

GUIDEBOOK

on the methodology for financial assessments
to address climate change

CHAPTER XIV: COASTAL ZONES SECTOR

(adaptation to climate change)



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About this publication

This methodology is an update to the first financial assessment methodology, which was released in 2009. The objective of this methodology is to support countries to implement their climate targets and to identify, reallocate, mobilize and manage the required financial resources and to create a fiscal framework conducive for climate action.

The update to this methodology was developed under UNDP's Climate Promise by the *Pledge to Impact* Programme. Delivered in collaboration with a wide variety of partners, the initiative has supported over 120 countries to enhance and implement Nationally Determined Contributions (NDCs) under the Paris Agreement. From Pledge to Impact is generously supported by the governments of Germany, Japan, United Kingdom, Sweden, Belgium, Spain, Iceland, the Netherlands, Portugal and other UNDP core contributors. This programme underpins UNDP's contribution to the NDC Partnership.

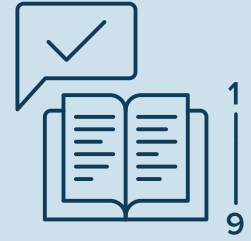
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About this Guidebook

As countries identify their national climate change targets—notably through Nationally Determined Contributions (NDCs) under the Paris Agreement—the need exists to break down targets into concrete steps of action, determine a financial framework to implement actions and achieve targets, and identify policy measures to facilitate the necessary changes that support low-emission development and a low-carbon future.

A key component to support this transformation is through assessing national investment flows and financial flows to address climate change. Many countries have used this method to articulate an effective and appropriate national response to climate change.

This Guidebook responds to the needs of countries to have a clear approach to support the implementation of national climate targets in the context of sustainable development that duly accounts for their national circumstances, capacities and resources.

Between 2008 and 2024, 60 investment flow and financial flow assessments were conducted worldwide, with more than 1,000 national stakeholders engaged in the technical and political aspects of the assessments. Since the adoption of the Paris Agreement and the development of NDCs, the methodology has helped countries utilize financial assessments to develop a pathway to NDC implementation.

While this methodology was first developed in 2008, an update has taken place in 2025. This Guidebook is a living document, which will continue to be improved based upon the experiences of those using it. Over the years, the methodology to carry out financial assessments to address climate change has been continually reviewed and updated regarding its user friendliness, feasibility of implementation and sectoral scope. Comments are invited. Please send feedback to Susanne Olbrisch (susanne.olbrisch@undp.org).

For more information, visit <https://climatepromise.undp.org/tags/investment-and-financial-flows-assessments>.

Contents

About this Guidebook	i
List of acronyms and abbreviations	iii

14.1 Introduction	1
--------------------------	----------

14.2 Application of financial assessment methodology to adaptation in the coastal zones sector	3
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<p>5</p> <p>Step 1. Establish key parameters of the assessment.</p>	<p>12</p> <p>Step 4. Identify annual IF, FF and O&M costs (and subsidy costs if included explicitly) for the baseline scenario.</p>	<p>15</p> <p>Step 7. Calculate the changes in IF, FF and O&M costs (and in subsidy costs if included explicitly) needed to implement the target scenario.</p>
<p>8</p> <p>Step 2. Compile historical IF, FF and O&M cost data (and subsidy cost data if included explicitly), and other input data for scenarios.</p>	<p>13</p> <p>Step 5. Define target scenario.</p>	<p>15</p> <p>Step 8. Identify policy implications.</p>
<p>11</p> <p>Step 3. Define baseline scenario.</p>	<p>14</p> <p>Step 6. Identify annual IF, FF, O&M costs (and subsidy costs if included explicitly) for the target scenario.</p>	

List of tables

Table 14.1: Examples of potential impact pathways	6
Table 14.2: Examples of investment flows and financial flows in the coastal zones sector	8

List of acronyms and abbreviations

A	Accommodation	NAP	National Adaptation Plan
BAU	Business-as-usual	NDC	Nationally Determined Contribution
BS	Baseline scenario	NGO	Non-governmental organization
CBD	Convention on Biological Diversity	O&M	Operation and maintenance
CO₂	Carbon dioxide	ODA	Official Development Assistance
FDI	Foreign direct investment	OECD	Organisation for Economic Co-operation and Development
FF	Financial Flow	P	Protection
GCF	Green Climate Fund	R	Retreat
GDP	Gross domestic product	REDD	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
GEF	Global Environment Facility	TNA	Technology Needs Assessment
GHG	Greenhouse gas	UN FAO	United Nations Food and Agriculture Organization
IF	Investment Flow	UNDP	United Nations Development Programme
IPCC	Intergovernmental Panel on Climate Change	UNFCCC	United Nations Framework Convention on Climate Change
ISIC	International Standard Industrial Classification	V&A	Vulnerability and adaptation
LPG	Liquid petroleum gas	WHO	World Health Organization
LT-LEDS	Long-term Low-Emission Development Strategy		
LULUCF	Land Use, Land-Use Change and Forestry		

Chapters I and II of this guide provide methodology on how to carry out a financial assessment. This chapter provides additional information needed to carry out a financial assessment in the **coastal zones sector**. To avoid repetition, some of the information provided in Chapter II that is relevant to all sectors is not included in this chapter. Careful reading of Chapter II before this chapter is highly recommended.

14.1 Introduction

Coastal zones are where ocean and land meet. The natural processes that shape coastal zones are highly dynamic, varying in both space and time. Coastal zones contain both land and ocean components and both land and ocean boundaries, determined by the degree of influence of the land on the ocean and vice versa. These boundaries are constantly changing in width, depth and height.¹ Coastal systems are dynamic, undergoing adjustments of form and process at different temporal and spatial scales in response to geomorphological and oceanographical factors. Coastal resources comprise all the natural ecological and physical systems within coastal zones. The term can also refer to the economic and subsistence value of these systems.²

Human activity exerts pressures on coastal systems that may dominate or interrupt natural processes.³ The sustainable management of coastal zones is required not just to address the significant impacts of climate change but also to handle the stresses of today's increasing movement of human populations to coastal areas.⁴

Climate change impacts on coastal systems include sea level rise, higher sea water temperatures, changes in precipitation and run-off patterns, changes in storm tracks frequency and intensity and changes in ocean chemistry, particularly acidification. These changes have different physical and ecological effects on coastal systems that include permanent inundation, flood and storm damage, permanent loss of wetlands, coastal erosion, saltwater intrusion, coral bleaching and rising water tables, among others. Climate change affects the physical and biological characteristics of the sea and their coastal areas, modifying their ecosystem structure and functioning. In its 2019 the IPCC concluded that "as a consequence of human actions that fragment wetland habitats and restrict landward migration, coastal ecosystems progressively lose their ability to adapt to climate-induced changes and provide ecosystem services, including acting as protective barriers."⁵

Rising surface water temperatures, for example, are likely to cause increased coral bleaching and the migration of coastal species toward higher latitudes. Changes in precipitation and storm patterns alter the risks of flooding and storm damage. Mangroves and coastal lagoons are expected to undergo rapid change and perhaps may be lost altogether as functioning ecosystems in vulnerable locations. Low-lying coastal areas and wetlands could also be displaced by saltwater habitats, disrupting fresh-water based ecosystems. Such changes are likely to result in the dislocation of migratory birds and aquatic species not tolerant to increased salinity or flooding.

¹ Kay, Robert and Alder, Jacqueline (2005). [Coastal Planning and Management \(Second Edition\)](#). Taylor and Francis, London.

² UNFCCC (2008). [Resource Guide for Preparing the National Communications of non-Annex I Parties, Module 2: Vulnerability and Adaptation](#).

³ Nicholls, R.J., P.P. Wong, V.R. Burkett, J.O. Codignotto, J.E. Hay, R.F. McLean, S. Ragoonaden and C.D. Woodroffe (2007). [Coastal systems and low-lying areas](#). In: *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 315-356.

⁴ Reimann, L., Athanasios T. Vafeidis and Lars E. Honsel (2023). [Population development as a driver of coastal risk: Current trends and future pathways](#). Cambridge Prisms: Coastal Futures , Volume 1 , 2023 , e14, Cambridge University Press.

⁵ Oppenheimer, M., B.C. Glavovic , J. Hinkel, R. van de Wal, A.K. Magnan, A. Abd-Elgawad, R. Cai, M. Cifuentes-Jara, R.M. DeConto, T. Ghosh, J. Hay, F. Isla, B. Marzeion, B. Meyssignac, and Z. Sebesvari (2019). [Sea Level Rise and Implications for Low-Lying Islands, Coasts and Communities Supplementary Material](#). In: *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate* [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. In press.

Significant changes in coastal zones affect virtually all aspects of human life, including agriculture, human health, freshwater supply and quality, energy supply, fisheries, tourism, industrial productivity, infrastructure, ecosystems and biodiversity.⁶ Sea level rise, for instance, could result in the loss of economic, ecological, cultural and subsistence values through:

- › increased flood risk to people, animals, land and infrastructure;
- › loss of land and infrastructure;
- › changes in water management, salinity and biological activity;
- › loss of tourism;
- › loss of coastal human and animal habitats; and
- › effects on agriculture and aquaculture.

Although autonomous adaptation is likely to happen in various forms, given the serious impacts of climate change on coastal systems, a need exists to plan adaptation measures that address these significant impacts. Measures must be integrated into coastal management programmes, along with a strengthening of physical planning and development regulations and integrated coastal zone management and shoreline management planning. Additional measures to take include systematic environmental impact assessments and coastal disaster management.

Integrated coastal zone management is a process for the integrated management of coastal lands and water and their resources, regarding all aspects of the coastal zone, including geographical and political boundaries, to achieve sustainability.⁷

Planned adaptation aims to reduce a system's vulnerability by minimizing risks and maximizing adaptive capacities. Generally, three planned adaptation options are considered for coastal zones:⁸

1. retreat (e.g., property relocation);
2. accommodation (e.g., natural disaster management); and
3. protection (e.g., hard and soft engineering options).⁹

Each of these options is designed to protect human use of coastal zones, and each has different consequences for coastal ecosystems and different associated costs and benefits, as well as social impacts. Retreat and accommodation help to maintain the dynamic nature of the coastline and allow coastal ecosystems to migrate inland unhindered and therefore to adapt naturally. In contrast, protection leads to coastal squeeze and loss of habitats, although this can be minimized using soft approaches to defense, such as beach nourishment.

While these three options remain valid today, coastal zone adaptation is increasingly being conceived in ways that allow a direct link to coastal management systems. Adaptation measures to address climate change impacts include those listed below, with a letter to indicate the category of option: retreat (R), accommodation (A), protection (P).

⁶ Nicholls, R.J., P.P. Wong, V.R. Burkett, J.O. Codignotto, J.E. Hay, R.F. McLean, S. Ragoonaden and C.D. Woodroffe (2007). [Coastal systems and low-lying areas](#). In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 315-356.

⁷ Kay, Robert and Alder, Jacqueline (2005). [Coastal Planning and Management \(Second Edition\)](#). Taylor and Francis, London.

⁸ Klein, R.J.T., Aston, J., Buckley, E.N., Capobianco, M., Mizutani, N., Nicholls, R.J., Nunn, P.D. & Ragoonaden, S. (2000). Coastal Adaptation. In: B. Metz, O.R. Davidson, J.W. Martens, S.N.M. van Rooijen and L.L. Van Wie McGrory (eds.), IPCC Special Report on Methodological and Technological Issues in Technology Transfer, Cambridge University Press, UK, 349–372.

⁹ UNFCCC (2008). [Resource Guide for Preparing the National Communications of Non-annex I Parties, Module 2: Vulnerability and Adaptation to Climate Change](#). Bonn, Germany.

- a.** For inundation, flood and storm damage:
 - › dyke/surge barriers (P)
 - › building codes (A)
 - › land use planning/hazard delineation (A/R)

- b.** For wetland loss (and change):
 - › land use planning (A/R)
 - › managed realignment/forbid hard defenses (R)
 - › nourishment/sediment management (P)

- c.** For erosion (direct and indirect change):
 - › coast defenses (P)
 - › nourishment (P)
 - › building setbacks (R)

- d.** For saltwater intrusion:
 - › saltwater intrusion barriers (P)
 - › change water abstraction (A)
 - › freshwater injection (P)

- e.** For rising water tables and impeded drainage:
 - › upgrade drainage systems (P)
 - › polders (P)
 - › change land use (A)
 - › land use planning/hazard delineation (A/R).

14.2 Application of the financial assessment methodology to adaptation in the coastal zones sector

This section describes how the financial assessment methodology presented in Chapter II can be applied to adaptation in the coastal zones sector.

As described in Chapter II, the financial assessment involves a series of steps, which are:



Step 1. Establish key parameters of the assessment.



Step 2. Compile historical IF, FF and O&M cost data (and subsidy cost data if included explicitly) and other input data for scenarios.



Step 3. Define baseline scenario.



Step 4. Identify annual IF, FF and O&M costs (and subsidy costs if included explicitly) for the baseline scenario.



Step 5. Define target scenario.



Step 6. Identify annual IF, FF and O&M costs (and subsidy costs if included explicitly) for the target scenario.



Step 7. Calculate the changes in IF, FF and O&M costs (and in subsidy costs if included explicitly) needed to implement target scenario.



Step 8. Identify policy implications.

Step 1.



Establish key parameters of the assessment.

Define detailed scope of the sector.

In this step, the subsectors of the coastal zone sector that are to be included in the financial assessment must be defined. This primarily entails determining which processes, activities, entities and geographic regions are included. This selection will be based on the national target that is being assessed (NDC, LT-LEDS or other).

Potential overlaps of the coastal zone sector with other sectors should be avoided to ensure no double counting of investment and financial flows takes place among financial assessments of different sectors.

Some adaptation measures may result in additional mitigation benefits in the coastal zone sector or even another sector. These additional benefits would be assessed qualitatively in the financial assessment.

To facilitate the assessment, the following information should be identified in this step:

- i. a clear identification of the problem;
- ii. a brief description of the present situation;
- iii. expected trends in the evolution of the problem in the future;
- iv. a brief description of links between the coastal zones sector and other water and non-water sectors; and
- v. an outlook of how climate change will influence the coastal zones sector.

Specify base year and assessment period.

The most recent year for which historical data is available is recommended as the base year (e.g., 2025). The assessment period should match the time horizon of the target that is being assessed. NDCs often have a time horizon until 2030, LT-LEDS often until 2050. The assessment period should have a considerable length to sufficiently take into account the long lifetimes of infrastructure in the sector.

Identify the target to be assessed and adaptation measures.

A set of adaptation options must be identified for the coastal zones sector, based on the national target that is being assessed (NDC, LT-LEDS, other). National targets being assessed are often general and visionary and not detailed enough to directly use them for a financial assessment. Therefore, the first step is to break down the overall national target into concrete measures and steps of action that can be used for the financial assessment.

Breaking down the national target often includes technical and political considerations. Therefore, it is key to do this step in close consultation with national policymakers to ensure their ownership of and buy in to the measures being identified. The selection of options should also consider relevant previous work in the sector, including national and sectoral plans, National Communications and National Adaptation Plans (NAPs).

The selected adaptation measures need to be specific and broken down into concrete activities so that investment and financial flows and O&M costs can be identified in Steps 4 and 6. The selection of options should also consider national and sectoral development plans, the technical feasibility, logistical feasibility and cultural acceptability of the options. Consideration should also be given to potential economic, social and non-GHG environmental benefits and costs of the options.

The impact of climate change on coastal zones varies depending on the type of ecosystem (as shown in Table 14.1).

Table 14.1: Examples of potential impact pathways

Climate factor	Direction of change	Bio-geophysical effects	Potential impacts
Wave climate	Poorly known, but significant temporal and spatial variability expected	Changed patterns of erosion and accretion; changed storm impacts	Sediment supply
Storm track, frequency and intensity	Poorly known, but significant temporal and spatial variability expected	Changed occurrence of storm flooding and storm damage	Wave and storm climate, morphological changes, sediment supply Sediment supply through storm, flood management, morphological changes, land claim Catchment management, land use
Precipitation intensity and runoff	Intensified hydrological cycle, with wide regional variations	Changed fluvial sediment supply; changed flood risk in coastal lowlands	CO ₂ fertilization Sediment supply through precipitation Sediment supply, migration space, direct destruction

Source: Nicholls, R.J. and C. Small. 2002. [Improved Estimates of Coastal Population and Exposure to Hazards Released](#). EOS Transactions.

Given the numerous links between the coastal zones sector and other sectors, the potential for synergies between coastal zones adaptation and mitigation, as well as adaptation in other sectors, is large. For example, forest conservation measures in upland catchments may reduce potential flood damages downstream in coastal lowlands. Such synergies and cross sectoral impacts should be discussed qualitatively in the assessment.

To address these impacts a range of policies are necessary. Adaptation policies for coastal zones include those described below.

- **Public awareness and outreach activities:** The public is informed of the danger of living in coastal lowlands that are at risk of being affected by climate change impacts.
- **Increase in height of coastal infrastructure and urban growth planning:** Physical planning and building control measures and regulations are implemented. For example, allocation of land that is likely to be flooded should be avoided. People located in high-risk areas could be offered incentives to relocate out of these areas. Policies that lead to relocation from high-risk areas reduce the need and cost of future disaster relief. Policies could be instituted that allow the use of high-risk areas as natural preserves or for low value use. Marginal increases in the height of infrastructure during the construction phase, as well as redirecting growth away from sensitive lands are relatively inexpensive options for reducing the impacts of sea-level rise and risk of flooding, especially in areas that are undeveloped.
- **Habitat preservation:** Declare areas as protected, discouraging exploitation of resources.

- › **Coastal zone management plan:** Land use planning in coastal zones, such as the use of building setbacks or allocating low lying vulnerable lands to lower value used (e.g., parks rather than housing) can help reduce vulnerability to sea-level rise. Other land use planning mechanisms, such as construction standards, reduce the risks of living in coastal areas. Additional risk measures can be encouraged through appropriate financial mechanisms. Each of these policies reduces the risk from climatic variability and protects against the impacts of sea-level rise. When put together in the form of a programme, they constitute a coastal zone management plan.

Select analytical approach.

An analytical approach needs to be determined to develop baseline and target scenarios and associated streams of annual IF, FF and O&M costs.

Analytical approaches for a financial assessment of adaptation in the coastal zones sector range from simple spreadsheets to dynamic models that identify the interactions between economic and ecological systems. A combination of approaches, e.g. a bio-economic model supplemented with spreadsheets, can also be used.

Impacts on coastal zones to be analysed include inundation, erosion, flooding and salinization. The [Tool for Environmental Assessment and Management \(TEAM\)](#) can be used to compare the relative strengths of adaptation strategies using quantitative and qualitative criteria.

Several methods to assess the vulnerability of coastal areas are available,¹⁰ including these listed below.

- › [SimCLIM](#), a tool to aid decision-making under changed climatic conditions.¹¹
- › [Coastal Zone Simulation Model \(COSMO\)](#), decision support tool of adaptation to climate change in coastal zone management.
- › **Shoreline Management Planning**, a “living” plan that stimulates the development of long-term coastal management systems that are appropriate to responding to climate change.
- › [Reef resilience toolkit](#), appropriate for tropical coastal and marine resource managers, and especially helpful to coral reef and fisheries managers to design protection areas and developing monitoring programmes.
- › A coastal vulnerability index.
- › A dynamic interactive vulnerability assessment model.

The use of modelling is optional; simpler approaches like extrapolation of trends from historical data may also be used.

¹⁰ See: UNFCCC (2008). [Resource Guide for Preparing the National Communications of Non-annex I Parties, Module 2: Vulnerability and Adaptation to Climate Change](#). Bonn, Germany.

¹¹ UNFCCC (2008). [Compendium of methods and tools to evaluate impacts of, and vulnerability and adaptation to, climate change](#). UNFCCC Secretariat.

Step 2.



Compile historical IF, FF, O&M cost data (and subsidy cost data if included explicitly) and other input data for scenarios.

Compile historical annual IF and FF data, disaggregated by investment entity and source.

The methodology recommends that countries compile 10 years of historical investment and financial flows data, i.e., for the base year and the previous nine years. At a minimum, data should be collected for at least three years (i.e., for the base year and two years during the previous decade).

The investment and financial flows data needed will likely reside in several national locations (e.g., national accounts, ministry records and plans, industry records, statistical agencies, extension agencies, research institutions). Note that sectoral and subsectoral definitions and disaggregation will vary among data sources, so expert judgement may be needed to reconcile datasets and extract needed data from aggregated and/or disaggregated categories.

After the information has been collected, the information will be compiled as in Table 2.4 ‘Template for three years of historical O&M cost data for an investment flow in 2023’ in Chapter II, specifying the amount of investment and financial flows per year for each investment type.

To facilitate the task, it is useful to list different investment and financial flow types likely to appear in the coastal zones sector (Table 14.2).

Table 14.2: Examples of investment flows and financial flows in the coastal zones sector

Year 2025		
List of investment flows and financial flows	IF (2025 US\$)	FF (2025 US\$)
Government		X
Policies and measures Relocation allowances Fiscal incentives Emergency funds Contingency plans Public awareness and outreach activities Urban growth planning Coastal zone management plan Shoreline management plan Coastal disaster management		
Regulations Concessions Limits in access to resources Habitats preservation		X

Table 14.2: Examples of investment flows and financial flows in the coastal zones sector (continued)

Year 2025		
Types of investment and financial flows	IF (2025 US\$)	FF (2025 US\$)
Government		X
Inundation, flood and storm damage		
Dyke/surge barriers (P)	X	
Building codes/building (A)		X
Land use planning/hazard delineation (A/R)		X
Wetland loss		
Land use planning (A/R)		X
Managed realignment/forbid hard defenses (R)	X	
Nourishment/sediment management (P)	X	
Erosion		
Coast defenses (P)	X	
Nourishment (P)	X	
Building setbacks (R)	X	
Saltwater intrusion		
Saltwater intrusion barriers (P)	X	
Change water abstraction (A)	X	
Freshwater injection (P)	X	
Rising water tables and impeded drainage		
Upgrade drainage systems (P)	X	
Polders (P)	X	
Change land use (A)		X
Land use planning/hazard delineation (A/R)		X
Government / private	X	
Training		X
Job diversification		
Use of new technologies		
Management		
Public		
Insurance		X
Cluster insurance		
Pooling of risks		
Financial instruments		
Research		X
Forecasting		
Risk analysis		
Resource monitoring		

Note: X indicates likely type of flow.

Compile historical annual O&M cost data, disaggregated by investment entity and funding source.

Historical O&M data are needed as a basis to project future O&M costs. Annual O&M costs for the physical assets that are in operation during the historical period should be collected for the same years for which historical investment and financial flows data are collected. Information about the expected lifetimes of assets that are in operation during the historical period and annual fluctuations in O&M costs (if any) also need to be collected. O&M data should be collected at a level of disaggregation consistent with the investment and financial flows data.

The O&M data that need to be collected may reside in one or more of the same locations for investment and financial flows data (e.g., national accounts, ministry records and plans, industry records, statistical agencies, utilities, research institutions). If such data are not available, countries should utilize one of the below approaches (see Chapter II of methodology).

- Adopt O&M cost data from similar assets in other countries and adjust the O&M data to in-country production and consumption rates.
- Derive estimates from proportional relationships between O&M costs and total costs or between O&M costs and capital costs (e.g., 10 percent, 25 percent or 75 percent).
- Use either standard assumptions about proportional relationships or proportional relationships observed in other countries.

Compile other input data for scenarios.

Which other input data are needed will depend on the analytical approach chosen, the sectoral scope and which mitigation and/or adaptation measures are to be assessed. Basic socio-economic and technological data will be needed (such as, population and economic growth projections and demand forecasts for products and services).

If a country chooses to include subsidies explicitly in the financial assessment, annual costs of subsidies for each type of investment during the historical period should be collected for the same years for which historical investment and financial flows data are collected. Information on subsidies may be available from relevant government ministries or agencies, statistical agencies, research organizations, academic institutions and private sector entities.

Step 3.



Define baseline scenario.

Climate-related changes in coastal zones will likely bring either increased economic hardship or missed opportunities for countries that depend upon coastal resources but lack capacity to adapt.

This step entails describing what is likely to occur in each coastal zone component without additional adaptation measures to climate change over the assessment period. It should reflect current sectoral and national plans, expected socio-economic trends (e.g., demographic change, economic growth and expected investments relevant to coastal zones). The baseline scenario considers current plans, strategies and policies. The baseline scenario should include information about investments (e.g., in equipment, facilities and infrastructure) as well as financial flows (e.g., in research, education, assistance and institutional investments) that are expected.

An integrated coastal zone management plan may have been developed by a relevant ministry or government agency, or if sector investments are dominated by private sector entities, investment plans may be available from those entities.

The baseline scenario will be based on the historical information collected, i.e. the historical investment and financial flows information and the further input data collected for the scenarios.

The development of the baseline scenario can also be supported by vulnerability assessment methods and tools, for example:

- > **IPCC Common Methodology**, which is useful as an initial country-level baseline analysis when little is known about coastal vulnerability; and
- > **DIVA** for national, regional and global scale analysis of coastal vulnerability, including strategic adaptation issues.

In cases in which countries are increasingly aware of climate change adverse effects and already have measures in place to address climate change, these measures should be reflected in the baseline scenario.

Step 4.



Identify annual IF, FF and O&M costs (and subsidy costs if included explicitly) for the baseline scenario.

Identify annual IF and FF for each investment type, disaggregated by investment entity and funding source.

In this step, the IF and FF for each activity that is part of the baseline scenario will be identified. The source of these data, or method of derivation, will depend on the analytical approach to be used.

As discussed in Chapter II, costs should be in real terms (i.e., inflation adjusted), in constant 2025 US\$ or national currency, should be reported in the year in which they are expected to be incurred and should be discounted using appropriate public and private discount rates.

The annual IF and FF for each investment type should be disaggregated by investment entity and funding source and also be divided into investment flows and financial flows.

The output of this step will be a stream of annual investment flows and financial flows for each investment type for the entire assessment period, by investment entity and funding source. These data should be organized as in Table 2.3 in Chapter II.

Identify the annual O&M costs for each IF, disaggregated by investment entity and source.

Annual O&M costs for assets purchased during the assessment period, and for assets purchased before the assessment period and that are expected to still be in operation, need to be collected for each investment (for example, investments to prevent inundation, flood and storm damage, wetland loss, erosion, saltwater intrusion, rising water tables and impeded drainage).

If a country chooses to include subsidies explicitly in the financial assessment, annual subsidy costs should be identified for each relevant investment type in the baseline scenario (see Section 2.2.1 of Chapter II).

Financial values will be captured in table 'Baseline scenario: *cumulative* investment and financial flows and O&M' and table 'Baseline scenario: *annual* investment and financial flows and O&M' (see Tables 2.6 and 2.7 in Chapter II).

Step 5.



Define target scenario.

This step entails developing a description of what is likely to occur in the coastal zone sector over the assessment period, with implementation of *additional* adaptation measures. The policies and measures will be based on the national target that is being assessed (NDC, LT-LEDS, other).

The target scenario includes comprehensive descriptions of the specific adaptation measures to be implemented (e.g., increase in height of the living surfaces of coastal houses constructed) and the implications of those measures (e.g., reduction of houses affected by inundation through planned relocation). The expected climate change impacts and related vulnerability of the coastal zones sector should be described as well.

The adaptation measures need to be defined clearly and completely so that IF, FF and O&M costs can be identified in the next step. This should include specific information about investment flows, such as in facilities and infrastructures like coastal defence structures, as well as financial flows, such as for early warning systems, training and education programmes. In-country expertise and prior work on climate change adaptation (e.g., National Communications, NAPs), should be utilized in this step.

Step 6.



Identify annual IF, FF, O&M costs (and subsidy costs if included) for the target scenario.

Identify annual IF and FF for each investment type, disaggregated by investment entity and funding source.

In this step, annual IF for the target scenario (e.g., for infrastructure and facilities) and annual FF for the target scenario (e.g., for research, education, assistance and institutional investments) are identified. As discussed in Chapter II, costs should be in real terms (i.e., inflation adjusted), in constant 2025 US\$ or national currency, should be reported in the year in which they are expected to be incurred and should be discounted using appropriate public and private discount rates. The annual IF and FF for each investment type should be disaggregated by investment entity and funding source.

The output of this step will be a stream of annual investment flows and/or financial flows for each investment type for the entire assessment period, by investment entity and funding source.

Identify annual O&M costs for each IF, disaggregated by investment entity and funding source.

Annual O&M costs for assets purchased during the assessment period and before the assessment period that are expected to still be in operation need to be collected for each measure identified in the previous step. For example, this could be the O&M costs incurred in saltwater intrusion barriers constructed before or during the assessment period.

The output of this step will be a stream of annual O&M costs for each investment type for the entire assessment period, disaggregated by investment entity and source.

If a country chooses to include subsidies explicitly in the financial assessment, annual subsidy costs should be identified for each relevant investment flow, financial flow and O&M cost (see section 2.2.1 of Chapter II).

Financial values will be captured as in Table 2.8 'Target scenario: *cumulative* investment and financial flows and O&M' and Table 2.9 'Target scenario: *annual* investment and financial flows and O&M' in Chapter II.

Step 7.



Calculate the changes in IF, FF and O&M costs (and in subsidy costs if included explicitly) needed to implement target scenario.

The shifts and increases in IF, FF and O&M costs that are needed to implement the target scenario in each component are calculated in this step by subtracting the baseline scenario IF, FF and O&M from those of the target scenario. The objectives of this step are to determine: 1) how *cumulative* IF, FF and O&M costs would change; and 2) how *annual* IF, FF and O&M costs would change. These calculations are described in detail in Chapter II.

The accompanying volume on reporting (Reporting Guidelines for the Assessment of Investment and Financial Flows to Address Climate Change) and associated excel file contain worksheets that can be used for capturing and processing information and to perform the calculations.

Step 8.



Identify policy implications.

Once the necessary financial shifts and increases have been identified in the previous step—including which investment entities and funding sources are responsible for the largest shifts and increases in IF, FF and O&M, it will be important to identify the policy implications.

This step includes the formulation and implementation of appropriate policies at the national and also at the regional scale, considering the broader view of exposure and vulnerability patterns in the country.

Sound public policies to minimize climate change impacts and enhance adaptive capacities in the coastal zones sector are supported by, inter alia, the actions noted below.

- a. Build institutional and legal frameworks that acknowledge climate change impacts and consider them in conjunction with other pressures on coastal zones.
- b. Identify and quantify links between the demands of population growth and income level and their effects on natural resources.
- c. Analyse the impacts on livelihoods in coastal zones, exposure and vulnerability of coastal resources and climate change impacts on food access and security.
- d. Formulate and test policy options, including policy incentives, instruments and measures to ensure food and infrastructure security, while preserving the environment.
- e. Use and monitor environmental impacts of human activities, while considering the principles of responsible tourism.
- f. Eliminate harmful subsidies and perverse incentives that serve unprofitable companies to further degrade the state of coastal zones.



United Nations Development Programme
304 East 45th Street, New York, NY 10017

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