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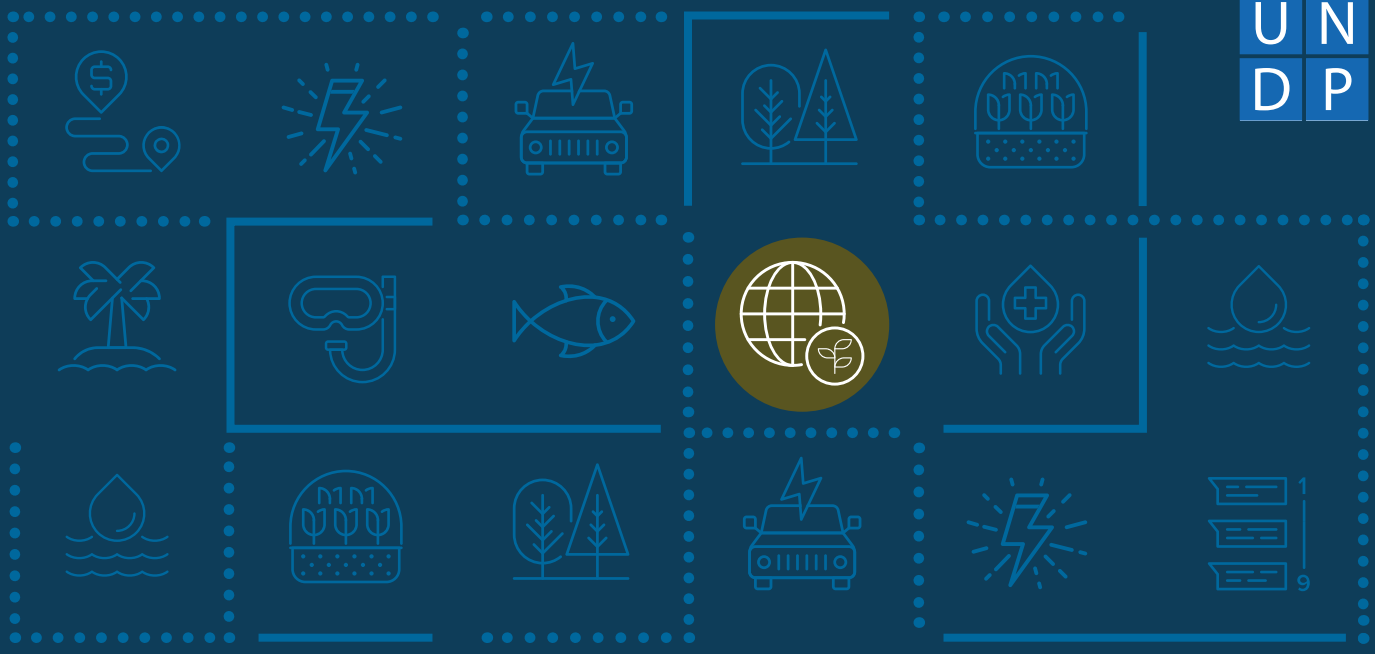
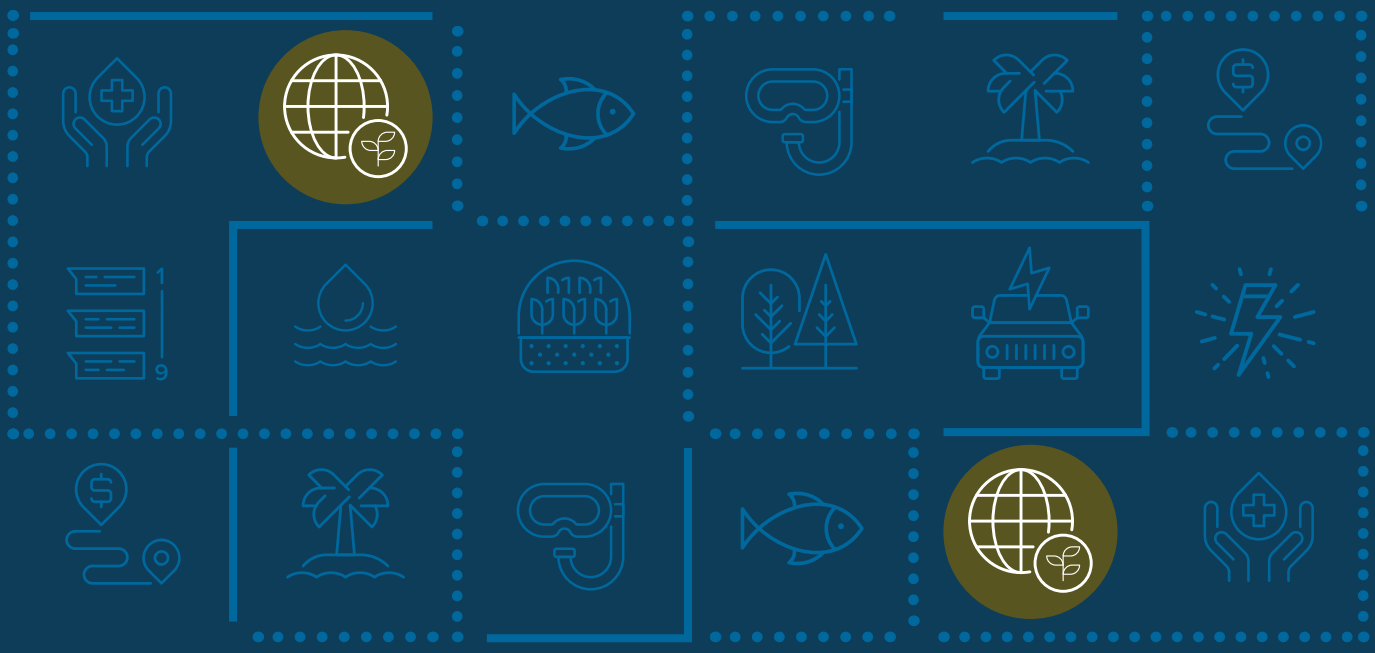


GUIDEBOOK

on the methodology for financial assessments to address climate change

CHAPTER XI: BIODIVERSITY 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.

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List of acronyms and abbreviations

A/R	Afforestation/reforestation
AFOLU	Agriculture, Forestry and Other Land Uses
BAU	Business-as-usual
BS	Baseline scenario
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CO_2	Carbon dioxide
FDI	Foreign direct investment
FF	Financial Flow
GCF	Green Climate Fund
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gas
IF	Investment Flow
IPCC	Intergovernmental Panel on Climate Change
LT-LEDS	Long-term Low-Emission Development Strategy
LULUCF	Land Use, Land-Use Change and Forestry
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
NGO	Non-governmental organization
O&M	Operation and maintenance
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
REDD	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
SNA	System of National Accounts
UN FAO	United Nations Food and Agriculture Organization
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
V&A	Vulnerability and adaptation
WHO	World Health Organization

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 **biodiversity 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.

11.1 Introduction

The Convention on Biological Diversity defines biodiversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems."[1] In this regard, biodiversity also comprises the specific genetic variations and traits within species, as well as the assemblage of these species within ecosystems.

As already highlighted in the 2005 Millennium Ecosystem Assessment,[2] climate change is one of the most important drivers of biodiversity loss and is projected to further adversely affect the role of biodiversity as a source of goods and services. Some examples of biodiversity loss are described below.

- Changes in climatic variables have led to increased frequency and intensity of outbreaks of pests and diseases.
- Changes in stream flow, floods, droughts, water temperature and water quality have been observed and they have affected biodiversity and the goods and services ecosystems provide.
- Coral reefs have been adversely affected by rising sea surface temperatures.
- Diseases and toxicity have affected coastal ecosystems.
- Changes in marine systems, particularly fish populations, have been linked to large-scale climate oscillations.
- Large fluctuations in the abundance of marine birds and mammals have been detected and may be related to changing regimes of disturbances, climate variability and extreme events.
- Changes in forest vegetation types have been observed due to climate oscillations.
- Substantial species–range shifts have been observed as a result of warming and drying trends.
- Endemic species in various mountain ecosystems have become extinct due to habitat loss.

Climate change adaptation activities can promote conservation and sustainable use of biodiversity and reduce the impact of changes in climate and climatic extremes on biodiversity. A more dynamic and proactive approach to biodiversity management is required to incorporate ecosystems into climate policy. This is likely to demand a fundamental review of biodiversity and ecosystem management regulatory frameworks, including the way in which protected species and protected area designation is determined and applied.

Further, actions to reduce other drivers of biodiversity loss (i.e., deforestation, spread of invasive species, pollution, over exploitation, etc.) will be crucial to improve resilience and make biodiversity more robust to future changes.

[1] Convention on Biological Diversity, Art. 2. United Nations Treaty series (1993).
[2] Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-being: Synthesis. Island Press, Washington, D.C.

There are limited adaptation options for some ecosystems (e.g., coral reefs and high latitude areas) because of their sensitivity and/or exposure to climate change. For some of these systems, adaptation options may include limiting other pressures. For example, conservation of biodiversity is strongly targeted at protected areas.

Some examples of adaptation activities and their potential impact on biodiversity identified in the IPCC Technical Paper V on Climate Change and Biodiversity[3] are listed below.

Integrated land and water management (or landscape management)

- Remove policy distortions that result in loss and or unsustainable use of biodiversity.
- Develop and establish a methodology that allows examination of tradeoffs between meeting human needs and conservation and sustainable use goals.
- Establish extensive land management programmes.
- Plant/conduct forestation to overcome land and water degradation.
- Control invasive species.
- Cultivate wild food and medicinal species.

Integrated approach to coastal fisheries management, including the introduction of aqua- and mariculture

- Aqua- and mariculture would reduce the impact on the remaining coastal systems but may be best implemented when considered as part of integrated approach to coastal management.

Integrated approaches aimed at enhancing sustainable agriculture and rural development simultaneously, might include:

- appropriate management of agricultural production systems;
- improved shifting cultivation with sufficient fallow periods;
- diversification of cropping systems;
- continuous ground cover;
- nutrient restoration; and
- agroforestry systems that involve various combinations of woody and herbaceous vegetation with agricultural crops.

Moving species to adapt to the changing climate zones

- Assist some species for a time by providing natural migration corridors (e.g., by erecting reserves of a north-south orientation).

Reduction of use of pesticides and herbicides in response to new pest species

- Avoid damage to existing plant and animal communities, water quality and to human health.

Water use efficiency

- In response to increasing demand for water use due to socio-economic conditions and warmer temperatures and exacerbated by decreased precipitation in some regions

Avoid physical barriers built as adaptation measures to cope with present climate variability

- Enhancement and preservation of natural protection (e.g., replanting of mangroves and protection of coral reefs)
- Nourish artificial beaches.

[3] IPCC (2002). Climate Change and Biodiversity. IPCC Technical Paper V.

- Raise the height of the ground of coastal villages.
- Strategically place artificial wetlands.

“Precautionary” approaches:

- Enforce building setbacks.
- Implement land use regulations.
- Obtain insurance coverage.

Long term success for these adaptation strategies depends on meeting the economic needs of communities whose livelihoods already depend to varying degrees on biological resources and the ecosystem services biodiversity support. The effectiveness of adaptation activities can be enhanced when they are integrated with broader strategies designed to make development paths more sustainable. There are potential environmental and social synergies and tradeoffs between climate adaptation activities (project and policies) and the objectives of multilateral environmental agreements.

11.2 Application of financial assessment methodology to adaptation in the biodiversity sector

This section describes how the financial assessment methodology presented in Chapter II should be applied to adaptation to climate change in the biodiversity 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 precise components of the biodiversity sector to be included in the financial assessment must be defined. The scope of the assessment will be determined by the national target that is being assessed (e.g. the Nationally Determined Contributions (NDC), report on long-term low-emission development strategies (LT-LEDS), or other). Biodiversity is comprised of three main components, genetic diversity (variety of individuals within one and the same species), species diversity and ecosystems diversity (includes a variety of woodlands, deserts, fields, rivers, seas, oceans and other bio-communities interacting with each other and with the non-living environment). The definition of the biodiversity sector and whether all possible components — that is the different existing ecosystems (see Table 11.2) — are to be examined, or only a subset within the sector, will need to be addressed early on in the process of assessment. The precise subsectors that are to be included in the financial assessment must be defined, such as the specific activities, entities and geographic regions that are encompassed.

The type of information to be collected for each ecosystem within the assessment include annual average temperature, annual average precipitation, geographical distribution, characteristics, conservation situation and climate change impacts.

When determining the scope, data availability should be considered, as well as the structure of national government entities in which data reside and the scope of related assessments that have been completed, especially analysis of direct and indirect impacts of climate change identified as part of the National Communications, vulnerability assessments and other adaptation studies that may have been completed.

It is important that the scope avoids overlap with other sectors (e.g., water, agriculture, forestry, food security) that might also be assessed.

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 being assessed. NDCs often have a time horizon until 2030, LT-LEDS often until 2050. The assessment period should have a considerable length to be sufficiently able to account for the long lifetimes of infrastructure in the sector.

Identify the target to be assessed and adaptation measures.

Adaptation options must be identified for each component of the biodiversity sector or ecosystem/s included in the assessment. National targets that are 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 actions that can be used for the financial assessment. Breaking down the national target often includes technical and political considerations, therefore it is important to do this step in close consultation with national policymakers to ensure their ownership of and buy in to the measures that are 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. The selected adaptation options 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.

Climate change will impact biodiversity through a multiplicity of direct and indirect pathways depending on the type of ecosystem, as shown in Table 11.1.

Table 11.1: Examples of potential impact pathways

Ecosystem	Vulnerabilities	Impacts
Deserts	Desiccation and soil mobilization	More episodic climate events and inter-annual variability may increase in future
	Drier and warmer conditions	More severe and persistent droughts
Grasslands and savannas	Warming Fire regime changes Increased rainfall variability	Vegetation affected Production and soil water balance
Mediterranean	Warming Desertification	Desert and grassland expansion Fire frequency and fire extent Rainfall frequency reductions
Forests and woodlands	Forests and woodlands Forest dieback Drought	Mortality and a potential reduction in resilience Insect outbreaks
Tundra and Artic/Antartic	Species extinction Paludification Thermokarst processes Dryness	Threats to the livelihoods and food security
Mountains	Earlier and shortened snow melt period Water shortage Extinction of endemic species	Genetic diversity reduction within species Reshuffling of species Increase in evapotranspiration
Freshwater wetlands, lakes and rivers	Raising temperatures	Dependence on water availability controlled by outside factors Lower water quality
Oceans and shallow seas	Higher seawater temperatures Declining carbonate	Increasing thermal stratification, reducing upwelling Sea level rise Increases in wave height and frequency Loss of sea ice Risk of diseases in marine biota

Source: Based on Fischlin, A., G.F. Midgley, J.T. Price, R. Leemans, B. Gopal, C. Turley, M.D.A. Rounsevell, O.P. Dube, J. Tarazona, A.A. Velichko (2007). "Ecosystems, their properties, goods and services. 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, 211-272.

Given the numerous linkages between biodiversity and other sectors, the potential for synergies between biodiversity adaptation and mitigation and adaptation in other sectors is large. For example, forest conservation measures may reduce species loss in the forest. Countries should be alert to such synergies and the cross-sectoral impacts and discuss them qualitatively in their reports.

Although climate change is a global issue, local efforts are needed to help maintain and enhance resilience and limit some of the longer-term damages from climate change. Diverse adaptation policies have been identified for biodiversity. Natural resource management techniques can be applied to increase resilience of ecosystems. The "ecosystem approach" developed by the Convention on Biological Diversity is a "strategy for management of land, water and living resources that promotes conservation and sustainable use in an equitable way." The ecosystem approach includes:

- Expansion of reserve systems can reduce ecosystem vulnerability to climate change, such as industry standards on biodiversity and protected areas in the mining sector.
- Reduce and manage other stresses on species and ecosystems, such as habitat fragmentation and destruction, over-exploitation, eutrophication, desertification and acidification, e.g. avoiding overfishing through allowances; cultivating native species by means of aquaculture.
- Increase in agricultural productivity, leading to less reduction of and fragmentation of habitats, e.g. a more efficient use of irrigation water and development of agriculture.
- Managing areas outside protected areas, e.g. through the devolution of resource ownership and management to communities, securing community tenure rights and incentives for resource reutilization, as well as avoiding shipping disasters (e.g. oil spills).
- Migration strategies implemented over larger regions and across national borders.
- Controlled burning and other techniques to reduce fuel load and the potential for catastrophic wildfires.
- Securing water rights to maintain water levels through a drought or by having infrastructure capable of surviving floods, in order to minimize the effect of severe water events. Also hydropower engaged with regional planning efforts.
- Disperse population policies to minimize the probability that localized catastrophic events (i.e. hurricane, flood and typhoon) will cause significant negative effects.
- Restoration of habitats currently under serious threat, or creation of new habitats in areas where natural colonization is unlikely to occur. Restoration of habitats could be encouraged through certification of ecotourism practices to promote its development.

Adaptation strategies need to be context and location specific and to consider short- and long-term impacts. National, regional and community level adaptation actions can be integrated into the assessment.

Select analytical approach.

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

Modelling the changes in biodiversity in response to climate change presents some significant challenges. It requires projections of climate change at high spatial and temporal resolution and often depends on the balance between variables that are poorly projected by climate models. It also requires an understanding of how species interact with each other and how these interactions affect the communities and ecosystems of which they are part.

The financial assessment for biodiversity will need to be operationalized through indicators. Sectoral and regional level environmental and social impact assessments can be adapted to measure the impacts of adaptation activities on biodiversity and other aspects of sustainable development.

- Environmental and socio-economic impacts of adaptation activities can be assessed through project and sectoral/regional environmental and social impact assessments.
- A wide range of decision frameworks can be used to prioritize adaptation activities, including decision analysis, cost-benefit analysis and cost-effectiveness analysis.
- Indicators consistent with sustainable development objectives can be used to assess the impacts of adaptation activities on biodiversity and sustainable development, such as:
  - number of endemic species;
  - total number of known species;
  - number, extension and percent area coverage for protected areas;
  - fire frequency;
  - rainfall frequency;
  - insect outbreaks, etc.

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.

To be able to conduct a financial assessment for biodiversity, it will need to be operationalized through indicators. 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, countries should collect at least three years of data (i.e., for the base year and two years during the previous decade). Data should be compiled for each investment type, should be annual, be disaggregated by investment entity and by funding source and also be divided into investment flows and financial flows (see Chapter II, Table 2.3).

In the biodiversity sector, investment flows would include assets, such as artificial beach nourishment, coastal village height, artificial wetlands, etc. Investment flows would also include assets for research, education, assistance, policy and institutional arrangements. Financial flows would include non-asset investments in the research, education, assistance and institutional areas (e.g., labour costs).

The investment and financial flows data needed will likely reside in several domestic locations, for example national accounts, ministry records and plans, industry records, statistical agencies, extension agencies and research institutions. After the information has been collected, the information will be organized as in Chapter II, Table 2.3: 'Template for one year of historical investment and financial flows data' which specifies the amount of investment and financial flows per year, for each kind of investment type, according to the policies and measures, plans, actions, programmes, activities and projects that are being implemented and considering the origin of these investments.

Examples of different investment and financial flows types in the biodiversity sector are seen below in Table 11.2.

Table 11.2: Examples of investment flows and financial flows in the biodiversity sector (X indicates likely type of flow)

Year 2025

Types of investment and financial flows	**IF** (2025 US$)	**FF** (2025 US$)
Government		
Policies and measures		
Relocation allowances		
Fiscal incentives		X
Emergency funds		
Contingency plans		
Regulations		
Concessions		X
Limits in access to resources		
Government/private	X	
Land and water management		
Reforestation		
Sustainable forest management	X	
Invasive species control		
Wild food and medicinal species cultivation		
Integrated coastal fisheries management		X
Sustainable agricultural and rural development		
Agroforestry systems		X
Reduction on pesticides and herbicides use		
Moving species		
Reduce other stresses on species and ecosystems	X	X
Migration strategies		
Water use efficiency		X
Physical barriers avoidance		
Natural protection		
Expansion of reserve systems		
Artificial beach nourishment	X	
Coastal village height		
Artificial wetlands		

Table 11.2: Examples of investment flows and financial flows in the biodiversity sector (X indicates likely type of flow)*(continued)*

Year 2025

Types of investment and financial flows	IF (2025 US$)	FF (2025 US$)
"Precautionary" activities Enforcement of building setback Land-use regulation Insurance	X	
Controlled burning and other techniques		X
Training Job diversification Use of new technologies Management Education and communication programs		X
Research Forecasting Risk analysis Resource monitoring		X

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

Historical O&M data are needed to provide a basis from which to project future O&M costs. In the biodiversity sector, O&M costs include costs associated with management plans (e.g. coastal fisheries management, agricultural and rural development plans, forestry management plans, water efficiency use plans, etc.) such as labour costs, fuel and power costs.

The O&M cost data may reside in the same locations as 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:

- either adopt O&M cost data from similar assets in other countries and adjust the O&M costs to in-country production and consumption rates;
- or derive values 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), using either standard assumptions about proportional relationships, or proportional relationships observed in other countries.

O&M costs will be presented as in Chapter II, Table 2.4: 'Template for three years of historical O&M cost data for an investment flow in 2023.'

Compile other input data for scenarios.

In addition to historical investment and financial flows and O&M cost data, the characterization of the scenarios and identification of annual IF and FF for the scenarios will require other historical and non-historical data relevant to the sector. Required information includes these items listed below.

- Characterization of the biodiversity sector through indicators selected, including past and current trends.
- Characterization of adaptation options, including technical feasibility, cultural acceptability, scalability and economic feasibility. For example, any new technology relevant to biodiversity and climate change (e.g., coastal defences, herbicides and pesticides development, agroforestry systems), natural resources available to assist in adaptation strategies (e.g., natural barriers), existence of a disaster response plan.
- Possible externalities and links with other sectors should be noted, such as to the energy, agriculture, water resources and tourism sectors.
- Information on major sectoral and macroeconomic policies (both recent and expected) that could affect biodiversity, e.g., agriculture promotion reducing vegetation species.

If a country chooses to include subsidies explicitly in the financial assessment, annual 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. Subsidies should be compiled separately for IF, FF and O&M (see Chapter II, Table 2.5: ‘ Template for three years of historical subsidy cost data’).

Step 3.

Define baseline scenario.

This step entails describing what is likely to occur in each biodiversity component under business-as-usual activities, i.e. without additional adaptation activities to climate change. The baseline scenario projects into the future the expected trends identified in Step 2 over the assessment period.

The baseline scenario will likely show large-scale, climate-related changes in biodiversity bringing increased economic hardship or missed opportunities for countries. The baseline scenario also includes any measures that are already being implemented, such as sustainable use regulations, improved standards, management decisions on market approaches, codes of conduct and others.

To develop the baseline scenario either a model can be used, a sector plan, a projection of trends or a combination as the basis of the projection.

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 investment and financial flows and O&M costs are derived for each activity of the baseline scenario. The source of these data will depend on the scope and the types of investment entities relevant for biodiversity. The values may be the output from a model or may be obtained from planning documents or may be derived from historical data. If a model is not used, information may be available from investment entities, government ministries, statistical agencies or research institutions.

The output of this step will be a stream of annual investment flows and/or financial flows for each investment type in each subsector for the entire assessment period, by investment entity and funding source. These data should be organized as in Chapter II, Table 2.6: 'Baseline scenario: *cumulative* investment and financial flows and O&M' and Table 2.7: 'Baseline scenario: *annual* investment and financial flows and O&M.'

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 subsector.

If a country chooses to include subsidies explicitly in the financial assessment, annual subsidies are identified for each relevant investment type and for investment and financial flows and O&M costs in the baseline scenario.

Step 5.

Define target scenario.

This step entails describing what is likely to occur in each biodiversity subsector over the assessment period after implementation of additional and scaled-up adaptation measures, based on the national target that is being assessed (NDC, LT-LEDS, other). This includes comprehensive descriptions of the specific adaptation measures that would be implemented and their effects (e.g., reduction in water shortages).

The adaptation measures need to be defined clearly so that IF, FF and O&M costs can be identified in the next step. This includes information about facility and infrastructure investments for each measure, as well as non-asset investments. In-country expertise and prior work on climate change adaptation (e.g. National Communications, National Adaptation Plans, should be used 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 ewach investment type, disaggregated by investment entity and funding source.

In this step, annual IF for the target scenario facility and infrastructure investments and annual FF for the target scenario research, education, assistance and institutional investments are identified for each activity. The output of this step will be a stream of annual investment and financial flows for each investment type in each subsector 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.

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. All information should be organized as in Chapter II, 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'.

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 changes in IF, FF and O&M costs needed to implement the target scenario are calculated in this step by subtracting baseline scenario values from those of the target scenario. The two primary 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.

If subsidy costs are included explicitly in the assessment, the changes in subsidy costs may be calculated.

The accompanying volume on reporting (Reporting Guidelines for the Assessment of Investment and Financial Flows to Address Climate Change) contains worksheets that can be used for developing country-specific worksheets for capturing the information and for performing these calculations.

Step 8.

Identify policy implications.

Step 7 calculated the magnitudes and timing of changes in IF, FF and O&M by each investment entity and from each funding source needed to implement the target scenario. The purpose of this step is to identify the policy implications to induce the necessary changes in investment and financial flows that were identified in Step 7.

First it should be determined which investment entities are responsible for the most significant changes in investment and financial flows and the predominant sources of their funds. Then policy measures need to be identified that induce those entities to implement the proposed measures and change their investment patterns and the additional sources of funds that might be utilized to meet new investment needs. It will be important to distinguish between public and private sources of finance, as well as between domestic and foreign sources.

Policy measures include a variety of instruments, including economic instruments (e.g., taxes), regulatory instruments (e.g., fuel portfolio standards), voluntary agreements, information dissemination and strategic planning and research, development and demonstration.

Public policies to minimize impacts of climate change and enhance adaptive capacity in the biodiversity sector that may be considered include those described below.

a. Build institutional and legal frameworks that acknowledge climate change impacts and consider them in conjunction with other existing pressures on the biodiversity sector, as well as on other sectors at the country level.

b. Identify and quantify the links between the demands of human population growth and income levels and their effects on natural resources.

c. Analyse the impact of biodiversity loss on livelihoods and the impact of climate change on food access and security.

d. Identify and test policy incentives, instruments and measures to ensure food and infrastructure security, while preserving the environment.

e. Support initiatives, such as creation of property rights and other incentive mechanisms, and link appropriate financing instruments.

f. Eliminate harmful subsidies and perverse incentives that allow companies to continue to further depress the state of biodiversity.

g. Strengthen future management policies by providing a comprehensive, long-term view of the dynamics of production and the demand for resources.

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