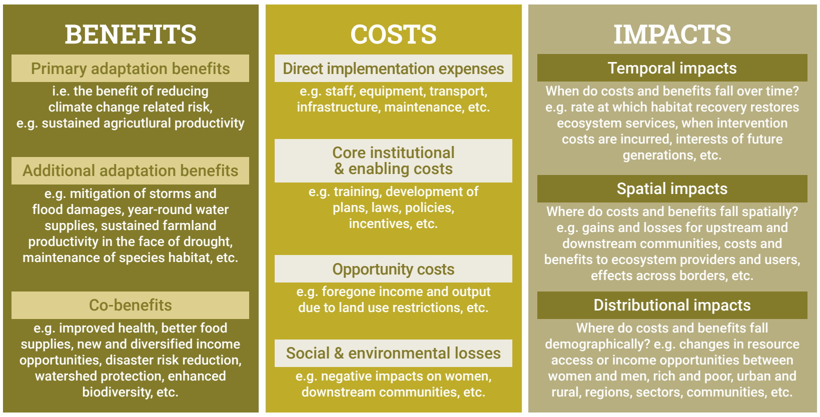

Figure 1. *Framework of EbA benefits, costs and impacts (adapted from Emerton 2017).*

Similarly, the full range of costs needs to be considered. Direct implementation expenses are the financial costs of establishing the adaptation measure, whether engineered or ecosystem-based. Opportunity costs, such as foregone income from land use, should also be considered. Environmental and social losses cover the wider costs that might arise, and tend to fall outside the market. All of these costs are within the bounds of a standard cost-benefit analysis, and should be assessed for both EbA and engineered adaptation options.

Core institutional and enabling costs are not normally part of a standard cost-benefit analysis because they apply to the general context of adaptation decision making rather than to specific projects. They do highlight the fact, however, that a strategic investment to build institutional capacity may be required to support adaptation planners and allow EbA options to be routinely identified and considered as part of adaptation strategies alongside traditional engineering solutions.

As referred to in Figure 1, 'impacts' represent when, where and, critically, upon whom the costs and benefits of different options fall. Understanding who wins and who loses from specific adaptation choices can help in understanding why EbA options are not always advanced. For example, if beneficiaries are more spread out geographically, or benefits are more long term, their views may have less influence (being harder to capture) than those of beneficiaries from engineered solutions, which may have more short-term, localized benefits.

Assessing costs and benefits

While monetisation is often perceived as the focus of economic appraisal, it is not required for decisions to take account of costs and benefits. Indeed, other ways of measuring values, such as avoidance of injury or loss of life, or protection/provision of local employment, may have more resonance. How values are measured and best described will be context-specific. As Figure 2 shows, some of the potential changes that may result from EbA interventions are more likely to be suitable for quantitative measurement than others.

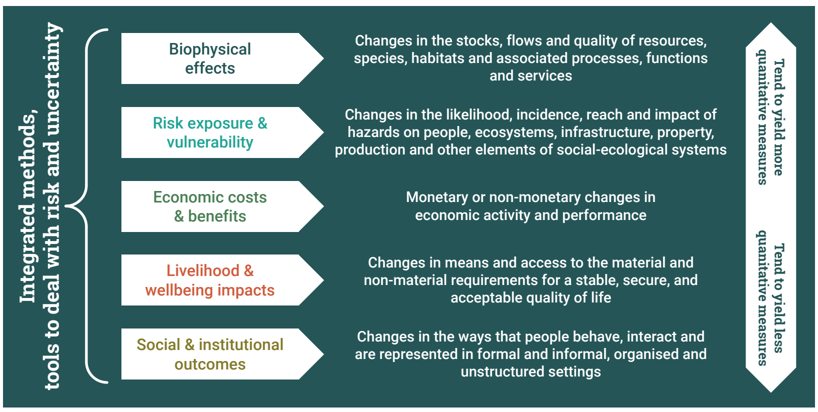

Figure 2. *Categories of EbA valuation methods (adapted from Emerton 2017).*

Monetisation allows comparability across different issues and different options, but it is unlikely to be able to capture all values, especially those that can only be described qualitatively. This limitation must be kept in mind, and impacts that have not been monetised should be highlighted, so that they can be considered alongside monetary indicators.

Capturing the full spectrum of costs and benefits associated with EbA interventions in a way that represents different stakeholder groups and their perception of value therefore requires a multidimensional, multifaceted and interdisciplinary approach. Detailed guidance on valuation approaches can be found in the EbA Valuation Sourcebook.[4]

Hannah McNeish/UNEP

BRIEFING 5 NOTE

Cost-benefit analysis and cost effectiveness

Both cost-benefit analysis and cost effectiveness are often used in economic analysis of options, and both rely – to an extent – on monetary analysis.

Cost-benefit analysis focuses on the overall costs and benefits of an adaptation measure (Box 1). Typical results of a cost-benefit analysis are a single number such as the net present value of a project, or the benefit-cost ratio. The 'net' in net present value indicates that it incorporates benefits minus costs, so if it is a positive number, the project has net benefits for society. Present value indicates that discounting has been applied.[5] Discounting can introduce bias against projects that have more benefits in the long term. Strong arguments exist for reducing discount rates over time where, as in EbA, long-term considerations are a major issue. The benefit-cost ratio is an alternative way to present cost-benefit analysis results. For example, a project that generated $2 worth of benefits for every $1 invested would have a benefit-cost ratio of 2:1. To have a net benefit to society, a project's benefit-to-cost ratio needs to be greater than 1.

Cost effectiveness analysis looks at the least costly way of achieving a given objective (e.g. measurable reduction in climate change related risk). This could be applied to EbA and engineered adaptation measures if they were expected to deliver the same primary adaptation outcome. The best option would then be the one with the lowest net cost.

Box 1. Adaptation cost-benefit analysis in Lami Town, Fiji

Climate change is projected to increase flooding and erosion threats to the rapidly growing population and infrastructure of urban and peri-urban Lami Town.

To help understand the full impact of different adaptation options, a cost-benefit analysis was carried out for four different adaptation interventions. The scenarios used had different levels of ambition with regard to use of EbA (including replanting mangroves and stream buffers, and reducing upland logging and coral extraction) with increasing use of engineered adaptation approaches where EbA measures were not used.

The analysis looked over a 20-year time horizon and considered benefits, including reduced health costs, avoided damages to businesses and households, and wider ecosystem services being maintained or enhanced. Despite assumed lower impacts in terms of damage avoided, ecosystem-based options were identified as having the highest return per dollar of investment.

Scenario	Benefit-to-cost ratio (FJD)	Assumed damage avoidance
Ecosystem-based options	$19.50	10–25%
Emphasis on ecosystem-based options	$15.00	25%
Emphasis on engineering options	$8.00	25%
Engineering options	$9.00	25–50%

Benefit-to-cost ratio for each scenario of adaptation options, and assumed damage avoidance.
Source: http://www.sprep.org/attachments/Publications/Lami_Town_EbA_Synthesis.pdf

Economic analysis in a broader context

The final selection of options will not be based solely on the economic case (Figure 3). The strategic case, for example, emphasises the importance of framing options and assessments in relation to the adaptation goal. The economic case focuses on maximising the expected returns in terms of societal welfare, accounting for all costs and benefits whether they are priced in markets or not. The financial case is distinct from the economic one, focusing on the flows of money required to fund the project on the cost side, and revenues generated by the EbA intervention (e.g. through provisioning services). This will not capture other, non-market, EbA benefits such as flood control, river flow regulation and soil retention, which are usually unvalued and therefore unrecognised by policy makers. However, it can help a government understand if it can afford to pay for the scheme.

Strategic Case	Is the proposal needed?	Will it further the aims and objectives?	Is there a clear case for change?
Economic Case	Is it value for money?	Has a range of options been considered?	Is it the best balance of cost, benefits and risk?
Commercial Case	Is it viable?	Is there a supplier who can meet our needs?	Can we secure a value for money deal?
Financial Case	Is it affordable?	Are the costs realistic and affordable?	Is the required funding available and supported?
Management Case	Is it achievable?	Are we capable of delivering the project?	Do we have robust systems and processes in place?

Figure 3. *The different business cases that need to be made to help deliver value for money from investments such as adaptation as illustrated by the UK Treasury's Five Case Model[6] (redrawn from http://fivecasemodel.co.uk/).*

Decision makers will also need to consider whether they are capable of managing the delivery of projects and whether they can find suppliers to deliver projects. In either case, EbA might present more challenges as businesses may be more familiar with supplying engineered solutions, and those making procurement decisions more accustomed to managing such investments. This reinforces the point made in the benefit, cost and impact framework (Figure 1) that there are likely to be additional enabling costs, which may act as a barrier to bringing EbA options onto even playing field with engineered approaches.

These challenges are not insurmountable, however, nor are they unique to EbA. The need to understand how nature underpins the delivery of economic and social objectives (see Briefing Note 2) and reflect this throughout public and private sector decision making (see Briefing Note 6) is a recurring theme (e.g. Aichi Biodiversity Targets, Sustainable Development Goals). Accordingly, as in other fields, there is a clear need for EbA planners, implementers and donors to push for more comprehensive assessments in order to strengthen the evidence base on costs, benefits and impacts across social, economic and environmental objectives. Such assessments should be framed in relation to the adaptation goals that are being prioritised by decision-makers. This will improve EbA practice, help consolidate the business case for EbA and increase its uptake.

Hannah McNeish/UNEP

Key action points

- Incorporate activities that build the economic evidence on the full range of benefits delivered by EbA.
- Build 'business cases' comparing EbA options to alternatives.
- Use economic evidence to help integrate adaptation into plans, budgets and policies across sectors.

References

[1] Emerton, L. (2017) *Valuing the benefits, costs and impacts of ecosystem-based adaptation measures: a sourcebook of methods for decision-making.* Bonn/Eschborn: GIZ.

[2] ECO Consult (2017) *Interim brief: summary of findings from the assessment, clustering and gap analysis of EbA-relevant valuation methods.* Unpublished report to GIZ Global Project 'Mainstreaming EbA – Strengthening ecosystem-based adaptation in planning and decision-making processes'. Oberaula.

[3] Emerton, L. (2017) *Valuing the benefits, costs and impacts of ecosystem-based adaptation measures: a sourcebook of methods for decision-making.* Bonn/Eschborn: GIZ.

[4] Ibid.

[5] Discount rates are used in economics to adjust future costs and benefits to a present day value. This accounts for people tending to prefer benefits that arrive sooner rather than later (time preference) and for them expecting to be wealthier in the future (implying that future costs and benefits will feel less significant). Discounting can also allow for the potential impact of catastrophic risks, i.e. the chance that the costs and benefits never arise due to catastrophes that wipe out humanity. It can be readily argued that time preference discounting should not be used to account for inter-generational equity. Similarly, uncertainties over future growth, especially in the context of climate change, mean this rationale for discounting can also be questioned. Reducing the discount rate accordingly will reduce the impact that discounting has on how we perceive future cost and benefits in appraising EbA options.

[6] HM Treasury (2013) *Public sector business cases: using the five case model.* Green book supplementary guidance on delivering public value from spending proposals. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/469317/green_book_guidance_public_sector_business_cases_2015_update.pdf