

**Facilitator:** This is the final module of the workshop. This module focuses primarily on hands-on activities associated with developing the project concept the participants have brought with them into an actual project. Because there are so many hands-on activities associated with this module, it is expected that this module will take 2 days to complete.

In this module the participants will learn the *key steps, the sequence and process of CCA project preparation* so that they can manage the process in an efficient manner in their country.

The objective is to give you a sound guide to managing the CCA project preparation process. The module will suggest the key steps involved, the contents of each step, how to involve stakeholders in each step, and will provide a proven way for pulling all the work together into a CCA project that is clear to understand and can be efficiently implemented.

At the end of this module, participants will have developed the following key skills/competencies:

- Management of project design phase steps involving consultants, including:
  - Developing a terms of reference (TOR)
  - Consultant selection
  - Management and evaluation of bids
  - Negotiating consulting agreements
  - Logistical arrangements to support the consulting team
- Steps in project preparation, with particular emphasis on:
  - Problem tree analysis
  - Objective tree analysis
  - Project development objective
  - Logistical framework
- Best practices for monitoring and evaluation

- Day 1: Climate Finance and the “Evidence Base”
- Day 2: Linking to Broader Strategies and Problem Identification
- **Day 3: Managing Project Prep and Economic Considerations**
- Day 4: Safeguards and Project Design
- Day 5: M&E and the Path Forward



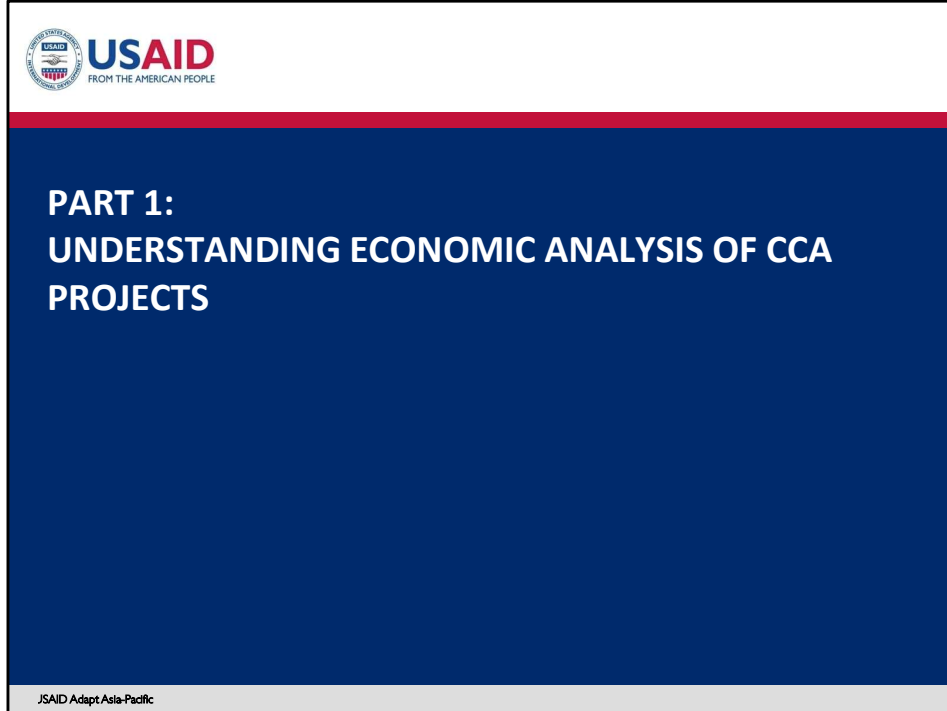
### Module 2: Finance for Adaptation

This module will cover the main sources of finance for adaptation, focusing on the main international funds, and how to access their resources. If the country in which the materials are being implemented has a domestic fund, the module will cover the domestic fund. Full details for localization of this module can be found in the instructor guide. In addition, it will include the global Adaptation Fund (AF), Green Climate Fund (GCF), Global Environment Facility (GEF), etc. The aim of the module is to inform participants of the various sources, their requirements for access, an orientation to their formats for project concepts and proposals, and the main features of project proposals that they seek.

**Outcomes of module 2:** *Trained government personnel who understand the basics of identifying international climate finance for use in future CCA projects in their countries.*

**Objective of module 2:** Training materials on the various sources of international financing for CCA projects. The materials will be adequate for presenting a one-day module to a group of country officials, including slides, case studies and supporting

notes/source information.



The general topics to be covered in this part of the module, and the order of these topics, is as follows:

- The role of economic analysis in the project cycle
- Describing the manager's role in economic and social analysis
- Describing **project cost estimates**
- Understanding different types of **costs**
- Cost summaries and schedules
- Types of **benefits**
- Comparing and contrasting **economic analysis** and **financial analysis**

### GOALS-IMPORTANCE-OBJECTIVES-OVERALL FIT

#### **GOALS**

The goal of this module is to familiarize participants with concepts and procedures associated with **Economic and Financial Analysis**, including the determination of project **costs** and **benefits**. Costs and benefits have to be determined and quantified in economic and financial analysis.

## **IMPORTANCE**

This section focuses on **Economic Analysis**, which is one of the key steps in **project design** and subsequent **project approval**. All major climate financing agencies have rigorous standards for project economics and finance. This section equips participants with the knowledge required to manage the conduct of accurate and transparent economic analysis.

### **OBJECTIVES:**

4.1.A. Participants will describe the importance of rigorous economic analysis as a cornerstone of good project design

4.1.B. Participants will recognize and adopt managerial best practices for economic analysis

4.1.C. Participants will identify and define several types of costs and benefits relevant for economic and financial analysis

4.1.D. Participants will identify documentation and tools associated with economic and financial analysis

4.1.E. Participants will compare and contrast economic and financial analysis and describe the role of each in project design.

### **OVERALL FIT**

The material covered in this section is a substantial part of the feasibility study, which is the “meat” of project design. Economic analysis is somewhat complex and technical and requires specialized skill sets. Thus in most if not all cases, the economic analysis will be carried out by a team of consultants. Your role in this is to manage the process and provide support to the consultant team while at the same time appraising the product of their work. In order to do this effectively, you need to have a general understanding of how economic analysis works.



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## Module 10 Part 1 Objectives

- 10.1.A. Describe the importance of rigorous economic justification as a cornerstone of good project design
- 10.1.B. Identify and define several types of costs and benefits relevant for economic analysis
- 10.1.C. Define “discounting” and describe how costs and benefits are calculated over time
- 10.1.D. Describe and apply measures for demonstrating the economic viability of a project, including Net Present Value and Benefit-Cost Ratio

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These are the objectives of this section of the module. Each bullet will come in individually. Make sure to cover each of the objectives and address any questions the participants may have.



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## Economic Justification: WHY?

- Demonstrate that your project is an appropriate use of public funds and that they will be used efficiently
  - “Is this a good project?”
- Demonstrates that you have thought about the costs and benefits of the project
  - Reveals the distribution of benefits and costs across society
- Shows that the project is the best choice among options
  - “Which project is better?”
- Identifies risks and strategies to mitigate risks

*A tool to support decision-making*

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**Demonstrate that your project is an appropriate use of public funds and that they will be used efficiently.** For any given project, you want to know “is this a good project?” Financiers and investors like to see economic justification because they are concerned that their money is generating net benefits, or they want to ensure that projects are designed with minimal harmful effects. For governments, the economic justification answers the question “should the government invest in the project proposal?” The economic justification will help to address this question, because it looks at the costs and benefits of the project from the perspective of society as a whole, not just the government or developer or investor. The economic justification shows that the project will increase society’s well-being.

**Demonstrates that you have thought about the costs and benefits of the project.** The economic justification demonstrates that you have accurately accounted for all of the costs, and so it improves transparency. In summarizing all the positive and negative aspects of a project, the economic analysis that goes into the economic justification serves as a framework for stakeholders to discuss the various aspects, both positive and negative, of projects or policies. The economic analysis which feeds into the justification will also reveal the distribution of benefits and costs across society, and so it will help you determine if one group sacrifices or gains disproportionately in the



proposed project.

**Shows that the project is the best choice among options.** For a group of project options, we want to be able to answer the question “which option is the best”? Methods of economic justification quantify the costs and benefits of different projects. The method that we are going to examine, Cost Benefit analysis, enables users to aggregate the costs and benefits of each option into a single metric (the “net present value”) that can be used to compare different project options. You can demonstrate which option offers the best value for the money.

**Identifies risks and strategies to mitigate risks.** Another part of doing a good economic analysis for a project is to consider uncertainties and risks, and the effect that these could potentially have on the ability of the project to achieve its goals. In this session we will discuss sensitivity analysis, which enables designers to consider how different future conditions might affect the feasibility of the project.

**A tool to support decision-making.** We are going to discuss economic analysis as a way to quantitatively consider the costs and benefits of a project option to society. But it is important to point out that cost benefit analysis, cost effectiveness analysis, or any tool that you are using is just part of deciding whether or not to undertake a project, since economic considerations are only one part of the picture.



## Practical Questions: Projects

### GCF:

- Please provide the narrative and rationale for the detailed economic analysis
- Based on the above analysis, please provide economic and financial justification (both qualitative and quantitative) for the concessionality that GCF provides

### Adaptation Fund

- Describe or provide an analysis of the cost-effectiveness of the proposed project/program
- Describe measures for financial and project/program risk management



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## Economic vs. Financial Analysis

- Economic analysis: assessing the pros and cons of an investment project or policy from the point of view of society...
  - Required for most projects
- Financial analysis: assessing the pros and cons of an investment project or policy from the point of view of the individual or firm...
  - Required in certain circumstances



## Economic Analysis of Climate Adaptation Projects

- Fundamentally the same as other projects...
  - ...but adds an additional element of uncertainty
  - No more stationarity
- Several relevant tools & methodologies:
  - Cost-Benefit Analysis (CBA)
  - Cost-Effectiveness Analysis (CEA)
  - Multi-Criteria Analysis (MCA)

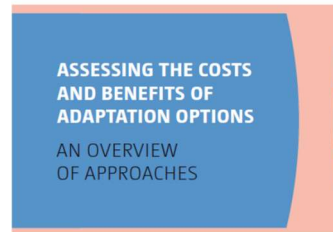


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## One Common Method: Cost-Benefit Analysis (CBA)

- Measures costs and benefits of a project with money as the measuring rod
- Expresses costs and benefits as aggregate community costs and benefits
  - The “Net Present Value” (NPV)
- Demonstrates if the benefits of a project outweigh the costs, and by how much compared to alternatives
  - The “Benefit Cost Ratio” (CBR)
- Can show if some groups benefit or suffer disproportionately

THE NAIROBI WORK PROGRAMME  
ON IMPACTS, VULNERABILITY AND ADAPTATION TO CLIMATE CHANGE



United Nations  
Intergovernmental Panel on  
Climate Change

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CBA is a form of economic analysis. It is not to be confused with financial analysis. Financial analysis focuses on the flow of cash associated with a project whereas CBA focuses on costs and benefits. This distinction is important because not all costs have cash values – e.g., pollution; and not all benefits have cash values – e.g., health improvements.

Moreover, a financial analysis focuses on the profitability of a project to the person or firm running it. By comparison, a CBA considers the impact of a project to everyone, including those not targeted by the project. For instance, it might consider the pollution effects on a downstream community of a mill operation. These would not normally be covered in a financial analysis. In effect, a CBA looks at the wellbeing of a community compared to the profitability of a select group in a financial analysis.

The guidebook featured on this slide is from the UNFCCC and describes several different procedures for analysing costs and benefits, including CBA, cost effectiveness analysis, multi-criteria analysis and some others. Remember that CBA is not the only way to do an economic analysis. Different methods have different strengths and weaknesses, and hence are appropriate in different applications. This guide can be downloaded at [http://unfccc.int/resource/docs/publications/pub\\_nwp\\_costs\\_benefits\\_adaptation.pdf](http://unfccc.int/resource/docs/publications/pub_nwp_costs_benefits_adaptation.pdf).



## Steps in CBA & Needs

1. Identify the costs and benefits
2. Value the costs and benefits
3. Aggregate the costs and benefits
4. Sensitivity analysis

*Needs: data, inputs, expertise, understanding of context*



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Here we have listed the basic steps in conducted a CBA. Some guides include some additional steps, but these are the basics. CBA also has several requirements, including:

**Data.** Information is needed in a cost benefit analysis to assess benefits and costs. In general, the financial costs of a proposed activity are relatively easy to determine. More difficult is the estimation of benefits or intangible costs. This is because the benefits of many activities – especially before a project takes place – are still only hypothetical so their true extent may not be clear.

**Inputs.** Conducting a cost benefit analysis will take time and expertise. Data may need to be bought. Travel may need to be conducted. All of these items cost. In particular, there are only a limited number of agencies in the Pacific that routinely conduct economic analysis of development projects that link with the natural environment. As a result, it may be difficult to find the necessary expertise to conduct the work. Alternatively, it may be expensive to do so if consultants are used.

### Expertise

**Understanding of the Context.** The economic value of an activity needs to be considered in the context of other critical issues including, for example, the sustainability of project impacts, environmental impacts, cultural impacts and the distribution of wealth (equity). As indicated, economic considerations can feed into the decision-making process (such as voting or consensus) but would unlikely be the sole determinant of whether an activity should be/ should have been pursued. Cost benefit analysis is a compelling input to the decision-making process. By highlighting the economic impacts of projects, decision makers have a valuable insight to the contribution that different activities can make to social well-being. Nevertheless, economic issues are not the only consideration in a decision. For example:

- projects must be socially acceptable. A project which offers substantial net benefits but which disadvantages key stakeholders in the process is likely to be culturally unacceptable and/ or politically difficult to sell; and
- a project that offers a relatively poor pay-off may, nevertheless, be important to support for non-economic reasons, such as to prevent social breakdown or to ensure continuity and trust.

The guidebook pictured here was published in 2015 by the ADB and represents part of their efforts to incorporated climate change into the projects they support. This guide has more details about many of the steps we discuss in today's module. It can be downloaded at <https://www.adb.org/sites/default/files/publication/173454/economic-analysis-climate-proofing-projects.pdf>.



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## Step 1: Identify Costs and Benefits

- Identifying costs and benefits creates a baseline for measuring impacts
- “With and without” analysis
  - Different from “before and after”
  - Allows costs and benefits resulting from a project to be identified
- Develop with/without tables

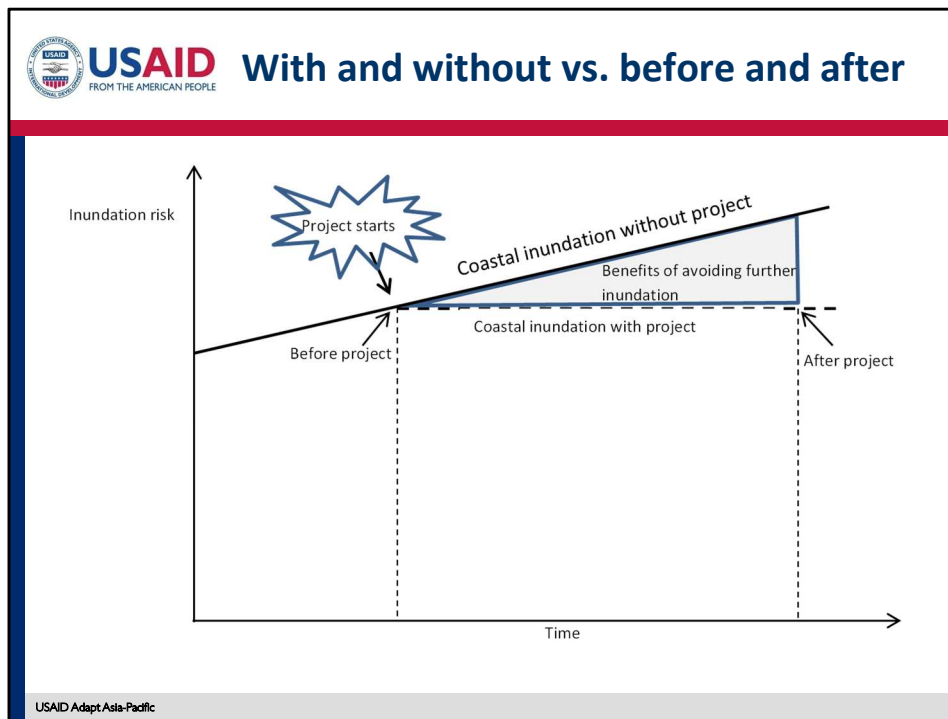
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**Identifying costs and benefits creates a baseline for measuring impacts.** The first step is to identify the various costs and benefits that need to be considered for your project, or between different options. This will provide the baseline from which a project’s impact can be identified and measured.

**With and without analysis.** The way that you identify the costs and benefits for the project is to consider the with project scenario and compare it to the without project scenario. This refers to thinking about what would happen if the project was not implemented (the “without-project” scenario), and then comparing this to what would happen if the project were to be implemented (“with-project” scenario). The without project scenario provides the baseline from which the changes generated by a project can be identified and measured. This enables you to identify the changes resulting from the project, including costs and benefits. Here you want to identify only changes associated with the project, and not changes that would have occurred anyway. Sometimes this is tricky. Note that with and without analysis is different from before and after analysis.

The before and after comparisons only look at the change between two single points in time (before the project is implemented and after the project has been completed).





With-and-without analysis should not be confused with ‘before-and-after’ comparisons. Before-and-after comparisons only look at the change between two single points in time, that is, before the project is implemented and after it has been completed. The with-and-without analysis measures change for every year (or other time increment) across the life of the project. This difference matters because many natural systems are dynamic so the ‘without’ situation itself may change over time, irrespective of whether a project is implemented.

As an example, coastal erosion and inundation risk in Kiribati is a result of beach mining activity *and* sea level rise *and* a number of other factors. Based on sea levels and beach mining today, an assessment of coastal inundation made today would reflect the current risk. However, after 10 years with continued beach mining and on-going sea level rise, the inundation risk would be expected to be higher. A project that keeps coastal inundation at existing levels, therefore, avoids the cost of higher inundation. Yet, this would appear as offering no benefits if the ‘before’ and ‘after’ situations were used to value the project. It is, therefore, essential to assess ‘with-project’ and ‘without-project’ scenarios instead.



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## Example 1: Household Biogas System

Without-project scenario	Demonstration of hh biogas systems
Most households (hh) buy expensive Liquefied Petroleum Gas (LPG) and kerosene for their cooking needs	<u>Costs</u> <ul style="list-style-type: none"> <li>•Establishment costs (purchase and installation of systems)</li> <li>•Annual operation and maintenance</li> </ul>
Poorer hhs spend time collecting and preparing firewood for cooking needs	<u>Benefits</u> <ul style="list-style-type: none"> <li>•LPG and kerosene cost-saving</li> <li>•Time saved collecting firewood</li> <li>•Improvement in health</li> <li>•Generation of residue by-product</li> <li>•Improved quality of lagoon environment</li> <li>•Greenhouse gas reductions</li> </ul>
Use of firewood indoors contributing to respiratory and other health issues	
Parts of lagoon environment are degraded due in part to pig waste pollution	
Greenhouse gas emissions from LPG and kerosene contributing to climate change	

The with-and-without-project table summarizes the present situation, the future situation without the project, and the future situation if the project options are implemented.

The without project column describes what inputs, outputs, and outcomes relevant to the project problem are expected to arise without any project options being implemented.

The with project column of the table describes the outputs and outcomes of the project with different project options. This is the changes in outputs and outcomes that would be expected to occur because o the project activities. These columns include the inputs required to implement the project options.



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## Example 2: Lagoon Dredging Project

Present situation	Without lagoon dredging	With lagoon dredging and accompanying ban on beach mining
<p><b>Beach mining of coastal aggregates (household mining estimated at 77,000 m<sup>3</sup> per year and Ministry of Public Works and utilities (MPWU) estimated at 6,500 m<sup>3</sup> per year)</b></p> <p><b>Importation of aggregate material from overseas estimated at 5,000 m<sup>3</sup> per year</b></p>	<p>Total beach mining increases at 5 per cent per year for next 10 years</p> <p>Importation of aggregate material increases at 7 per cent per year for next 10 years</p>	<p>Reduced reliance on coastal mining and importation of aggregate:</p> <p>Provision of 46,000 m<sup>3</sup> of aggregate per annum, expected to offset 75 per cent of imported aggregates and all aggregates mined by MPWU from the coast. The remainder of the 46,000 m<sup>3</sup> is intended to offset an equivalent quantity mined by communities</p> <p>Beach mining for large boulders and remaining aggregate needs (21,000 m<sup>3</sup> estimated) continues</p>
<p><b>Coastal erosion exacerbated by mining of beach flats, leading to increased risk of inundation, and damage to infrastructure, agriculture and public health</b></p>	<p>Coastal erosion continues with resulting ongoing harm to infrastructure, agriculture and public health</p> <p>Expenditure on protective works (e.g. sea walls) increases by Aus\$7,500 per year</p>	<p>Expenditure on protective works remain at the same level</p> <p>Reduced damage costs in infrastructure and agriculture</p> <p>Reduced public health losses</p> <p>Possible impacts on fisheries?</p>
<p><b>Coastal mining supplementing incomes to numerous families, and sole or primary source of income for many</b></p>	<p>Continues at same level</p>	<p>Negative impacts on livelihoods of some community members</p>
<p><b>Low compliance with regulations restricting coastal mining (illegal mining in vulnerable areas, low payment of mining royalties)</b></p>	<p>Continues</p>	<p>Increased compliance from some sectors of the community but</p> <p>Likely on-going noncompliance from some families reliant on beach mining as primary source of income</p> <p>Possible social unrest due to negative perceptions by community of lagoon dredging (negative impact of livelihoods, environmental impacts etc.)</p>

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The inputs, outputs and outcomes identified in the ‘with’ and ‘without’ scenarios need to be identified as positive (benefits) or negative (costs). Inputs are costs (negative) while outputs and outcomes may be either positive and or negative.

Typical benefits arising from natural resource management projects include:

- improved productivity levels (e.g. improved agricultural or fisheries production or
- increased supply of clean water);
- improved health;
- improved environmental quality;
- resilience to climate change; and
- diversification of livelihoods.

Typical costs include:

- up-front costs:
- research, design and development costs;
  - capital expenditure;
  - labour; and
  - use of government-owned land, facilities, or machinery.
- operating and maintenance costs for the entire expected economic life of the project

- costs of regular inputs (fuel, materials, manufactured goods, transport and storage, etc.); and
- on-going labour.
- negative impacts arising from the project, e.g. health effects or environmental damage,
- costs of relocation due to inundation, loss of livelihoods, etc.

Impacts such as health, social and environmental benefits or costs are commonly not marketed (that is, these items are not purchased or sold in markets) or are characterised by prices that reflect less than their full value. Market prices will, therefore, unlikely reflect the economic value of these types of impacts from a project. Nevertheless, it is important that these items are included in the analysis. At a minimum, they should be discussed and described in qualitative terms.



## Example: Maldives Water Project (UNDP-GCF)

- With the project, no need to transport water to the islands from the Male desal plant. Water production costs at Male and water transport costs will decrease.
- People on the islands often use untreated water, and so they get sick. If they have treated water, they won't get sick.



## Tips for determining with and without scenarios

- Expert consultations – discuss with key stakeholders e.g., project proponent, community affected by the project, government, scientists, experts in the field etc.
- Literature review – review similar previous projects – what would have happened had other projects not occurred?
- Scientific data – what data exists to show what is happening?

*Check the accuracy of without scenario by getting it reviewed by others who are knowledgeable*

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If you are doing the CBA yourself, make sure that you triangulate the data to create scenarios that are as robust to experts as is practical for the CBA. If you are getting someone else to come up with the scenarios, share the scenarios with other experts to see if these seem reasonable. If you do not identify a benefit or cost, you will not be able to describe or value it. It is essential to identify all effects at this point.



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## Step 2: Value the Costs and Benefits

- Describe the changes that are expected to result from the project and identify the inputs needed.
- Quantify inputs, outputs, and outcomes for the project
- Start with your budget or Project Cost Estimate
  - Costs: “Fixed” & “Variable”
- Include market and non-market values.

*Take note of special cases.*

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**Describe the changes that are expected to result from the project and identify the inputs needed.** As far as is practical, the costs and benefits of the project should be valued in monetary terms. This will enable you to compare the costs and benefits, and to compare different options if you happen to be looking at different options.

**Quantify inputs, outputs, and outcomes for the project.** Decide how much/how many of the inputs you need, and how much/how many of the outputs and outcomes are going to be produced. To the extent possible, assign dollar figures to the inputs, outputs, and outcomes. This is necessary to allow for direct comparison of different project options. You will then assign dollar (rupiah) figures to the inputs, outputs, and outcomes.

**Start with your budget or project cost estimate.** In the last session we talked about developing a budget for the project. This is a good place to start for describing project costs, as it should clearly describe most of the inputs needed to implement the project. In some larger projects, the costs are described in tables called the “Project Cost Estimate”, which is presented with the logframe or design and monitoring framework. The Project Cost Estimate aggregates the costs in a cost summary per output.

**Costs: Fixed & Variable.** Fixed costs include costs of resources to establish a project or activity. These are generally market costs. Fixed costs tend to remain the same regardless of production output. R&D; capital expenditures, use of land, facilities, machinery. Variable costs, on the other hand, can change depending on a number of factors, including production volume or changes in market price for inputs. Variable costs include the cost to maintain a project or activity, including labor. Generally these are market costs.

**Include market and non-market values.** Goods and services produced by or consumed by your project can be market items, which are those that are bought and sold and which are easy to value (use the market price), and non-market items, which are those that are not traded or sold (e.g. clean air). Non-market values generally require the use of specialized methodologies. There are different techniques, and each has advantages and disadvantages. Some techniques are better in certain situations than others.

**Take note of special cases.** In many cases, there are complications with valuing costs and benefits. Though you most likely won't encounter these complicating factors on smaller projects, it is important to be aware of them, and that they require special consideration and procedures in more complex and bigger projects. For example, when markets don't function well (or at all), alternative methods of valuation may be used. When goods and services are taxed and/or subsidized, special procedures may be used to determine accurate values.





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## Examples of costs

Typical **costs** include:

### **Fixed costs**

- a) Research, design and development costs
- b) Capital expenditure
- c) Use of government-owned land, facilities, or machinery

**Variable costs** (operating and maintenance costs for the entire expected economic life of the project)

- a) Costs of regular inputs (fuel, materials, manufactured goods, transport and storage, etc.)
- b) On-going labour

**Negative impacts** arising from the project, e.g. health effects or environmental damage

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Costs may be fixed or variable. Variable costs vary depending on a company's production volume, rising as production increases and falling as production decreases. Variable costs differ from fixed costs such as rent, advertising, insurance and office supplies, which tend to remain the same regardless of production output. (See: [www.investopedia.com/terms/v/variablecost.asp](http://www.investopedia.com/terms/v/variablecost.asp).)



## Valuing Costs & Benefits: Best Practices

- Be rigorous in data collection
- Accuracy, consistency, completeness and honesty
- Tables in clear formats as per requirements of financier
- Transparency of all assumptions
- Link with Design and Monitoring Framework to ensure tables are presented on an outputs basis and described consistently in project documents

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**Be rigorous in data collection.** Data collection for CBA can be time-consuming and costly. Remember that the recommendations that stem from your CBA are determined by the data that you use.

**Accuracy, consistency, completeness and honesty.** Again we emphasize the importance of these elements in cost estimations. If you don't have these things you will likely end up with a poor quality estimate. Some common things that contribute to poor quality estimates are:

- Incomplete or incorrect information
- Failure to reflect prices prevailing at the time the estimate is prepared
- Lack of adequate risk assessment and quantification
- If estimates are too low, it is difficult or impossible to deliver the project outputs. If the estimates are too high, the result can be under programming in the investment plan, making it difficult to meet delivery targets.

Moreover, performance and governance standards are rising and financing organizations rightly insist on attention to accuracy. Remember that there is a limited pool of funds out there, and so there is competition because there is not enough financing to meet all of the need. If you can internalize and institutionalize these

accuracy practices, you will likely be more competitive going forward.

Remember that cost changes that impact project budgets are a constant concern to executives, senior management, as well as political leaders and auditing agencies. Quality cost estimates are also necessary in maintaining public confidence and trust throughout the life of the project.

**Tables in formats as per requirements of financier.** Each project financier has their format for table presentations. Look at examples of approved projects, and the template for new submissions.

**Transparency of all assumptions.** Set out the assumptions showing the derivation of costs. In your CBA report, you should describe the uncertainties associated with the key values, the assumptions made, and a description of any costs and benefits that have not been included so that policy makers can see the limitations of the assessment.

**Link with Design and Monitoring Framework to ensure tables are presented on an outputs basis and described consistently in project documents.** Be sure to present cost estimates for all activities and components linked to specific outputs as per the Project Design and Monitoring Framework. Costs are to be presented in summary tables on an OUTPUT basis, for monitoring purposes and to show the cost of all outputs. You need to make sure that the cost estimates are consistent with the procurement plan and the safeguards documents (discussed in parts 2 & 3 of this module). All of the project documentation and the budgets need to be mutually coherent.

The material on this slide addresses **learning objective 4.1.B.**



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## Distribution of Costs & Benefits: Best Practices from the Adaptation Fund

- Attention to most vulnerable communities and groups within communities
- Equitable distribution of benefits
- Avoid maladaptation
- Avoid marginalization of minority & indigenous groups
- Comply with environmental and social principles
- More guidelines [here](#).

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Another important consideration in cost benefit analysis is to figure out how the costs and benefits are distributed over time and space, and amongst various groups of people. On this slide we present some practical guidelines drawn from Adaptation Fund (AF) materials, but the principles described here apply to most funding organizations.

**Attention to the most vulnerable communities and groups within communities.** The AF and other funds call for project descriptions to *specifically reference* economic, social, and environmental benefits that accrue to vulnerable communities, as well as the most vulnerable groups within communities. This applies to considerations of gender equity. Project descriptions also need to describe how they will **mitigate negative impacts**.

**Equitable distribution of benefits.** Projects should not benefit certain groups or stakeholders better off vulnerable communities, households, and individuals. In other words, the project should not increase the gap between the most vulnerable and the rest of the community or society.

**Avoid maladaptation.** *Maladaptation*, defined briefly, describes projects and programs

that may provide short-term benefits, but over the long term end up leaving a community or a groups within that community more vulnerable to climate change. Specific studies that demonstrate how maladaptation will be avoided may be required.

**Avoid marginalization of minority & indigenous groups.** This is a very important consideration for the AF, ADB, World Bank, and other funders.

**Comply with environmental and social principles.** We will focus more on environmental and social principles later on in this module.

**For more guidelines,** download [Environmental and Social Policy](#). Adaptation Fund 2013.

**Suggestions:** provide a brief description of the benefits, supported by adequate data on the stakeholders. Note the need for the project to address the needs of minorities, the poor and the most vulnerable. Project area-specific data are required. Consider using photos or illustrations from the project area to help the reader to understand the proposal. Make sure the project design is in line with the Environmental and Social Policy of the Adaptation Fund.

We've included an excerpt directly from the Adaptation Fund below:

*Describe how the project/programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project/programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.*

**AF Guidance:** *The proposal should include information on the expected beneficiaries of the project/programme, with particular reference to the equitable distribution of benefits to vulnerable communities, households, and individuals. In target areas where minority groups and indigenous communities have been identified, particular benefits provided by the project/programme to those groups should be outlined.*

*For a fully developed proposal, the estimated benefits will have to be quantified, whenever possible. In addition, if there is any concern of negative development or maladaptation in any of these areas, relevant evidence would need to be referenced, with specific studies if necessary. Projects/programmes supported by the Fund shall not increase the vulnerability of beneficiaries or non-beneficiaries, nor reduce their capacity to adapt to climate change. Any risk of marginalization of minority groups or indigenous people should be ruled out. All proposed projects/programmes shall demonstrate compliance with the environmental and social principles as outlined in the Environmental and Social Policy.*

The material on this slide addresses **learning objective 4.1.A.**



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## Step 3: Aggregate Costs and Benefits

- Converting all costs and benefits from the life of the project into one value
- Three “sub-steps”:
  1. Convert costs and benefits into present day values:  
**DISCOUNTING**
    - **WHY DO WE DO THIS?**
  2. Sum all the present day costs and benefits
  3. Use the summed present day values to determine net present value and/or benefit/cost ratio

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### **Converting all costs and benefits from the life of the project into one value.**

Aggregation means that you are bringing together all the different costs and benefits from the life of the project and are presenting them as a single number or value. This facilitates comparison of different options, and also provides a simple way to demonstrate the relationship between costs and benefits in a given project option.

**Convert costs and benefits into present day values.** This requires a process known as “discounting”, which involves converting the value of future costs and benefits into present day values. We do this because the costs and benefits for a project happen at different times. Many of the costs happen early on in the life of the project, whereas the benefits accrue in the future. However, we naturally value future benefits differently than we value benefits that we experience today, and the cost-benefit analysis should reflect this.

Consider how you value future benefits. If you had \$100 in cash, and I wanted to write you a check that you could only cash in one year to buy the \$100 cash, how much would you demand that the check be written for? You most likely would not accept a \$100 check, but would instead demand \$105, \$110, or even more. In this case you are **discounting** the value of the check, because you will only receive the benefits in one

year. The longer the benefits are delayed, the more you are likely to discount them. We will discuss the discount rate more in the next slide.

**Sum all the present day costs and benefits.** Once you have all the values converted into today's prices, add up all the costs and benefits.

**Use the summed present day values to determine net present value and/or benefit/cost ratio.**





## Discounting & Present Value

Discount Rate	Present value	Year 1	Year 2	Year 3	Year 4	Year 5
0%	\$100	\$100	\$100	\$100	\$100	\$100
5%	\$100	\$95	\$91	\$86	\$82	\$78
10%	\$100	\$91	\$83	\$75	\$68	\$62



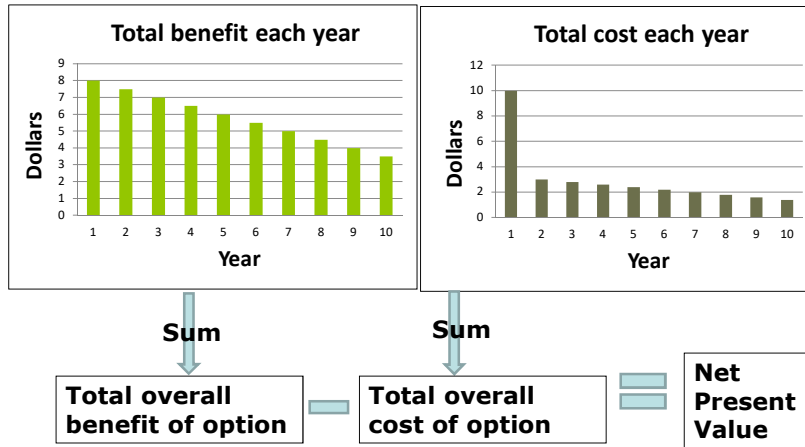
## NPV, BCR, & IRR

- The “Net Present Value” is simply the present value of all the benefits *minus* the present value of all the costs...
  - “Decision Rule”: project is good if NPV is positive
  - “Decision Rule”: choose the project with the highest NPV
- The “Benefit-Cost Ratio” is the present benefits *divided by* the present costs.
  - Decision rule: if B/C ratio is more than 1 the project is good
  - Decision rule: if the B/C ratio is less than 1 the project is bad.
- The “Internal Rate of Return” is the rate at which the NPV of the investment is zero
  - Decision rule: if the IRR is greater than the discount rate, the project is good



## Net Present Value

“what is the overall impact of this option?”

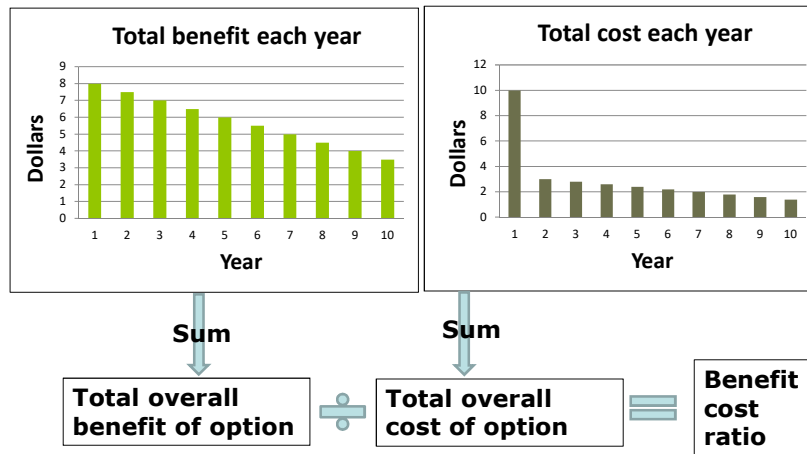


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The net present value (NPV) is the total discounted benefits minus the total discounted costs.

## Benefit Cost Ratio

“For every dollar spent, how much is returned in benefits?”



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Benefit cost ratio (BCR) is the total discounted benefits divided by total costs. It effectively shows the payback per dollar invested.



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## Step 4: Sensitivity Analysis

- Many sources of uncertainty; projects should consider and account for risks
- Sensitivity Analysis is used to determine influence of uncertainties & test responsiveness to changes in assumptions
  - An indicator of *robustness*
- 4 key steps
  1. Identify parameters that are uncertain
  2. Determine alternative values (upper and lower bounds)
  3. Examine impact of change in the values on project NPV
  4. Does this change recommendation for the project?
- Look at previous projects for examples

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**Many sources of uncertainty; projects should consider and account for risks.** In designing your project, you make a lot of assumptions, and if you use the wrong values to represent your assumptions, you may have poor results from your CBA, which can lead to poor decisions. Uncertainties come from lots of different sources. For example

- Data limitations. We may have incomplete information about some part of the analysis. Your estimates of costs and benefits may be less-than-exact
- Limited understanding about the future. This includes both human factors and environmental factors. For example, we are uncertain about the rate of sea-level rise, and in many areas we don't know the direction and magnitude of change for rainfall values. We might also be uncertain about the costs and benefits of goods and services in the future.
- Limited understanding of the relationships between natural environment, technology, and human behavior

**Sensitivity Analysis is used to determine influence of uncertainties & test responsiveness to changes in assumptions.** Sensitivity analysis can help you to understand how responsive the results of your analysis are to changes in the assumptions. In other words, it is an indicator of how *robust* your CBA findings are

**1. Identify parameters that are uncertain.** Some examples might include the cost of inputs (fuel and labor, which fluctuate over time), yield or output levels, lifespan of equipment, or the efficacy of any awareness or outreach programs.



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## Uncertainty

- Uncertainties arise from:
  - Limited understanding of the causal relationships between natural environment, technology, and human behaviour
  - Data limitations
  - Limited understanding about the future
  - The value of some costs and benefits (particularly non-market ones)
- If we use wrong values (parameters) or assumptions, this may lead to incorrect results and conclusions
  - Leading to poor decisions

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Unless you are lucky, you are going to face challenges in doing CBAs because of uncertainty. This may be because the interactions between a project and the environment are unclear (e.g. how do we know how much our project has improved biodiversity?). This is because data is limited (some countries do not collect data on production in certain sectors and this may make our ability to estimate benefits tricky) and because some values are hard to quantify (like pollution).

If we use wrong values (parameters) or assumptions, this may lead to incorrect results and conclusions.



Scenarios	NPV (\$ millions)	IRR
Base case	15.01	27.2
Cost +20%	11.1	22.6
Benefits -20%	8.5	21.7
Cost +20% and Benefits -20%	6.8	18.0

### Maldives water project (UNDP-GCF)

Scenario	EIRR (%)	NPV (\$ million)	Switching Value (%)	Sensitivity Indicator
Base case	32.4	173.99		
Costs increase by 20%	29.5	162.85	317.99	0.29
VOC decreases by 20%	29.4	134.56	(88.62)	(1.11)
Base traffic decreases by 20%	27.2	111.91	(56.18)	(1.75)
Traffic growth rate decreases by 20%	27.9	113.92	(58.06)	(1.72)
No time benefits	30.0	141.48		
No traffic generated	31.9	167.31		
Costs increase by 20%, VOC decreases by 20%	26.5	123.63		

( ) = negative value, EIRR = economic internal rate of return, NPV = net present value, VOC = vehicle operating cost.  
Source: Asian Development Bank.

### Cambodia Rural Roads Improvement Project (ADB)





## Example: Maldives water project

- Estimate population projections from 2015-2040 to know required investment (costs) and avoided costs of transport (benefits)
- Estimate capital cost & operations and maintenance (O&M) over 2015-2040
- Estimate possible water shortages from 2015-2040 to estimate total transport costs without project
- Estimate benefits of avoided transport costs and incremental quantity of clear potable water

*Importance of discounting and climate information*



## Example: Samoa Flood Management Project

1. Map flooded areas for periodic flooding events with and without investments
2. Overlay housing and building in flood areas
3. Estimate flooding and housing for with and without
4. Estimate infrastructure damage and productivity losses

*What types of data and expertise would be required?*



## Optimum Option (Outcome) of a Project

- The optimum option does not always mean maximized “returns” to investment, e.g. farmers may choose a traditional variety of rice over HYV rice because of taste preference
- For private businesses, firms or public corporations, a major objective is to maximize net income at less risk
- For public projects, due to policy and social reasons, a transport corporation, for example, may run a bus service in a less populated area
- The project should be the best mix of policy, social, environment and economics (National Planning Policy, National Action Plan for Climate Change)

### ***Note for Facilitator.***

The final design of the project should reflect the optimum balance between costs, benefits and other strategic factors that reflect its objectives.



## Is CBA always needed?

- Not all CCA project financiers call for project CBA in economic terms
- Many projects funded via the Adaptation Fund or Green Climate Fund have been approved without an economic CBA. Greater emphasis has been placed on *financial analysis and cost-effectiveness* as a key input to the decision-making criteria
- Reasons for this focus on the difficulty of quantifying all benefits in terms of monetary values
- Livelihoods investments through CCA interventions also rely on *financial analysis* as these benefit individual households; these are justified through *financial analysis of the livelihoods aspects*.



## Climate Proofing?

- “A process that aims to identify risks that an investment project may face as a result of climate change, and to reduce those risks to levels considered to be acceptable” (process/procedure)
- “A measure aimed at mitigating the climate risk to which a project is exposed” (intervention)



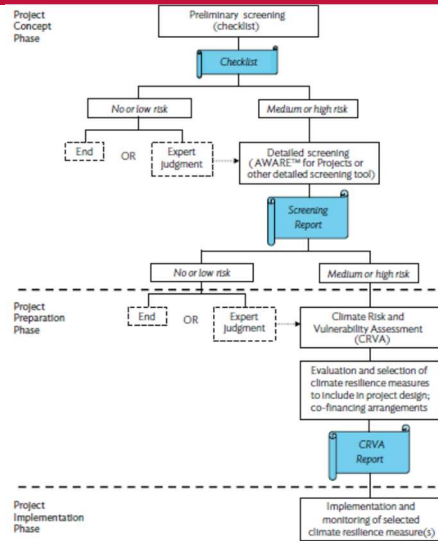
## Questions to answer

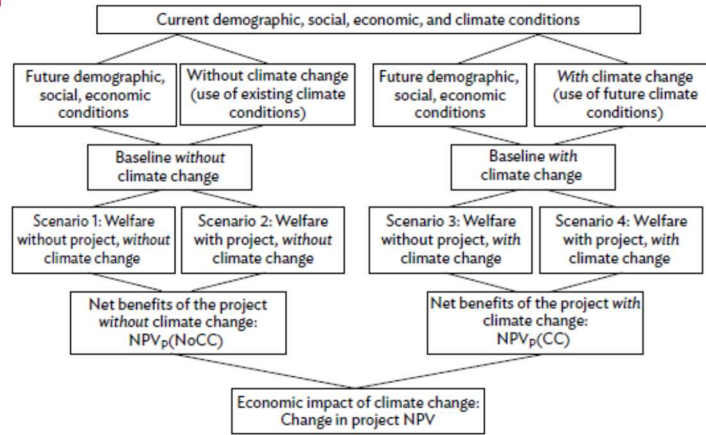
- To climate proof, or not to climate proof?
  - Balancing the loss of welfare against costs of adaptation
- Which option among several should be recommended?
  - Avoiding over/under-engineering
- Should we consider co-benefits?
- When should we climate proof?

*How, how much, and when to climate proof*

## Climate-Proofing Stages (ADB)

- Stage 1: preliminary screening: is this project potentially at risk (concept stage)
- Stage 2: detailed screening of projects at medium or high risk (concept stage)
- Stage 3: Climate risk and vulnerability assessment (CVRA) assesses risks and adaptation measures (design stage)
- Stage 4: Reporting. Assessment results included in recommendation to the President.



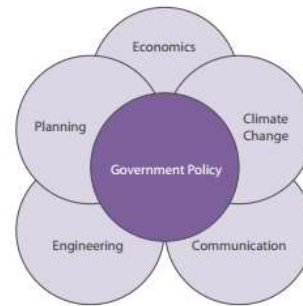


***If NPV (no CC) > NPV (CC), then climate change is costly to the project.***



## Steps and team composition

- Assess physical impacts on the project: *non-economist*
- Translate impacts into costs of climate change: *economist*
- Assess technical feasibility of options: *non-economist*
- Estimate incremental costs of alternative design: *economist*
- Compare costs and benefits: *economist*
- Calculate NPV: *economist*





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## If you want to know more...

- All approved GCF projects are online and contain brief descriptions of economic analysis
  
- Look at ADB project website for examples of economic and financial analysis summaries