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Resilience Evaluation, Analysis and Learning

RESILIENCE MEASUREMENT
PRACTICAL GUIDANCE NOTE SERIES | 7

Cost-Benefit Analysis (CBA) in Resilience Programming

About the Resilience Evaluation, Analysis and Learning (REAL) Associate Award:

REAL is a consortium-led effort funded by the USAID Center for Resilience. It was established to respond to growing demand among USAID Missions, host governments, implementing organizations, and other key stakeholders for rigorous, yet practical, monitoring, evaluation, strategic analysis, and capacity building support. Led by Save the Children, REAL draws on the expertise of its partners: Food for the Hungry, Mercy Corps, and TANGO International.

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Disclaimer:

This guidance note is made possible by the generous support and contribution of the American people through the United States Agency for International Development (USAID). The contents of the materials produced through the REAL Award do not necessarily reflect the views of USAID or the United States Government.

Acknowledgements:

This publication was produced for review by USAID Center for Resilience. It was prepared by Kristen Schubert (Causal Design), with contributions from Mercy Corps team members, Olga Petryniak, Bradley Sagara, Jill Scantlan, and Jenny Morgan, as well as Madeleine Gauthier (USAID).

Photo Credits:

Front cover: Miguel Samper/Mercy Corps. *Back cover:* Kristin Lambert/Mercy Corps.

Recommended Citation:

Schubert, K. (2020). *Resilience Measurement Practical Guidance Note Series 7: Cost-Benefit Analysis (CBA) in Resilience Programming*. Produced by Mercy Corps as part of the Resilience Evaluation, Analysis and Learning (REAL) Associate Award.

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Table of Contents

1. Introduction and Learning Objectives

Resilience Evaluation, Analysis and Learning (REAL) guidance notes have focused on best practices for measuring the benefits of resilience interventions. Equally as important as understanding the effectiveness of resilience interventions is understanding if these interventions are also cost-effective. A project that achieves its intended effect and does so at the lowest cost allows project teams to spread scarce financial resources to a larger population. Ultimately, this contributes to greater outcomes for vulnerable communities and systems. The purpose of Guidance Note 7 is to provide a resource for policymakers and implementing organizations looking to identify cost-effective resilience interventions and prioritize development resources using this economic analysis tool called, Cost-Benefit Analysis (CBA), to understand the costs and benefits of building resilience capacities in contexts affected by shocks and stresses, and access additional learning resources. It is not intended to be a comprehensive, technical guide on CBA; cost-benefit analysis is a tool that has been used in development programming for decades and technical guides are widely available (see Resources section below). Instead, this Guidance Note is about key considerations for those interested in adapting this well-established methodology to resilience investments, which is a relatively new programming area that poses unique and uncommon challenges.

Cost-Benefit Analysis (CBA):

CBA is an economic tool used to directly compare the benefits against the costs of a project or activity.

This Guidance Note has the following learning objectives:

- Understand why and when CBA can be useful for the design, implementation, and evaluation of resilience activities;
- Identify questions that a CBA can and cannot help answer for resilience interventions;
- Be familiar with the standard practices in CBA;
- Learn how to adapt the CBA framework to measure the costs and benefits of resilience interventions (treatment of shocks, measuring and monetizing key outcomes, etc.) and compare the cost-effectiveness across resilience interventions; and,
- Know how to promote high-quality and transparent CBAs and contribute to expanding the body of knowledge on resilience measurement that can inform future studies of cost-effectiveness.

2. Core Concepts

Proponents of a resilience approach to development have long held that investing in resilience capacities has long-term benefits that make it more cost-effective than "business as usual" even if upfront costs are greater. However, to date, empirically demonstrating that an ounce of prevention is worth a pound of cure has generally eluded resilience researchers and evaluators, with a few notable exceptions mentioned below. CBA can help with building this empirical evidence. CBAs are

common project appraisal tools used by many major donor organizations including USAID, the World Bank, Millennium Challenge Corporation, and the UK's Department for International Development.[1]

2.1. What is CBA?

CBA is an economic tool used to directly compare the benefits against the costs of a project or activity.

CBA relies on data to determine if an activity, implemented in a certain way, is an investment worth its costs and/or if another intervention might achieve greater benefits for the same cost. To do this, CBA places a monetary (or dollar) value on the financial and social/economic benefits of an activity so these benefits can be directly measured against the costs of the activity[2]. A CBA can be done from different perspectives (e.g., households, farmers, the local government) to determine who is likely to benefit in monetary terms from the activity, and by how much. Additionally, the CBA model can identify the risks a project might face, and whether the project is likely to be sustainable. Finally, it can be used to identify modifications to a project or alternative designs that might have better outcomes. This helps determine if our projects are generating value for money.

CBA measures the value of an investment on a financial or economic basis. Other factors, such as humanitarian, social, environmental, political, and security dimensions, are also important when assessing the value of a project (more on this in Section 6). If the costs and benefits associated with these considerations cannot be quantified and monetized for a CBA, project teams should undertake qualitative analysis about their importance and magnitude to complement the CBA. When a decision is made to do a CBA for a project, qualitative information on any significant but not quantifiable or non-monetized costs and benefits should be reflected in the CBA report.

2.2. What Value Does CBA Add for Researchers and Decision-Makers in Resilience Investments?

Resilience investments take a multi-sectoral approach and build capacities at multiple levels (i.e., individual, household, community, and system). But there are times when — due to limited funding or project/activity scope — we have to make decisions on which interventions to invest in. CBA can help inform such decisions. Ultimately, the central question driving all CBAs is whether an intervention's benefits outweigh the costs *(i.e., was this intervention valuable?)*. By comparing CBAs for different interventions or designs, project teams can also then identify the intervention or design that achieves the highest benefits per dollar spent *(i.e., which intervention is most cost-effective?)*. With

[1] Examples of USAID's work in CBA can be found here: https://www.usaid.gov/what-we-do/economic-growth-and-trade/promoting-sound-economic-policies-growth/working-more

[2] A CBA can be done on a simple intervention as well as on a complex, multi-activity project. In this document, the words intervention, activity, and project are generally used interchangeably, unless made explicit from the context.

the ability to measure project value and cost-effectiveness, project teams can answer questions for their resilience activities such as:

- Which interventions should be prioritized? For example, should planners choose interventions that (i) protect the agricultural sector against climate change? (ii) focus on disaster risk reduction activities, or (iii) are more transformative such as changes in local governance?
- Does increasing the ability to avoid losses from a shock outweigh the costs? Or can the project be redesigned or modified so that more people benefit without increasing the costs?
- Will households benefit financially from their investments in reducing their risks and avoiding losses from shocks and stresses? Will other stakeholders (e.g., community groups, the government) also benefit financially, creating incentives for them to participate in the project?
- Is there an alternative way to design or adapt this resilience intervention that has better welfare outcomes for households in the face of shocks and stresses for the same cost?
- Is there an alternative way to design or adapt this project that might result in cost savings for the donor?[3]
- Will this project be financially sustainable after the intervention is complete, and what are the risks to its long-term sustainability?

CBAs are able to provide answers to these questions using quantitative data, reinforcing evidence-based decision-making. It is important to note that CBAs are especially useful for addressing economic questions surrounding an intervention, but less useful for addressing a number of other questions concerning the political economy, institutional arrangements for designing and implementing projects, political will, etc. These limitations are discussed later in this Guidance Note.

2.3. When to Conduct a CBA

CBAs, conducted at different periods during the Program Cycle, can inform project design and implementation in the following ways:

Ex-ante CBAs: These CBAs are usually done early in the Program Cycle to help design a project or activity. This is the most common time to perform a CBA. In practice, USAID economists conduct most ex-ante CBAs. This is often done using data from previous projects, in consultation with the Mission project designers and technical experts and using secondary data available for the target population (see more on data sources below). Uses for ex-ante analysis are described below:

[3] The donor and the implementing partner are treated as the same perspective in CBA, since they typically share all relevant costs and aim to achieve the same benefits.

- **Project Design:** CBAs are useful during project design, to identify implementation problems early on such as affordability or financial viability, and to investigate if an alternative design might have greater impact per dollar spent. It is also useful for extracting implicit assumptions about the Theory of Change that may need closer examination for the project to be successful. Finally, CBA models create forecasts for a period of analysis of usually 10 to 20 years following the beginning of a project/activity, which is useful for analyzing the sustainability of this investment.

  Period of analysis: The period of analysis for a project should generally be long enough to capture the major costs and benefits of the investment, but not so long that the projected costs and benefits become too uncertain. For this reason, it is conventional to match the period of analysis to the anticipated lifetime of a project's largest purchased asset. If this period is difficult to determine, or if a project does not involve major assets, the period of analysis is usually 10-20 years.

- **Monitoring Indicators:** CBAs done at the beginning of a project can help identify monitoring and evaluation (M&E) targets based on anticipated project performance.

Ex-post CBAs: These CBAs are done any time after project implementation has begun, when the nature of the intervention and the Theory of Change is clear. USAID economists can do these kinds of CBAs, but also evaluators or implementing partners. These CBAs benefit from monitoring, evaluation, administrative, and financial data from the project/activity being analyzed, knowledge from the implementing partners, in addition to the data available to ex-ante CBAs. CBAs completed during or after the project can serve the following purposes:

- **Collaborating, Learning, and Adapting during Project Implementation:** Project managers can conduct or update existing CBAs to identify implementation problems, suggest mid-course corrections, and resource reallocations. These CBAs can be built from M&E data or assessments that have been conducted in the initial years of the project and assumptions can be updated based on new outside evidence or changing conditions on the ground.

- **Monitoring:** CBAs done during implementation can help recalibrate M&E targets based on observed performance.

- **Evaluation:** CBA can be used at the end of a project to help determine if the investment was cost-effective and if particular stakeholders may have financially benefited. It is also a way to estimate how sustainable the project might be after the project end date.

This Guidance Note focuses primarily on conducting ex-post CBAs. While the analytic framework for ex-ante and ex-post CBAs is the same, there are challenges to developing ex-ante CBAs until a larger body of knowledge is available to help place monetary values on the benefits of resilience

interventions. This is particularly the case for measuring the extent to which resilience interventions lead to averted financial losses from shocks and stresses (see Section 4 on the CBA framework).

Therefore, we anticipate that ex-post CBAs (particularly those that are tied to impact evaluations) are the first step to understanding and measuring critical data points that will be useful for ex-ante CBAs of resilience projects in the future.

2.4. How to Conduct a CBA

The key steps in conducting a CBA are as follows:

- **What is the key question for the CBA?** Project teams or researchers need to identify the specific question for the CBA (such as those listed in Section 2.2), which will define how the analysis is designed.
- **Identify the Theory of Change for all interventions analyzed:** Any interventions that will be examined need to have a Theory of Change or a basic understanding of the inputs expected for an intervention to be successful, anticipated outputs, and the expected, measurable outcomes. This informs the key data parameters in a CBA (more on this in Section 4).
- **Understand the analytic framework for CBAs of resilience interventions:** Resilience benefits are primarily (1) direct project benefits that stakeholders experience as a direct result of a resilience intervention regardless if there is a shock or stress; and (2) reduced financial losses following a shock or stress as a result of the resilience intervention. Costs that are needed to achieve those benefits could include financial (e.g., costs to install a water pipe), time (e.g., time spent in trainings), and in-kind commitments (e.g., lending tools to the community). Section 4 provides a detailed framework for resilience CBAs.
- **Collect and input the data into the CBA model:** Once all inputs and outputs from the intervention are identified (based on the Theory of Change, and in conforming to the CBA framework), the data need to be identified in order to quantify and monetize the costs and benefits of each intervention examined. Section 5 goes into more details on the practical considerations around data needs and collection.

3. How have CBAs been used in Resilience Contexts to Date?

CBA has been applied at a policy level (e.g., to determine the cost effectiveness of ex-ante risk-preventive interventions compared to ex-post humanitarian responses)[4], and it has appeared in project-level resilience research, primarily focused on measuring interventions that address climate and disaster risk. Oxfam conducted a synthesis of 23 project-level CBAs of community-based

[4] See for example: Cabot Venton, C., Fitzgibbon, C, Shitarek, T., Coulter, L., and Dooley, O. (2012). The Economics of Early Response and Disaster Resilience. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/67330/Econ-Ear-Rec-Res-Full-Report_20.pdf

initiatives for disaster and climate risk management in 2013, which included water investments, structural protection measures such as dams or embankments, alternative livelihoods, irrigation and other agricultural measures, early warning, and first aid training.[5] This study suggests that most CBAs in disaster and climate risk management are ex-post, although CBAs are increasingly being used ex-ante or forward-looking (i.e., during the project design phase). According to this synthesis, climate and disaster risk CBAs have been used for the following types of analysis:

- **Prevention versus preparedness**. For example, should a project construct a dam to 'prevent' floods or rather should the project build grain storage to ensure food is available during a flood. This type of analysis can be done both at the project level as well as the policy level: for example, Cabot et. al. (2012) used CBA to compare the economics of early response to late humanitarian response to disasters at a regional/national level rather than assessing specific project interventions. This study examined three different scenarios (i.e., late humanitarian response to drought; early humanitarian response through commercial destocking of excess livestock and early procurement and transportation of aid supplies; and building disaster resilience). Findings suggested that early response is more cost-effective than ex-post humanitarian interventions over a 20-year period.[6]
- **Structural/hard versus non-structural/soft interventions**. Hard structural measures typically refer to the strengthening of physical systems (for example, water pumps, dams and embankments), whereas soft non-structural measures typically refer to activities such as training, advocacy, and awareness-raising measures that reduce the impact of shocks and stresses on people.

PAHAL Example on Deciding Between Different Packages of Resilience Interventions:

Mercy Corps commissioned an impact evaluation of their Promoting Agriculture, Health, and Alternative Livelihood (PAHAL) project in Nepal as the project was coming to an end in 2019. As part of this impact evaluation, they wanted to examine households that received different combinations of resilience interventions and determine which combination was most effective, as well as most cost-effective. The motivation behind this evaluation was that training households on a high number of resilience interventions might lead to the greatest outcomes, but could also come at a higher cost and limit PAHAL's ability to reach more households. The impact evaluation measured each combination's effect on key outcomes and the CBA then monetized these benefits to compare them directly to project costs. This analysis then identified the most cost-effective combination of PAHAL interventions that would reach the greatest number of households. In this context, it appears that households that received interventions targeted towards improved agricultural practices, nutrition, sanitation, hygiene, and access to clean and reliable water was more cost-effective than, for example, households that also received training in financial services, natural resource management, and improved local governance. More details are available in the PAHAL Brief, located here.

[5] Chadburne, O. Anderson, C., Cabot Venton, C. and Selby, S. (2013). Applying CBA at a Community Level - A Review of Its Use for Community Based Climate and Disaster Risk Management. Oxfam Research Reports. June 2013.

[6] Cabot Venton, C., et. al (2012).

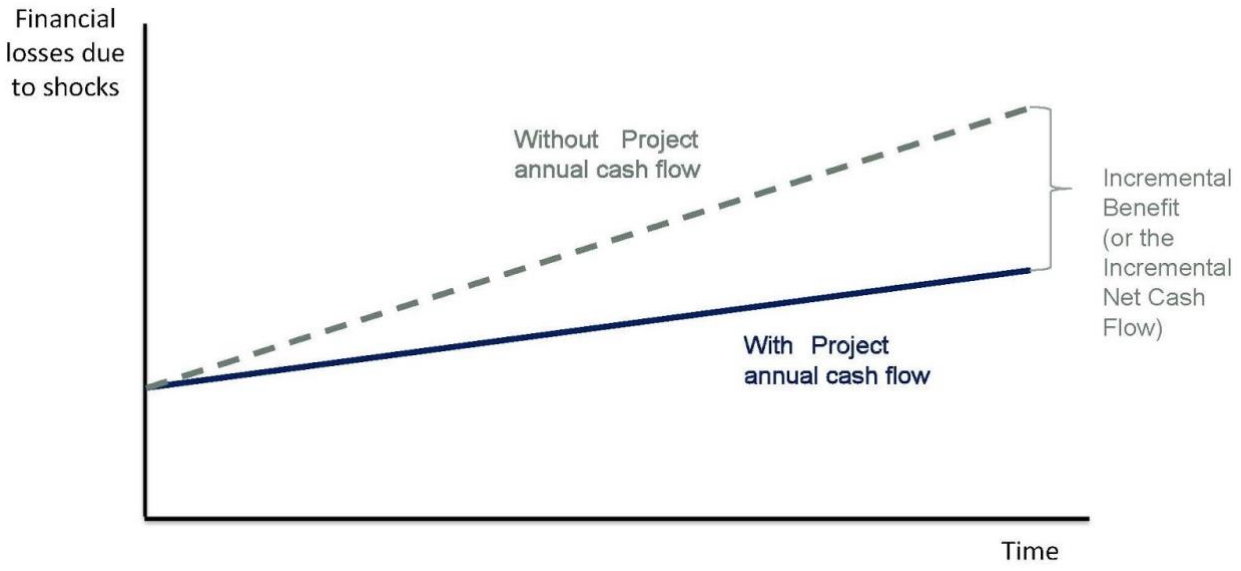
4. The CBA Framework and How Resilience Concepts are Quantified and Monetized

The building blocks of a CBA include an analysis of the costs and the benefits of an intervention. All costs and benefits must be quantified and monetized. For example, how do we know if a food security project that promoted improved rice seed varieties achieved any benefits? First we need to know how much yields increased (quantifying the benefit) and how much more money farmers received from these increased yields (monetizing the benefit). Using a simple numeric example, one might say that the average Nigerian farmer is able to increase his/her annual yields from 2.6 metric tons using traditional seeds to 4.6 metric tons with improved seeds by the end of a food security project, which amounts to a benefit of 2 metric tons (quantified benefit) as a result of the project. If rice can be sold on the market for 400 USD per metric ton, then the value of this benefit to the farmer participating in the project is $800 per year (monetized benefit).

Incremental Analysis: CBA compares the projected costs and benefits of a project/activity with the costs and benefits of a status-quo or counterfactual situation. In other words, analysts compare the costs and benefits "with project" to the costs and benefits "without project." This approach is preferable to before-and-after analysis, which can omit critical changes over time that would happen in the absence of the investment in the "without project" scenario, as depicted in the following figure.

"With project" scenario: This scenario is modeled based on the project Theory of Change, defined by the project inputs and the outputs and outcomes achieved (or expected to achieve).

Figure 1: Depicting measurements between the "with project" and "without project" scenarios



"Without project" scenario: This scenario is the best estimate of what the household, community, or system would look like without the project intervention. Sometimes this is called business-as-usual, or if it is tied to an impact evaluation this would be the control group.

In order to measure the monetary impact of projects/activities, analysts calculate the net benefit in each year for the "with project" scenario, by subtracting costs from benefits. This is called the net cash flow. The same is done in the "without project" scenario. Incremental analysis is calculated by subtracting the "without project" net cash flows from the "with project" net cash flows; this is called the net incremental cash flow. This is visually depicted in the figure above, and can be summarized with the following formula in each year of the CBA:

(1) Net Incremental Cash Flow = $(\text{Total Benefits - Total Costs})_{\text{with project}} - (\text{Total Benefits} - \text{Total Costs})_{\text{without project}}$

Incremental net benefits: This considers the incremental impact or benefit of a project, minus the incremental costs. This is done by taking the net benefits of a "with project" scenario minus the net benefits of the "without project" scenario.

Identifying Benefits and Costs from Resilience Investments: How do we measure the costs and benefits of a resilience investment? As a first step, all costs and benefits need to be identified. Let us use households as an example: Financial costs and revenues in the household budget that are directly related to the intervention are a good place to start. But it is not just financial revenues and costs that matter, but also interventions that save resources (like time) or increase access to resources (like on-farm food consumption). Resources that are not traded with cash transactions can still be quantified and monetized.

Only *relevant* costs and benefits should be considered, which are those that are directly related to the intervention. Generally, these costs and benefits can be identified from the Theory of Change (TOC), which should make explicit all the inputs and assumptions that are needed for the intervention to be successful. All CBAs should reflect a project's TOC. Benefits, broadly speaking, fall into the following two categories:

Direct project benefits	These benefits come directly from the Theory of Change outcomes such as increased incomes, increased food consumption as well as from targeted resilience capacities and strategies such as improved financial literacy, and improved natural resource management that increases access to water and forest resources. These are benefits that stakeholders experience regardless if there is a shock or stress.

Avoided "shock impact" costs	Evidence that project/activity stakeholders are better able to cope with a shock or mitigate its impacts, or in fact if they are less vulnerable and face fewer shocks as a result of the resilience intervention. These benefits are measured by fewer or avoided losses following shocks (e.g., reduced total household assets lost or crop/livestock loss, lesser impact on their income, and fewer medical costs). **Note:** This benefit stream is a distinctive component of resilience CBAs that does not appear in most other sectoral CBAs. It is also the most difficult benefit to measure because it is hard to estimate what the financial losses following a shock *would have been* if the project had not existed. It can best be measured with impact evaluations comparing the financial losses following a shock in the project/activity population compared to a control group.

Costs are all those that are required to achieve all identified benefits. This can include project implementation costs, time spent by people to achieve any benefits, and in-kind contributions from stakeholders (e.g., stakeholders who contribute timber from their forests to build shelters).

Taking an example from the PAHAL CBA discussed above: the CBA examined the impact of an intervention that introduced multiple-use water systems (MUS) to communities to improve access and reliability of water for households. It was expected that households with access to a MUS will reduce the amount of time they spend collecting water. Additionally, they will have more reliable water for their gardens especially in the lean season, leading to increased yields of healthy vegetables. This should lead to greater resilience in the face of a shock or stress, increasing household access to food and reducing their need to rely on negative coping strategies. To achieve and sustain these benefits, PAHAL invested in trainings for water user groups, helped pay for the construction of the MUS along with recruiting the manual labor and financial contributions of the community and worked with the water user groups to establish appropriate fees to finance maintenance and operations of the system. From this TOC, the following benefits and costs can easily be identified for the CBA:

Table 1: Costs and Benefits from PAHAL's Theory of Change Behind a Water Intervention

Benefits from PAHAL's Water Intervention	Costs from PAHAL's Water Intervention
From the household's perspective:	
• Direct project benefit: Reduced time spent collecting water • Direct project benefit: Increased annual yields in their garden plots • Avoided "shock impact" costs: Reduced financial losses following a shock	• Time spent in PAHAL trainings • Time spent in water user group meetings • Cost spent for installing the MUS (both time spent installing the MUS and financial contributions towards the MUS) • Annual fees for water user group
From PAHAL's perspective:	
	• Cost to install the MUS (costs not paid for by the community) • Cost to train the farmers • Other expenses associated with administering the intervention

4.1. Building Blocks for Quantifying a Resilience CBA

Once the costs and benefits are identified from the Theory of Change, the first step is to *quantify* those costs and benefits. This is done for both the "with project" and "without project" scenarios as described below:

1. **An assessment or analysis of the "without project" scenario:** that investigates the population's vulnerabilities, capacities, and resources "without project" in periods without shocks, as well as the impacts of shocks on the households/community. Only those vulnerabilities, capacities, and resources that we believe will be impacted by the intervention need to be examined for CBA (i.e., not *all* capacities and resources are analyzed in a CBA). For each relevant capacity and resource identified, all benefits and costs must also be quantified (e.g., how much water do households access on an annual basis and how much time does it take to access that water?). This data can often be collected from project baseline data or perhaps from impact evaluation data from ongoing or completed projects. The REAL Guidance Note 1 details how to collect secondary data and primary qualitative data on risk profiles and resilience capacities of the target population and how well these capacities are accessed and used to mitigate potential or realized impacts of shocks or stresses. Additionally, REAL Guidance Note 4 details how to determine existing levels of various resilience capacities, household coping strategies, shock exposure and wellbeing outcomes; understand trends over time, and; how to measure resilience capacities,

household responses, and households resilience in the context of a shock as well as periods without a shock.

Example: If a project is considering an intervention that promotes improved resilience capacities around access to appropriate credit or loan products, the "without project" assessment might need to know what credit and loan products currently exist in a targeted community and how they are used in the absence of a shock. In the presence of a shock, how do households respond? Do they go to local money lenders because they offer more immediate or easier money? If so, what is the interest rate and the borrowing terms? Understanding how the target population behaves *on average*[7] is key to modeling the "without project" scenario.

2. **An assessment or analysis of the "with project" scenario:** what interventions have been/can be introduced that aim to strengthen access to and control of a target set of resources, as well as knowledge of how to use them for risk management? How does this change stakeholder behavior in periods without shocks and how much risk will be reduced as a result of these interventions in periods with shocks? What are the costs of these interventions? This assessment quantifies the costs and benefits on the households/community "with project". This is necessary for understanding *direct project benefits* that occur regardless of a shock, as well as to measure *avoided "shock impact" costs* by understanding how people respond to shocks with access to increased capacities, resources and resilience strategies.

   The incremental difference in impact "without" and "with" the intervention represents the benefit of this project/activity. Ideally, data for the "with project" scenario comes from impact evaluations (either from the project or from a similar project implemented in a similar context) in order to estimate the precise relationship between the intervention and how it will impact households and communities. However, impact data is not always available. In these cases, theorized impacts need to be estimated. When impacts are estimated based on a theory, this needs to be clearly stated in the CBA report and details provided on how these estimates were reached. For ex-post CBAs done mid-project or at the end of a project, another (albeit imperfect) way to measure this is to rely on monitoring indicators that can provide a measurement of change over time.[8] The REAL Guidance Note 5 and Guidance Note 6 provide resources on measuring how a project's resilience approach is contributing to households' and communities' ability to mitigate shocks and stresses.

[7] CBA models cannot model all stakeholders and their varying preferences and behaviors, so models simply identify the resources and capacities used by an average stakeholder.

[8] Before-after analysis is an imperfect measure of change over time because it assumes that nothing is changing in the household or community without the project, which may not be true, but does provide a reasonable proxy for measuring change over time.

Important note on treatment of shocks in CBAs: *The type of intervention will influence the type of CBA needed. For projects/activities that are trying to mitigate the impact of covariate shock events that directly affect large numbers of people in a given geographic area (e.g., floods), CBA analysts will additionally need to understand the magnitude and frequency of the event, in order to model this irregular impact into a CBA over a 10- or 20-year time period (see number 3 below). For example, if a project is deciding whether to build a bridge that will not wash away in a flood, we will need to know how often flood events occur within a 20-year period and the likelihood that the flood is large enough to threaten the stability of the bridge, in order to estimate if the costs are worth the benefits.*

However, in the case of interventions aimed to improve households' or communities' overall resilience to idiosyncratic shock events (those events that affect specific individuals or households uniquely within a community), understanding the magnitude and frequency is not as relevant since we expect these shocks to occur every year to at least some people within the target population. A shock assessment (described below) may still be useful for interventions targeted towards idiosyncratic events to understand if their magnitude is expected to change in the "without project" scenario over time. However, the impact of the resilience intervention will likely be visible in impact evaluations or M&E indicators, which can measure change in the average levels of stress or idiosyncratic shocks occurring within the entire targeted population over time.

3. **A shock assessment** is used to investigate the shocks affecting the targeted populations, their magnitude and frequency. This is particularly relevant for estimating the *avoided "shock impact" costs* benefit to stakeholders. This data can be collected at baseline, using secondary data on shock frequency, or as part of ongoing measurement during project implementation (perhaps from recurrent monitoring surveys). Guidance for measuring shocks and stresses can be found in the REAL Guidance Note 2.

   The most challenging part of this assessment is to understand what the likely shocks and stresses are over the period of analysis chosen for the CBA (more information on this in Section 4.4 below); which could be 10 or 20 years into the future. With evolving environmental, demographic, and economic changes expected in many contexts where we work, this can be a difficult data parameter to estimate. It is recommended to use the information about the scale, severity, and frequency of shocks provided at baseline as a reasonable assumption for the future and if there is sufficient evidence of an improving trend or the situation is worsening, moderate assumptions ought to be built into the model to account for these trends.

With these building blocks, the major costs and benefits of a resilience intervention can be quantified. As a next step, these costs and benefits need to be *monetized* (in other words, a dollar value or some other currency must be assigned to the value of that quantity). By assigning all benefits and costs a dollar value, they can be directly compared to each other in order to assess cost-effectiveness. We begin to do that with the "Financial Analysis."

4.2. Financial Analysis for Project Participants

The first analysis in a CBA is called the "Financial Analysis" and this is done from the perspective of the main participants in an intervention. This helps understand who is benefiting financially and who is losing money from an intervention. Key perspectives might include households, the local government, villages, etc. Separate Financial Analysis models are developed from each stakeholder's perspective, looking closely at their costs and benefits.

Monetizing the Benefits of Resilience Investments: Once benefits and costs are identified and quantified (as explained above), models need to identify the monetary value of the *direct project benefits* and the *avoided "shock impact" costs* benefits. The best starting place is the market value for any goods or services that are impacted as a result of the project. For example, if farm yields increase for vulnerable households, what is the price they can sell those commodities at? If households react to shocks by relying on money lenders, what is the interest rate on those emergency loans?

> **Opportunity Cost:** This is a monetary value that is assigned to a good or service that is not traded with cash, and therefore does not have an obvious market value or price. Opportunity cost is the value of the next best alternative use of a resource.

For benefits that are not directly traded with cash (and therefore, do not have an easily identifiable market value), we think about the **opportunity cost**. Opportunity cost is the value of the next best alternative use of that resource, which often can be identified with a market value. For example, if a project helps a farmer access free firewood from a nearby forest, she is able to consume that firewood without paying cash for it. However, *instead of consuming the firewood, she could also decide to sell it on the market*. The market price can be used to estimate the value of the free resources she is able to access. As another example, projects often require people to give their time for trainings. What is the value of that time? Instead of the time spent in trainings, the next alternative way to use their time might be to perform some day labor on a neighbor's farm – if so, the price that these people might expect to earn for the same amount of time is the opportunity cost of their time.

Table 2: Examples for Quantifying and Monetizing Resilience Benefits

Examples of resilience investments	Examples of how this benefit might be quantified and monetized from the stakeholder's perspective
Households invest in bio-engineering using local forest resources to reinforce their vulnerable property	Households, on average, demonstrate decreased likelihood of losing their land following a severe weather event. By asking households how much crop losses (for example) they experience following a shock, an impact evaluation has shown that households

Examples of resilience investments	Examples of how this benefit might be quantified and monetized from the stakeholder's perspective
	with bio-engineering have fewer crop losses than households without bio-engineering. **CBA analysts would want to quantify the number of crops that are saved as a result of the bio-engineering and estimate the market price of those crops.**
Governments improve watersheds in a community to protect the water resources	M&E data demonstrate that farmers achieve 20 percent higher crop yields as a result of more reliable water resources. **A value can be assigned to this 20 percent increase in crop yields using current market prices.**
Farmers groups participate in financial literacy training courses	Recurrent monitoring surveys demonstrate that farmers are changing their behavior and seeking loans from more formal institutions. Data from these formal institutions show that households are now receiving debt products with lower interest rates than they previously received from informal sources, resulting in lower debt repayment costs. **These reduced debt repayment costs can be directly modeled as financial savings compared to the "without project" scenario.**
Governments are trained to respond to shocks by providing targeted disaster assistance to affected populations	The Theory of Change suggests that households that receive disaster assistance following a shock will be less likely to take out a loan to pay for the damages. Households have received cash transfers from the government and the opportunity cost of that assistance is what they would have done in the "without project" scenario, which is taking out a loan. The difference between those two scenarios, or **the incremental benefit, is that households will no longer have to repay debt used to recover from a shock, which is an incremental savings to the household as a result of the disaster assistance provided by the government.**

Monetizing the Costs of Resilience Investments: Improving resilience requires actions, strategies, and investments by stakeholders in order to better cope, adapt, or mitigate shocks and stresses. These are **"anticipation costs"** or investments by stakeholders that might be financial, or require additional time or resources that are not purchased on the market. Costs could include upfront capital or investment costs (e.g., improved water infrastructure, attending a training) and operating and maintenance costs over a longer period (e.g., maintaining improved farm practices each year, maintaining the improved water infrastructure).

As with the resilience benefits, these costs are quantified and monetized. Examples of how this might be done in resilience CBAs are in the table below.

Table 3: Examples for Quantifying and Monetizing Resilience Costs

Examples of resilience investments	Examples of how this cost might be quantified and monetized from the stakeholder's perspective
Households invest in bio-engineering using local forest resources to reinforce their vulnerable property	A recurrent monitoring survey asks households how many shrubs households planted to reinforce their land. Analysts will count the average number of shrubs households used, and how much those shrubs would cost if purchased at the market. In addition, the CBA analyst will also need to quantify the number of hours households spent in planting and reinforcing their land, and what the value of their time is (their opportunity cost). Especially in poor and rural contexts, identifying the opportunity cost of time is often done by estimating the daily wage rate for short-term, unskilled labor, which can often be provided by local project managers.
Governments improve watersheds in a community to protect the water resources	Improving a watershed requires time and resources such as planting trees and shrubs along the waterways. As with the previous example, **analysts will need to estimate the amount of time that was spent on this activity by the government and the value of their time, and the number of physical resources used to protect the watershed.** In some cases, these costs might be available in government records as a total cost without providing specific details on the number of trees (for example), which is also a

Examples of resilience investments	Examples of how this cost might be quantified and monetized from the stakeholder's perspective
	sufficient way to estimate direct costs to the government.
Farmers groups participate in financial literacy training courses	While not a financial cost, trainings take time. **The analyst would want to know the number of hours or days farmers spent in training, and then what the value of their time is** (or the opportunity cost of their time using the method described in the first example in this table).
Governments are trained to respond to shocks by providing targeted disaster assistance to affected populations	Similar to the previous example, government officials will be trained by the project teams on responding to shock and the amount of their time spent in training needs to be quantified and a value for that time needs to be estimated. Additionally, administering disaster assistance takes time as well as the direct cost to the government in transferring this assistance to households. **In addition to estimating the quantity and value of time spent in training on disaster response and administering disaster assistance, analysts will also need to know how much disaster assistance will be given to households (as a value) and how many households will receive this assistance (as a quantity).**

Net Present Value (NPV): The sum of the project's discounted incremental net benefits across all the years evaluated. This is the main value used to determine if the benefits of a project are worth the costs.

Once all the costs and benefits are monetized, an incremental cash flow is calculated for each year of the CBA (see formula (1) above). Annual incremental cash flows are summed across all years, to come up with one figure — the **Net Present Value (NPV).** If this figure is positive (or the NPV is greater than zero), this implies that the total project benefits are greater than its costs. If the NPV is less than zero, that means the costs exceed the benefits.

Why does this matter? Using households as an example:

This means that the average household with the project is *worse off* compared to the "without project" scenario. This could be because they experienced very limited benefits and/or the intervention was not as effective as planned. Or it could mean that the intervention was very effective but came at costs that were too high. A reasonable interpretation of this is that households will not be incentivized to sustain these resilience investments or these behaviors because they will know they are not benefitting overall. This could also suggest that there will be low adoption rates in the project.

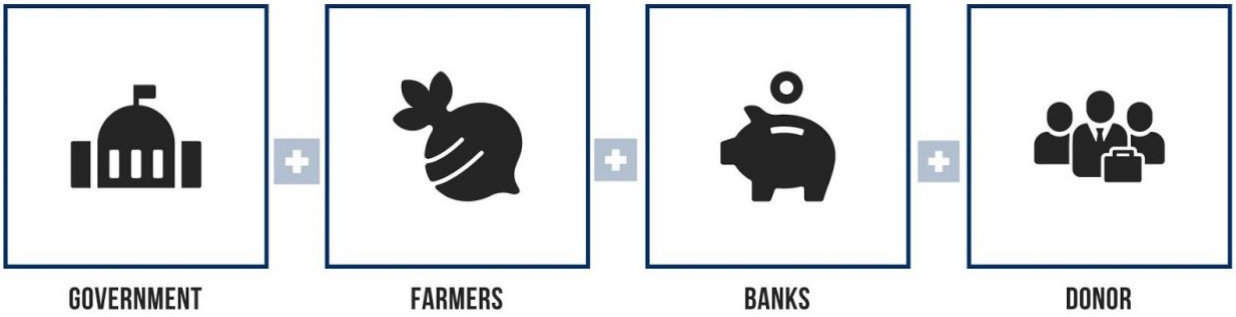
This result means that the average household with the project is *better off* compared to the "without project" scenario, because they experienced significant benefits or at least their benefits were greater than the costs they invested. This is a good sign that adoption rates might be high for the project, that the project is leading to improved household welfare outcomes and could be a sign that households will be incentivized to maintain their resilience investments in order to maintain the benefits.

4.3. Economic Analysis

The Economic Analysis is done from the perspective of the economy.[9] In the Economic Analysis, all the perspectives modeled in the Financial Analysis are added together into what is called an "integrated model." As a result of most development investments, there are participants who "win" or who have net financial benefits (hopefully the farmers, for instance), and there are some participants who "lose" or come out with net financial losses (the government, for instance, who needs to support increased budgets). The Economic Analysis asks: does society win overall? This analysis also includes the perspective of the donor, whose investment costs to achieve these societal/economic gains need to be taken into account. All relevant perspectives are added together in the Economic Analysis, for example:

Net benefits: The total benefits of a project, minus the total costs. Net benefits could be a negative or positive number.

[9] This may sometimes be referred to as the societal perspective.



Other important additions in the Economic Analysis include any significant and external (outside of the project) costs that are necessary for the project to be successful (e.g., if local community organizations have dedicated time to promoting risk reduction messaging). This analysis may also include **externalities** as a result of the project if they are expected to cause significant costs or benefits to the economy. Externalities are costs or benefits that accrue to individuals unintentionally, as a spillover of an investment. For example, efforts to encourage households to switch from burning firewood to using more sustainable energy sources reduce deforestation. Reduced deforestation impacts all stakeholders but is not a benefit paid directly to any specific stakeholder. This externality could be valued by estimating the amount of avoided greenhouse gas emissions, for example.

Externality: This is a side effect or consequence of a project that affects other the main beneficiaries without this being reflected in their direct costs or financial benefits.

As with the Financial Analysis above, net benefits in the "without project" scenario are subtracted from the "with project" scenario and an NPV is calculated from these incremental net benefits for the economy perspective. For USAID and from a development perspective, we are interested in the economic net benefits of investments, as it is a measure of how much the *entire economy* is benefitting as a result of this investment.

Here's how one can interpret an NPV in the economic perspective:

A project with a negative economic NPV means that the economy as a whole with the project is *worse off* compared to the "without project" scenario. Overall, all project stakeholders have fewer benefits for their investments than they did without the project. This could be because the project was not as effective as planned. Or it could mean that the intervention was effective, but came at costs that were too high. Ideally, project planners would not proceed with this project unless they can find ways to lower the costs of their interventions or try to increase benefits. Some project designers may consider proceeding with a project with a slightly negative NPV if they

know there are measurable, but not easily monetized welfare outcomes (these exceptions are discussed below in the section on limitations to CBA).

A project with a positive economic NPV means that the entire economy is better off as a result of the project. Overall, all project stakeholders have more benefits for their investments than they would without the project. This could be because the project is effective at achieving its Theory of Change, and/or it is able to achieve these benefits at a low cost. On economic grounds, a positive economic NPV provides sufficient justification to proceed with the investment.

4.4. Discount Rate

All CBAs use a discount rate and for two CBAs to be compared to each other, they must use the same discount rate. Why do we need a discount rate? Cash flows that occur across different time periods are not directly comparable — for example, we prefer receiving $100 today rather than waiting 10 years. Similarly, we prefer reducing food insecurity this year rather than waiting 10 years for this outcome. Because of this preference for immediate benefits, we need a mechanism that allows us to compare costs and benefits between different time periods. The discount rate is the rate at which we equate future benefits to present benefits. This allows the analysts to convert all future values to a "present value". At USAID, the convention is to use a 12% discount rate for the Economic Analysis, and a discount rate in the Financial Analysis that matches the cost of capital (often the prevailing interest rate in the intervention areas).

Discount Rate: The rate at which future benefits or costs must be reduced to estimate their value from today's perspective (i.e., "present value"). This comes from the idea in economics that we prefer benefits today, instead of next year - so we need a mechanism to compare a project that has immediate benefits to a project with delayed benefits. That mechanism is the discount rate; USAID CBA Guidelines recommends using a 12 percent discount rate for the economic analysis.

4.5. Sensitivity Analysis

Cost-benefit analysis makes assumptions about the future, which may turn out differently from what we predict. As a result, there is a lot of inherent uncertainty in CBA models. "Uncertainty" here means the possibility of different outcomes due to the fact that we are making assumptions about future events. CBA models can account for uncertainties and variability of exogenous factors, such as price fluctuations and natural disasters. In a CBA model, sensitivity analysis is performed to test underlying assumptions in the model and analyze how varying these assumptions impact the

project's outcomes. We manage uncertainty by understanding the possible impact of a range of assumptions. Examples for how this might be useful are provided in the table below.

Table 4: When to Use Sensitivity Analysis, With Examples

How sensitivity analysis can help project and research teams	Bio-engineering examples
Sensitivity analysis might change the answers to questions about which intervention to select or whether to proceed with a particular project design	If we are not sure how much bio-engineering may limit household losses following a shock, we can try a range of assumptions. If the NPV is always positive, regardless of the assumption, the project designer can be assured that the uncertainty around the bio-engineering intervention does not affect whether this is a good investment.
Sensitivity analysis helps project designers understand how much risk they are accepting with a certain project design	Let us say that the bio-engineering intervention is only cost-effective (or has an NPV above $0) if it reduces household financial losses following a flood by at least 50%. The project designer can speak with disaster risk reduction experts to determine if achieving a 50% reduction is feasible in this context and what needs to be incorporated into the project design to hit this target, before deciding if the uncertainty is worth the risk.
Sensitivity analysis identifies which variables are particularly risky or sensitive and need to be closely monitored or mitigated during project implementation	In the previous example, if the project designer decides to proceed, he/she can make sure to add a question to their annual monitoring or recurrent monitoring surveys specifically on losses following a shock for households that invest in bio-engineering to make sure the project is on track to be financial and economically viable (with an NPV greater than $0).

Practically speaking, testing for uncertainty can be done by plugging different assumptions into the CBA model and seeing what emerges from the model and its effect on the NPV. There are some more sophisticated ways to do this, including one-way or two-way tables in Excel, break-even analysis, and Monte Carlo analysis. Resources explaining these methods are listed in "Helpful Resources" below.

Summarizing Steps in a CBA:

All CBAs typically follow these same steps throughout the process:

1. Identify all costs, benefits, and assumptions from the project Theory of Change, as well as those for any alternative project designs *(if the CBA is comparing investment designs)*.
2. Quantify the costs and benefits. Useful data sources include:
    a) An assessment of the impacts of shocks on the households/community, specifically in relation to the population's vulnerabilities, capacities, and resources "without the project."
    b) Analysis of what interventions can be (has been) introduced to help people cope, adapt, and respond to shocks and how much risk will be (was) reduced as a result of these interventions, or if key outcomes improve(d) "with project". Also, analysis of what direct benefits were achieved even in years without a shock or stress "with project".
    c) A shock assessment to understand the magnitude and frequency of shocks (especially covariate shocks) that affect the target population.
3. Monetize, or value, the costs and benefits that have been identified and quantified. This can be done with market prices or thinking through opportunity cost. These costs and benefits can be summarized into:
    1. A Financial Analysis from the perspective of important stakeholders, and;
    2. The Economic Analysis that summarizes all stakeholders' costs and benefits, including those of USAID.
4. Conduct a sensitivity analysis of uncertain variables or assumptions that were inputted into the CBA model.

5. Practical Considerations for Setting Up a CBA

With the theoretical framework outlined above, there are a number of practical considerations for commissioning or conducting a CBA. Most importantly, collecting data for CBA does not *necessarily* require a great deal of extra resources or technical capacity (depending on the availability of data and the level of analysis undertaken). However, it can benefit from extra attention paid to the (expected) quantitative impacts of interventions. For all CBAs, ad-hoc assessments, research or results from other relevant resilience investments and data from local NGOs, research institutions, or government can be very useful for informing CBA models. For ex-post CBAs, baseline data collection and M&E or project administrative data are also useful. Analyzing the data and compiling it into a CBA model may require more technical expertise and/or the help of an economist.

We discuss some of the key data sources for CBA and main considerations associated with each below. As with all project assessments, planning early for an ex-post CBA is always beneficial as it helps to ensure that the needed data on costs and benefits will be available. This also helps lower the burden of conducting a CBA, if the data are easily available.

Table 5: Common CBA Data Sources and Key Considerations

Data Source	Considerations
M&E Data (annual performance surveys and recurrent monitoring surveys) and Administrative Data	M&E data are very useful for quantifying inputs, outputs and some outcomes from the project Theory of Change that are key data parameters in a CBA model. Such data points can include number of households reached, crop yields, number of households taking out formal loans, improved water sources, number of households affected by a shock, number of people trained, etc. Depending on the CBA model, M&E data can be directly inputted into the CBA. If a project or research team would like to consider a CBA at any point during project implementation, it might be useful to sketch out a CBA model at the beginning of the project to understand what data would be needed and if there are some indicators that could be included in regular surveys that would help inform an eventual CBA. Additionally, CBAs that are conducted at the beginning of the project can help to estimate annual M&E indicator targets during the life of the project. As the project progresses, one can compare actual data on M&E indicators to the CBA model targets to see if the project is on track to be more or less cost-effective than originally designed.
Project teams and local knowledge	Some data does not need to be collected directly from the project participants, and project teams have sufficient expertise to inform the CBA. This might include data such as market prices, local wage rates and household contributions towards installing or maintaining capital investments (e.g., how much households were required to pay for a MUS in their village, what are their water user group fees). Additionally, project teams and local experts can usually provide information on how many hours of training are required of households, farmers, government officials, etc. Many of these data points do not need to be collected on an ongoing basis and only require a targeted discussion with the relevant project or local expert.
Impact Evaluations	Impact evaluations are very useful for ex-post CBAs to measure the incremental benefit of an ongoing or completed project/activity. It can also be a useful source of data if one is looking at a follow-on activity or a new project in a similar context and needs help identifying reasonable assumptions for missing data. In a resilience context, there are a number of assumptions that are quite difficult to estimate without the help of impact data. Specifically, the *avoided "shock impact" costs* are very difficult to estimate without data or at a minimum, reasonable assumptions from other impact evaluations. For example, one may not know how much governance training activities will cost but can likely build an estimate based on the curriculum, expected hours it will take, local labor rates, etc.

Data Source	Considerations
	However, it is very difficult to accurately estimate the change in household financial losses following a flood as a result of a disaster risk reduction project (for example). These are critical parameters that a well-designed impact evaluation can measure. As such, we recommend that all impact evaluations *consider* adding a value for money component, as these analytic pieces can easily complement each other and the resilience community can begin to build a body of knowledge on these difficult to measure data parameters, such as *avoided "shock impact" costs.*
Secondary Data	Secondary data from local and international organizations can supplement much needed data, especially on the benefits. Local think tanks, research institutions, and government agencies often collect relevant data for CBA models. Examples could include government records on shocks or disasters (both frequency and magnitude), local agricultural colleges or demonstration plots might have data on how specific improved agricultural inputs perform in the local environment or with local agricultural practices. Additionally, other implementing partners may have published data on the impact of shocks and risk reduction associated with their interventions. Secondary data or qualitative interviews with experts can be very useful for integrating or ground-truthing assumptions that are built into the CBA models.
Project Financial Data	As discussed earlier, project costs are an important input into the Economic Analysis. Disaggregating project cost data to match the benefits in the CBA model is a critical step, and often a challenging one. For example, if the CBA is examining and comparing the cost-effectiveness of different interventions, project cost data needs to be disaggregated by each intervention (as in the PAHAL example above). If the CBA is examining and comparing the cost-effectiveness of interventions in different geographies or with different populations, the cost data needs to be disaggregated by those same geographies or populations. Often, it is too late to disaggregate the project cost data at the end of the project if financial systems are not set up to track the data in that way, which is why planning early for a CBA is particularly useful. However, if at the end of the project the financial data are not easily disaggregated, it is usually still possible to model the project as a whole and compare total project costs to project benefits.

The amount of time and resources it takes to complete a CBA is a function of the level of analysis and the availability of the data. For example, a CBA that wants to examine up to 10 different project designs and compare them will take significantly longer than a CBA that examines if one project is worth its costs. A CBA that can rely primarily on already collected M&E data and an impact evaluation will take much less time than one that requires original data collection.

Finally, there are some sectors where CBAs have been conducted for decades and data on impacts are well-researched. CBAs of these interventions may be easier to complete, especially if primary data collection is not possible. For example, activities focused on improved agricultural production practices, financial services, and infrastructure would be more straightforward to complete. On the other hand, estimating the benefits related to *avoided "shock impact" costs* from resilience projects, climate and disaster risk reduction, governance interventions, and many types of health interventions will likely require some primary data collection or incorporating a lot of uncertainty into the models.

The sophistication of the CBA question, the availability of primary and secondary data, the level of uncertainty project designers are comfortable with, and the detail of the intervention are all factors that will influence the complexity of the CBA. CBAs can be simple "back of the envelope" calculations that can take as little as a week to complete, and they can be complex, detailed models that can take two or three months. While all CBAs are simplified versions of complex projects, the simpler CBAs are less likely to reflect the reality of the intervention but can still be useful for thinking through what data are available, identifying the implicit assumptions of a project, and gathering a rough estimate of costs and benefits. For interventions with a high amount of uncertainty or specific questions about how to improve current or future project designs, more detailed CBAs might be appropriate.

All CBA models (usually done in Excel) ought to have an accompanying report, to ensure data sources, key assumptions, and uncertainties are clearly and completely documented and key results and recommendations are explained. This is also where other institutional factors and benefits or costs that could not be included in the CBA but are nonetheless essential to the success or failure of a project, can be discussed.

6. Limitations of CBA in Resilience Research

The strength of CBA as a decision-making tool is that it translates many different kinds of benefits into a single unit (a monetary value such as the U.S. Dollar) that can be directly compared to costs. However, converting benefits and costs into a monetary value has a number of limitations. Additionally, some benefits are difficult to quantify and/or monetize. Specific limitations in CBAs of resilience work may include:

- **Equality outcomes (e.g., gender, income, and caste):** The limitation of converting everything to a monetary value is that it does not capture how much value different groups may place on the same unit. For example, a project that helps a wealthy family earn an extra $10 is the same, in CBA, as a project that helps a poor family earn an extra $10. However, we know that $10 is more valuable in relative terms to the poorer family. The same may be true for different gender, castes, tribes, or other disadvantaged groups in a society. Additionally, there are many benefits that we know from social science have positive outcomes but are difficult to monetize — for example, we know that when women and men share decisions in household finances it can lead to more absorptive and adaptive

measures to respond to shocks and stresses. However, what is the dollar value one puts on a household where the females have been marginally more involved in decisions? Unless a clear link to measurable key outcomes can be established (e.g., decreased financial losses following a shock), it is difficult to monetize this intermediate outcome.

- **Social capital:** Similar to the issues with equality, intermediate outcomes associated with enhanced social capital are difficult to monetize. For example, how does one monetize households that have increased social interaction with other households in their community? Putting a dollar value on this outcome may not be possible; instead, we need to wait to measure if this intermediate outcome influences outcomes further along the Theory of Change that are easier to quantify and monetize (such as reducing the impact of shocks, improving the ability to recover from shocks, or increasing household asset wealth).
- **Subjective resilience:** Measures of subjective resilience, such as a person's improved confidence in their own ability to respond or recover from future shocks, are difficult to monetize. While resilience measurement frameworks have provided us with tools to quantify changes along this dimension, putting a dollar-value on confidence and similar measurements is challenging.
- **Multiplier effects:** Generally, CBAs are designed to only consider direct benefits and costs, and USAID's practice is not to consider multiplier effects or knock-on benefits or costs. This is because multiplier effects are often speculative, context-specific, and difficult to predict in advance. This could be limiting for projects that are designed explicitly to benefit from such spillovers. For example, projects that train government officials to be more responsive to the needs in their communities (e.g., through social accountability tools like public audits) may be designed for long-term improvements in budgeting and other decision-making that could lead to transformative resilience at the community level. However, improvements in local government budgeting (for example) may be indirect and therefore, not possible to directly link to the investment (in addition to being difficult to quantify and monetize). It is best to calculate the incremental benefits of direct beneficiaries and let ex-post evaluations determine if there were positive spillovers to the rest of the economy. These benefits should be easily identified from the Theory of Change and should not include any additional benefits.

Where the costs and benefits associated with these considerations cannot be quantified or monetized, project teams should undertake qualitative analysis about their importance and magnitude in consultation with experts and should reflect that research along with the results of a CBA.

Additionally, although CBA should be regarded as a means to assess whether one should undertake a particular investment, assuming such analysis is both feasible and appropriate, it is not the only consideration. CBA only addresses the financial or economic viability of an intervention but there are other important factors that need to be considered when making decisions about interventions such as:

- **Community and political buy-in:** Economists may be able to identify the interventions that have the greatest economic outcomes for households or communities. However, interventions can only be successful if they are supported, maintained and/or sustained by the communities where they operate. A successful watershed protection project that exists in a CBA model will fail if the local organizations do not commit to maintaining the watershed over the long-term. While CBA can make assumptions about the impact of long-term maintenance on project success, project implementers must take care to seek and build local buy-in and equip the appropriate groups with sufficient resources to make the CBA projections a reality. The local community's motivations and political economy are institutional factors that cannot be modeled in a CBA but are important factors nonetheless for a project's economic success.
- **Disaster response:** Some interventions require expeditious decision making where CBA would not be a suitable tool, for example with disaster response. In such cases, CBA can be done after the intervention, where appropriate, to determine if lessons can be learned about the cost-effectiveness of those interventions in preparation for future disasters.
- **Security, social, or humanitarian motivations:** Not all activities are motivated by economic outcomes, such as those that aim to increase stability or improve humanitarian outcomes. CBAs are often biased towards wealthier or more stable communities, where beneficial economic outcomes may be more likely than in areas with limited markets and vulnerable populations, especially those prone to shocks and stresses. While we should be careful not to treat humanitarian and stabilization projects as a blank check, CBA analysts need to be cautious about drawing comparisons between diverse communities. For example, it might not be appropriate to use CBA to decide on whether to perform a food security project in a vulnerable area vs. a less vulnerable area. A practical solution is to first decide which population is the appropriate one for a project/activity, then use CBA to help identify a project design within that population that can achieve the highest value for money and thereby, reach the largest number of people.

7. Conclusion

Resilience practitioners have made a lot of progress in recent years towards measuring and quantifying the benefits of resilience interventions.[10] Separately, very well-established best practices and methods exist for monetizing benefits, so they can be compared to costs. Marrying this economic analysis to data emerging from the field of resilience measurement allows resilience practitioners and researchers to develop an understanding of cost-effectiveness of their interventions.

Why does this matter? Knowing that a project achieves its intended effect is a critical first step in any development field. But knowing how to achieve a project's intended effect at the lowest cost

[10] See for example the work done by USAID's Resilience Evaluation, Analysis and Learning (REAL) consortium here: https://www.fsnnetwork.org/REAL

allows project teams to spread scarce financial resources as widely as possible, benefitting as many people as possible. Ultimately, this contributes to greater outcomes for communities and systems.

Adapting standard practices of CBA in other sectors to resilience poses some unique challenges, but is ultimately possible relying on data that often is already collected as part of emerging resilience measurement frameworks. This guide should help to standardize an approach to resilience CBAs that can contribute to research on the cost-effectiveness of such interventions, as well as create a body of knowledge to help inform CBAs of early project designs, ultimately increasing the effectiveness and efficiency of future resilience activities. Feedback and lessons learnt from CBAs of resilience interventions should be sent to resiliencemeasurement@gmail.com.

Helpful Resources

CBA Guidebooks

- This is the standard guidance on CBA that USAID relies upon for its approach to CBA:
    - Jenkins, G., Kuo, C., and Harberger, A. (2011). "Cost-Benefit Analysis for Investment Decisions." Development Discussion Papers: JDI Executive Programs. https://www.agrilinks.org/sites/default/files/resource/files/cost-benefit_analysis_for_investment_decisions.pdf
- This REAL Guidance Note adapted many of the ideas for a resilience CBA framework from this resource:
    - Béné, Christopher (2013). "Towards a Quantifiable Measure of Resilience," IDS Working Paper, Volume 2013, Number 434, September 2013. https://www.researchgate.net/publication/258999312_Towards_a_Quantifiable_Measure_of_Resilience

USAID CBA Resources

- Examples of USAID's CBAs (models and reports) in agriculture and food security can be found here: https://www.usaid.gov/what-we-do/economic-growth-and-trade/promoting-sound-economic-policies-growth/working-more
- Step-by-step recorded trainings on Feed the Future CBAs at USAID are available here: https://www.agrilinks.org/training/cost-benefit-analysis-training

Other CBA Training Resources

- Conservation Strategy Fund created some light-hearted videos that provide a useful introduction into basic CBA concepts, as well as how to think about environmental externalities: https://www.conservation-strategy.org/economic-video-lessons
- Many videos are available online for Excel one-way and two-way tables for the sensitivity analysis. One resource includes: http://info.marshall.usc.edu/dept/training/Documents/Applications/Excel/Data_Tables2(H).pdf

CBAs of Resilience

- A useful starting point is this synthesis of CBAs of climate and disaster risk reduction activities:
    - Chadburne, O. Anderson, C., Cabot Venton, C. and Selby, S. (2013). Applying CBA at a Community Level - A Review of Its Use for Community Based Climate and Disaster Risk Management. Oxfam Research Reports. June 2013. https://policy-practice.oxfam.org.uk/publications/applying-cost-benefit-analysis-at-a-community-level-a-review-of-its-use-for-com-303558

Key Concepts Used in CBA

Cost-Benefit Analysis (CBA): CBA is an economic tool used to directly compare the benefits against the costs of a project or activity.

Net Present Value (NPV): The sum of the project's discounted incremental net benefits across all the years evaluated. This is the main value used to determine if the benefits of a project are worth the costs.

Discount Rate: The discount rate is the rate at which future benefits or costs must be reduced to estimate their value from today's perspective (i.e., "present value"). This comes from the idea in economics that we prefer benefits today, instead of next year - so we need a mechanism to compare a project that has immediate benefits to a project with delayed benefits. That mechanism is the discount rate; USAID CBA Guidelines recommends using a 12 percent discount rate for the economic analysis.

Externality: This is a side effect or consequence of a project that affects other the main beneficiaries without this being reflected in their direct costs or financial benefits.

Opportunity Cost: This is a monetary value that is assigned to a good or service that is not traded with cash, and therefore does not have an obvious market value or price. Opportunity cost is the value of the next best alternative use of a resource.

"With project" scenario: This scenario is modeled based on the project Theory of Change, defined by the project inputs and the outputs and outcomes achieved (or expected to achieve)

"Without project" scenario: This scenario is the best estimate of what the household, community, system would look like without the project intervention. Sometimes this is called the business-as-usual, or if it is tied to an impact evaluation this would be the control group.

Net benefits: Net benefits are the total benefits of a project, minus the total costs. Net benefits could be a negative or positive number.

Incremental net benefits: The incremental net benefits consider the incremental impact of a project, minus the incremental costs. This is done by taking the net benefits of a "with project" scenario minus the "without project" scenario.

Works Cited

Béné, Christopher (2013). "Towards a Quantifiable Measure of Resilience," IDS Working Paper, Volume 2013, Number 434, September 2013. https://www.researchgate.net/publication/258999312_Towards_a_Quantifiable_Measure_of_Resilience

Cabot Venton, C., Fitzgibbon, C, Shitarek, T., Coulter, L., and Dooley, O. (2012). The Economics of Early Response and Disaster Resilience.

Chadburne, O. Anderson, C., Cabot Venton, C. and Selby, S. (2013). Applying CBA at a Community Level - A Review of Its Use for Community Based Climate and Disaster Risk Management. Oxfam Research Reports. June 2013.

ABOUT THE PRACTICAL GUIDANCE NOTE SERIES

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