



# GUIDEBOOK

on the methodology for financial assessments  
to address climate change

## CHAPTER V: FOREST SECTOR

(mitigation of climate change)



### About UNDP

UNDP is the leading United Nations organization fighting to end the injustice of poverty, inequality, and climate change. Working with our broad network of experts and partners in 170 countries, we help nations to build integrated, lasting solutions for people and planet. Learn more at [undp.org](https://undp.org) or follow at [@UNDP](https://twitter.com/UNDP).

### About UNDP's Climate Promise

UNDP's Climate Promise is the UN system's largest portfolio of support on climate action, working with more than 140 countries and territories and directly benefiting 37 million people. This portfolio implements over US\$2.45 billion in grant financing and draws on UNDP's expertise in adaptation, mitigation, carbon markets, climate and forests, climate risk and security, and climate strategies and policy. Visit our website at [climatepromise.undp.org](https://climatepromise.undp.org) and follow us at [@UNDPplanet](https://twitter.com/UNDPplanet).

### 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.

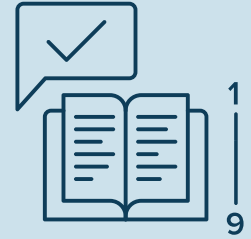
### UN disclaimer

The views expressed in this publication are those of the author(s) and do not necessarily represent those of the United Nations, including UNDP, or their Member States.

Copyright ©UNDP 2026. All rights reserved. One United Nations Plaza, New York, NY 10017, USA.

CLIMATE  
PROMISE





---

# 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](mailto:susanne.olbrisch@undp.org)).

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

# Contents

<b>About this Guidebook</b>	<b>i</b>
-----------------------------	----------

List of acronyms and abbreviations	iii
------------------------------------	-----

<b>5.1 Introduction</b>	<b>1</b>
-------------------------	----------

<b>5.2 Application of the financial assessment methodology to mitigation in the forestry sector</b>	<b>2</b>
---	----------

<p><b>3</b></p> <p><b>Step 1.</b> Establish key parameters of the assessment.</p>	<p><b>11</b></p> <p><b>Step 4.</b> Identify annual IF, FF and O&amp;M costs (and subsidy costs if included explicitly) for the baseline scenario.</p>	<p><b>17</b></p> <p><b>Step 7.</b> Calculate the changes in IF, FF and O&amp;M costs (and in subsidy costs if included explicitly) needed to implement the target scenario.</p>
<p><b>7</b></p> <p><b>Step 2.</b> Compile historical IF, FF and O&amp;M cost data (and subsidy cost data if included explicitly), and other input data for scenarios.</p>	<p><b>13</b></p> <p><b>Step 5.</b> Define target scenario.</p>	<p><b>17</b></p> <p><b>Step 8.</b> Identify policy implications.</p>
<p><b>10</b></p> <p><b>Step 3.</b> Define baseline scenario.</p>	<p><b>16</b></p> <p><b>Step 6.</b> Identify annual IF, FF, O&amp;M costs (and subsidy costs if included) for the target scenario.</p>	

## List of tables

<b>Table 5.1:</b> Mitigation options in the forestry sector	<b>1</b>
<b>Table 5.2:</b> Forest mitigation potential under different forest dynamics	<b>4</b>
<b>Table 5.3:</b> Land availability as per forest mitigation option	<b>5</b>
<b>Table 5.4:</b> Mitigation options in the forestry sector	<b>6</b>
<b>Table 5.5:</b> Compilation of historical data as a basis for baseline scenarios in the forestry sector	<b>8</b>
<b>Table 5.6:</b> An approach to develop the baseline scenario from historical data	<b>9</b>
<b>Table 5.7:</b> Different types of forest and land use to be considered for the baseline scenario	<b>10</b>
<b>Table 5.8:</b> Examples of forestry targets and activities	<b>13</b>
<b>Table 5.9:</b> Defining a target scenario	<b>15</b>
<b>Table 5.10:</b> Target scenario: <i>cumulative</i> investment and financial flows and O&M, examples from the forestry sector	<b>16</b>

# List of acronyms and abbreviations

<b>A/R</b>	Afforestation/reforestation
<b>AFOLU</b>	Agriculture, Forestry and Other Land Uses
<b>BAU</b>	Business-as-usual
<b>BS</b>	Baseline scenario
<b>CATIE</b>	Centro Agronómico Tropical de Investigación y Enseñanza
<b>CDM</b>	Clean Development Mechanism
<b>CIFOR-ICRAF</b>	Center for International Forestry Research and World Agroforestry
<b>FF</b>	Financial Flow
<b>GCF</b>	Green Climate Fund
<b>GEF</b>	Global Environment Facility
<b>GHG</b>	Greenhouse gas
<b>IF</b>	Investment Flow
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>LT-LEDS</b>	Long-term Low-Emission Development Strategy
<b>LULUCF</b>	Land Use, Land-Use Change and Forestry
<b>NDC</b>	Nationally Determined Contribution
<b>NGO</b>	Non-governmental organization
<b>O&amp;M</b>	Operation and maintenance
<b>ODA</b>	Official Development Assistance
<b>REDD</b>	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
<b>REDD+</b>	REDD plus the role of conservation, sustainable management of forests and enhancement of forest carbon stocks
<b>UN FAO</b>	United Nations Food and Agriculture Organization
<b>UNDP</b>	United Nations Development Programme
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>UN-REDD</b>	United Nations REDD Programme

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 for mitigation in the **forest 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.

## 5.1 Introduction

This chapter considers mitigation of greenhouse gas (GHG) emissions in the forestry sector, also known as the Agriculture, Forestry and Other Land Uses (AFOLU) sector.<sup>1</sup>

Carbon in the forestry sector is sequestered in five carbon pools, which are: (i) above ground biomass; (ii) below ground biomass; (iii) deadwood; (iv) litter; and (v) soil organic matter. These carbon pools can be increased by a variety of management interventions not only in the forestry sector but also in related sectors. Carbon stored in forests can be enhanced by targeting higher carbon density in these five pools, especially in the above ground biomass. Forest products can substitute steel, aluminum, plastics and other materials and contribute to reducing emissions. Forest-based bioenergy, such as fuelwood and charcoal, can substitute fossil fuels to a certain extent with potential effects on emissions, and thus contribute to climate change mitigation.

According to the Intergovernmental Panel on Climate Change (IPCC) sustainable forest management strategies will generate the largest sustained mitigation benefits when they maintain or increase forest carbon stocks, while producing an annual sustained yield of timber, fibre and energy from the forest.<sup>2</sup>

Three main options for mitigation of emissions in the forestry sector that can be considered in a financial assessment can be seen in Table 5.1.

**Table 5.1: Mitigation options in the forestry sector**

Mitigation options (general)	Mitigation options in the AFOLU sector, as per the United Nations Framework Convention on Climate Change (UNFCCC)
<b>Reduction of GHG emissions (REDD+)</b>	Reduce emissions from deforestation and forest degradation (REDD+) through committing forests as carbon pools (protection and sustainable management of existing forests).
<b>Carbon sequestration (afforestation/reforestation)</b>	Reduce degradation through the management of existing forests for enhancing existing carbon pools (restoring lost carbon pools).
	Afforestation* (A) <sup>3</sup> on non-forest land (create new carbon pools).
<b>Carbon substitution</b>	Reforestation* (R) on non-forest land (create new carbon pools).
	Biofuel plantations for fossil fuel substitution
	Substitution through increased use of harvested wood products for energy, timber and long-term use of wood-based products

Source: Elaborated by the authors.

<sup>1</sup> Previously, forestry options fell under the LULUCF sector (Land Use, Land-Use Change and Forestry).

<sup>2</sup> IPCC (2007). "Climate Change, 2007: Mitigation Options: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," Chapter 9: Forestry.

<sup>3</sup> Afforestation (A) and Reforestation (R) are defined according to the UNFCCC Marrakech accords.

## 5.2 Application of the financial assessment methodology to mitigation in the forestry sector

This section describes how the financial assessment methodology described in Chapter II can be applied to mitigation in the forestry 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.

Due to the diversity and complexity of forest-based mitigation options, a national planning team should include experts in forest resource assessment, forest policy and economics and forest management. The team needs an excellent level of understanding of the possibilities and requirements of the forest sector (e.g., a profound knowledge of the national forest programme) and the associated impacts of strategic options in the country for climate change mitigation.

To identify investment and financial flows for forestry mitigation options, three aspects to be considered include:

1. Investment and financial flows to conserve existing carbon pools, to manage existing forests for enhanced carbon density and to create new forests;
2. Investment and financial flows for investment in capacity building, research, technology transfer, information systems, development of financing mechanisms and related costs; and
3. opportunity costs of preventing deforestation and forest degradation, thus the indirect costs to protect and conserve forests and their carbon stocks.

The last step is an important dimension in a REDD+ approach that uses a payment scheme for “not to deforest” or “not to degrade.”

This chapter focuses on the forestry mitigation options mainly related to the first two aspects above. General guidelines for the third aspect are difficult to provide as this is subject to a wide variety of country contexts in terms of their policy and institutional framework and socio-economic conditions.

### Define detailed scope of the sector.

In this step, the scope of the forestry mitigation options considered in the financial assessment need to be determined. Options to consider will be determined by the national target that is being assessed (NDC, LT-LEDs). Depending on how general the national target is in terms of forestry options, it may be required to break down this national target into more concrete options, subsectors and actionable items for consideration in the financial assessment. Since this may include not only technical but also political decisions it is recommendable to maintain a close exchange with policymakers throughout the assessment to ensure their buy-in to the assessment and ensure their will be follow-up on the results.

The scoping entails determining the subsectors to be included (e.g., natural forest management, forest plantation development, agro-forestry development in non-forested areas, etc.). It is also important to determine which social groups, processes, activities, entities and geographic regions will be included in the sector.

Land-use planning documents, forest development plans, a national forest programme and similar policy documents should be used to define the sectoral scope. Other relevant input documents include National Communications, technology needs assessments, nationally appropriate mitigation actions and national adaptation plans. The IPCC GHG Inventory sectoral structure can be a useful reference for information.

It is also important to take into consideration local conditions, such as: forest land tenure and access rights; existing biodiversity; extent and nature of forest resources; land available for reforestation and afforestation; centralized and decentralized forest policies; drivers of deforestation and forest degradation in the different forest areas; and national sustainable development priorities. The condition of existing forest ecosystems also matters, such as whether a forest is: 1) in a human-induced development stage of a forest; 2) a degraded (forests in different stages of environmental degradation); or 3) a secondary (re-growing after deforestation).

As strategic opportunities are developed, they will depend on the socio-economic pressure on forests.<sup>4</sup> Forest-based mitigation options will have a relationship with forest cover and the rate of deforestation (as seen in Table 5.2).

**Table 5.2: Forest mitigation potential under different forest dynamics<sup>5</sup>**

Forest dynamics	Low-forest cover countries (< 25% of forest cover)	High-forest cover countries (>50% of forest cover)
<b>Countries with high deforestation rate in the past 5-10 years per hectare (&gt;2%)</b>	<p><b>REDD:</b> medium to high potential (depending on the definition of degradation)</p> <p><b>A/R:</b> medium to high potential</p> <p><b>Restoration:</b> medium to high potential</p> <p><b>Forest-based bioenergy:</b> medium</p>	<p><b>REDD:</b> high potential</p> <p><b>A/R:</b> low to medium potential</p> <p><b>Restoration:</b> high potential</p> <p><b>Forest-based bioenergy:</b> medium to high potential (availability of wood)</p>
<b>Countries with low deforestation rate in the past 5-10 years per hectare (&lt;2%)</b>	<p><b>REDD:</b> low to medium potential (low if conversion concerns high opportunity costs for REDD)</p> <p><b>A/R:</b> medium potential</p> <p><b>Restoration:</b> high potential</p> <p><b>Forest-based bioenergy:</b> medium potential.</p>	<p><b>REDD:</b> medium to high potential (depending on the future deforestation and degradation scenarios)</p> <p><b>A/R:</b> low potential</p> <p><b>Restoration:</b> low to medium potential</p> <p><b>Forest-based bioenergy:</b> high potential</p>
<b>Countries with no deforestation and with net increase of forest area in the past 5-10 years per hectare</b>	<p><b>REDD:</b> no potential</p> <p><b>A/R:</b> medium to high potential (high potential if land is available)</p> <p><b>Restoration:</b> medium potential</p> <p><b>Forest-based bioenergy:</b> high potential (if technology standard is high)</p>	<p><b>REDD:</b> low to medium potential (high potential, if keeping existing carbon pools are considered as a REDD option)</p> <p><b>A/R:</b> low potential (particularly if natural forest management is practiced)</p> <p><b>Restoration:</b> low potential</p> <p><b>Forest-based bioenergy:</b> high potential (if technology standard is high)</p>

Source: Elaborated by the authors.

<sup>4</sup> For more information, see Robledo, C. and Blaser, J. UNDP (2008). "Key issues on Land Use, Land Use Change and Forestry (LULUCF) with an Emphasis on Developing Country Perspectives." New York.

<sup>5</sup> Based on an approach proposed by Simula for qualitative assessment of investment potentials, modified (2008).

Based on the national target being assessed (NDC, LT-LEDS), it needs to be defined which forest mitigation options will be considered in the financial assessment. The main options are:

- reduction of emissions from deforestation and forest degradation (REDD);
- enhancement of carbon density of degraded and other existing forests through sustainable forest management/forest restoration;
- afforestation and reforestation (A/R) as defined in the Clean Development Mechanism (CDM) framework, which includes agroforestry and sylvopastoral systems; and
- substitution (e.g. of fossil fuels) through wood and non-wood products.

When identifying the scope of mitigation activities, the geographic scope also needs to be considered in terms of land ownership of the areas to benefit.

It is useful to clarify the relevance of each forest mitigation option, by identifying the area available for each mitigation option and its importance (Table 5.3).

**Table 5.3: Land availability as per forest mitigation option**

Forest mitigation option	Type of land (forest cover)	Current land use (indicate reference year)	Area (ha) (time period considered)	Importance Highly relevant: 5 Relevant: 3 Not relevant: 0 (time period)
<b>REDD+</b>	Closed and open forest, woodland, savannah	Forest (threatened by deforestation and/or under degradation)		
<b>Reducing degradation through forest enhancement (sustainable forest management and forest restoration)</b>	Forest (degraded) degraded forest land	Used/Unmanaged forest		
<b>Afforestation/ reforestation</b>	Non-forest	Grassland, unproductive pasture		
		Marginal cropland		
		Waste / abandoned land		
<b>Substitution (of fossil fuel by forest-based biofuel)</b>	Forest or non-forest (for bioenergy production)	Forest, grassland, cropland, waste / abandoned land		

Source: Elaborated by the authors.

## Specify base year and assessment period.

The base year and assessment period need to be selected for the financial assessment. The base year should be the latest year for which historical data is available, e.g., 2025. The assessment period should match the time horizon of the target that is being assessed, e.g., NDCs often have a time horizon until 2030, LT-LEDS often have a time horizon until 2050.

## Identify the target to be assessed and mitigation measures.

The most relevant forest management options for the national context should be identified (as shown in Table 5.4). Experiences (success, failure, costs) of existing forest programmes should be considered. For each classified forest/land management option the total area, average investment cost per hectare and average subsequent costs per hectare should be indicated for at least ten years.

**Table 5.4: Mitigation options in the forestry sector**

Mitigation options	UNFCCC / Kyoto Protocol mitigation options (AFOLU)	Classification of forest/land management options	Area (ha)	Average IF and FF (per ha)	O&M cost (per ha)
Reduction of GHG emissions	Reducing emissions from deforestation and forest degradation in developing countries (REDD)	Sustainable management of (natural production) forests			
		Sustainable management of planted forest under deforestation and degradation threat			
		Committed forests for REDD, including protected areas			
Carbon sequestration	Addressing deforestation through forest enhancement	Sustainable Forest Management/Restoration: ecological restoration, enrichment planting, guided natural regeneration, etc			
		Reforestation (R)	Planted forest on deforested forest land		
		Afforestation (A)	Agroforestry, agro-sylvo-pastoral systems		
Carbon substitution	Substitution through harvested wood products	Planted forest for long-term timber production			
		Substitution through non-wood products	Forest plantations for non-wood products (e.g., <i>Jatropha</i> sp., <i>Pongamia</i> sp.)		

Source: Elaborated by the authors.

## Select analytical approach.

Analytical approaches range from simple spreadsheets to complex dynamic forest management models designed to provide detailed tracking of annual investment costs across multiple scenarios.

A useful starting point for the analysis can be a sectoral plan (e.g., a national forest programme, a forest master plan) which typically includes descriptions of the current situation applying relevant indicators and projections of trends in forest area by type, production and consumption of forest products, etc. Information sources include national climate change reports, National Communications and national (investment) plans in the forest sector.

In addition to climate benefits, forest mitigation options usually provide considerable environmental and socio-economic co-benefits, such as water and soil protection, food production and biodiversity conservation, among others. Such co-benefits should be captured and described qualitatively in the assessment. Participatory approaches during planning and implementing measures are recommended to maximize co-benefits and reduce potential conflicts.

Forest mitigation measures, and especially sustainable forest management, will reduce the vulnerability of ecosystems and people to climate change and can contribute to climate change adaptation. More advice can be found in Chapter VII on Adaptation to Climate Change in the Forestry Sector.

---

### 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.

Historical investment and financial flows data, providing information on past investment patterns and a context of public and private plans, are the basis for developing future scenarios and identifying future associated investment and financial flows data (see Table 5.5). Historical data can sit in government agencies, e.g. ministries or departments dealing with forests (e.g., forest departments), forest research centres, ministries of territorial planning, agriculture and environment, national statistics offices and special government agencies for development-related statistics.

**Table 5.5: Compilation of historical data as a basis for baseline scenarios in the forestry sector**

**Cumulative discounted IF, FF and O&M for the target scenario** (million 2025 US\$)

Category of investment entity	Investment Type 1: Land tenure			Investment Type 2: Management system			Investment Type 3: Law compliance and monitoring			Investment Type 4: Tree planting		
	IF	FF	O&M Costs	IF	FF	O&M Costs	IF	FF	O&M Costs	IF	FF	O&M Costs
Households												
Corporations												
Government												
<b>Total</b>												

Notes: The establishment of 'land tenure' is an investment cost. The costs to be covered would include both the administrative process and demarcation of the designated area. 'Management systems' refers to sustainable forest management. Investments can be required for restoring degraded national forests or launching afforestation programmes. 'Forest law compliance and monitoring' requires investment flows to design the system, to procure necessary equipment and requires financial flows to organize initial training carried out by the government, as well as for law compliance and annual monitoring costs for measuring mitigation. 'Tree planting' may include labour costs related to planting, forest guards and annual silvicultural operations, for instance.

The amount of multi- and bilateral official development assistance (ODA) invested in the sector is also relevant. Country information about investments and financing flows in the forestry sector is often scattered. In such cases, data from global databases can be used, such as these below.

- › The Food and Agriculture Organization of the United Nations (FAO) Forest Economics and Policy Division maintains a [database](#) on forest finance, including investment costs in forest management and trade of forest products.
- › The Center for International Forestry Research and World Agroforestry (CIFOR) provides information on different [forestry options](#).
- › The Tropical Agricultural Research and Higher Education Center (*Centro Agronómico Tropical de Investigación y Enseñanza*, or CATIE) based in Costa Rica has a [knowledge base](#) with forestry information.
- › The World Bank offers information on [forest and forest-based investments](#) for each country.

Using the historical data and trends allow a future scenario to be developed. Future scenarios are the extrapolation of information from the past to the future and imply modelling different variables according to expected future changes (Table 5.6).

**Table 5.6: An approach to develop the baseline scenario from historical data**

Forest mitigation options	Historical trend	Future scenario
<b>REDD+</b>	Continuation of the deforestation and degradation trend at the measured rate	<ul style="list-style-type: none"> <li>a. Constant deforestation and degradation rate</li> <li>b. Acceleration of deforestation and degradation</li> <li>c. Deceleration of deforestation and degradation</li> </ul>
<b>REDD+</b> <b>forest restoration</b>	Continued degradation of forested areas	<ul style="list-style-type: none"> <li>a. Constant degradation</li> <li>b. Acceleration of degradation</li> <li>c. Deceleration of degradation/ restoration</li> </ul>
<b>Afforestation/ reforestation</b>	Continuation of grazing land at the measured productivity rate	<ul style="list-style-type: none"> <li>a. Grassland with increased/decreased productivity rate</li> <li>b. Change to cropland or wasteland</li> <li>c. Change to other land use (e.g., settlements)</li> </ul>
	Continuation of cropland at the measured productivity rate	<ul style="list-style-type: none"> <li>a. Grazing land with increased/decreased productivity rate</li> <li>b. Change to grazing land or wasteland</li> <li>c. Change to other land use (e.g., settlements)</li> </ul>
<b>Substitution through harvested wood products</b>	Maintaining current use at the same productivity	<ul style="list-style-type: none"> <li>a. Land-use change</li> <li>b. Change in productivity rate</li> </ul>
<b>Substitution through non-wood products (bioenergy)</b>	Maintaining current use at the same productivity	<ul style="list-style-type: none"> <li>a. Land-use change</li> <li>b. Change in productivity rate</li> </ul>

Source: Elaborated by the authors.

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

Historical O&M data are likewise needed as a basis to identify future O&M costs. Annual O&M costs should be collected for assets purchased during the historical period and for assets purchased prior to the historical period but that are still in operation. As with investment and financial flows information, O&M data should also be disaggregated by mitigation measure, year, investment entity and source.

## Compile historical annual subsidy cost data, if subsidies are included explicitly in the assessment.

The explicit inclusion of subsidy costs in the financial assessment is optional because filtering out subsidy costs from other costs may not always be possible. However, if it is decided to include subsidies explicitly, they should be included for investment and financial flows. Historical subsidy data will be used to identify future subsidy costs in the scenarios.

## Compile other input data for scenarios.

In addition to historical investment and financial flows data, the characterization of the scenarios will require the collection of other historical data relevant to the sector. For example, socio-economic data (e.g. population development and pressure on forest resources), economic growth projections, demand forecasts for forest products (in particular timber and services) and development of harvesting patterns will be needed. Opportunity costs for land uses other than forest conservation and management are of great relevance when assessing forest mitigation opportunities, in particular REDD. The development of forest target scenario will also require information about past, current and expected future GHG emissions, impacts and vulnerabilities of trees and forest ecosystems.

### Step 3.



### Define baseline scenario.

Defining a baseline scenario entails characterizing the forestry sector over the assessment period (for example, 2025-2050) under business-as-usual conditions. This essentially means creating a description of what will occur in the sector in the absence of new and scaled up policies to address climate change and using the current sectoral plans. The baseline scenario describes expected changes in forest land use, socioeconomic trends, technological change and public and private investment trends that affect forest and forest land use, relevant national plans and expected investments (i.e., physical assets and programmes) in the forest sector, including the nature, scale and timing of those investments.

The baseline scenario should extrapolate from (and be consistent with) trends in the historical data, unless sectoral or broader national plans imply otherwise. Also, plans in other sectors, especially transport, energy, agriculture and water, may affect the development of the forestry sector, for instance the construction of a new road might impact deforestation and forest degradation. Investment and financial flows may vary for the same forest mitigation measures according to the ecological zone in which the measure is applied. Therefore, ecological zones also need to be considered when defining the investment and financial flows.

**Table 5.7: Different types of forest and land use to be considered for the baseline scenario**

Type of land	Current land use	Historical trend	Future scenario
<b>Forest (“virgin,” “intact”)</b>	Sustainable (production forest/protected area) management	Secured protected area or sustained yield management	<ul style="list-style-type: none"> <li>a. Without deforestation and degradation threat</li> <li>b. Acceleration of deforestation and degradation</li> <li>c. Constant?</li> </ul>
<b>Forest (gradually degrading)</b>	Unsustainable forest management in production and multi-use forests	Continued deforestation and degradation at the same rate	<ul style="list-style-type: none"> <li>a. Acceleration of deforestation and degradation</li> <li>b. Deceleration of deforestation and degradation</li> <li>c. Constant?</li> </ul>
<b>Forest (having lost most of its initial carbon stock)</b>	Unsustainable forest management (continuously threatened by deforestation and/or under degradation)	Continued increase in degradation	<ul style="list-style-type: none"> <li>a. Acceleration/deceleration of forest degradation</li> <li>b. Change to other land use (e.g., cropland)</li> </ul>

**Table 5.7: Different types of forest and land use to be considered for the baseline scenario (continued)**

Type of land	Current land use	Historical trend	Future scenario
Non-forest	(Extensively used) Grazing land	Continuation of grazing land at the same productivity	<ul style="list-style-type: none"> <li>a. Grazing land with increased/ decreased productivity rate</li> <li>b. Change to cropland or wasteland</li> <li>c. Change to other land use (e.g., settlements)</li> <li>d. Undertaking A/R activity?</li> </ul>
	(Extensively used) Cropland	Continuation of cropland at the same productivity	<ul style="list-style-type: none"> <li>a. Cropland with increased/ decreased productivity rate</li> <li>b. Change to other non-forest land use</li> </ul>
	Waste / abandoned land	Continuation as wasteland	<ul style="list-style-type: none"> <li>a. Waste land with increased/ decreased productivity rate</li> <li>b. Commercial forestry</li> <li>c. Change to other non-forest land use</li> </ul>
Forest or non-forest	Forest plantations, grazing land, cropland, waste / abandoned land	Maintaining current use at the same productivity	<ul style="list-style-type: none"> <li>a. Land-use change</li> <li>b. Change in productivity rate</li> </ul>

#### 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, annual IF and FF for the baseline scenario are identified. 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 values 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 financial flows for each investment type for the entire assessment period, by investment entity and funding source. This information should be organized as outlined 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.'

For each forest mitigation option selected, this step will identify the associated IF and FF including:

- › **public domestic financing** including investments by national and local governments through transfer payments, soft loans, non-monetary incentives through, e.g., preferential resource policies, payments for forest-based services, such as fresh water conservation and direct investment;
- › **public international funding**, through bilateral grants by ODA, multilateral ODA (including grants, investment lending, investment guarantees), multilateral targeted programmes, such as the Forest Carbon Partnership Facility, UN-REDD, Global Environment Facility (GEF), CDM and voluntary carbon markets, etc; and
- › **private investment funding**, including foreign direct investment by forest industries, investments by financial institutions and institutional investors, philanthropic funding and targeted funding through international conservation funds.

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

Annual O&M costs for the baseline scenario are needed. These must include the O&M costs for assets purchased during the assessment period and the O&M costs for assets purchased before the assessment period and that are expected to still be in operation. The annual O&M estimates for each investment type should be disaggregated by investment entity and funding source as outlined in Chapter II, Table 2.4: ‘Template for three years of historical O&M cost data for an investment flow in 2023.’

The output of this step will be a stream of annual O&M costs for each investment type that includes a new asset purchased during the assessment period and streams of annual O&M costs for assets purchased prior to the assessment period, disaggregated by investment entity and funding source.

As with investment and financial flows data, O&M estimates may be from the output from a sectoral model or might be obtained from planning documents or might be derived from the historical data. If a model is not used, information may be available from investment entities, government ministries, statistical agencies or research institutions.

### If subsidies are included explicitly in the assessment, identify annual subsidy costs for each investment type and IF, FF and O&M costs.

If a country chooses to include subsidies explicitly in their assessment, annual subsidy costs for the baseline scenario need to be identified. Subsidies should be determined for each IF and FF as in Chapter II, Table 2.5: ‘Template for three years of historical subsidy cost data.’ Subsidies 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.

Subsidy information may be from the output from a sectoral model or might be obtained from planning documents or derived from the historical data. If a model is not used, information may be available from investment entities, government ministries, statistical agencies or research institutions.

## Step 5.



### Define target scenario.

This step entails developing a scenario of what needs to happen in the forest sector over the assessment period in the presence of new and scaled up policies to implement the national forestry target. The forest target scenario should describe expected socioeconomic trends, technological change, relevant sectoral and national plans, the mitigation measures that will be implemented (including the nature, scale and timing of each) and expected sectoral investments given implementation of the measures.

The national forestry target (from the NDC or LT-LEDS) needs to be broken down into concrete measures and actionable steps (Table 5.8 shows examples of targets broken down into activities).

**Table 5.8: Examples of forestry targets and activities**

Examples of forestry targets	Examples of activities
<b>Implementation of strategies for more effective conservation and management of forest protected areas (REDD)</b>	<ul style="list-style-type: none"> <li>➤ Review national conservation plan</li> <li>➤ Invest in training and professional capacity</li> <li>➤ Develop effective management of protected areas.</li> <li>➤ Develop collaborative management arrangements and ecosystem restoration</li> <li>➤ Implement demonstration projects (plantations, conservation projects, etc.)</li> </ul>
<b>Implementation of strategies for more effective management of production forests</b>	<ul style="list-style-type: none"> <li>➤ Enhance forest law enforcement and governance-related initiatives to contain illegal logging</li> <li>➤ Establish voluntary codes by private sector companies</li> <li>➤ Introduce outcome-based third-party certification</li> <li>➤ Invest in reduced impact logging</li> </ul>
<b>Revised strategies for forest harvesting and management to supply the timber requirements of the country</b>	<ul style="list-style-type: none"> <li>➤ Conduct policy consultations</li> <li>➤ Convene stakeholder engagement meetings</li> <li>➤ Consider wood certification schemes</li> </ul>
<b>Strategies for enhancement of degraded forests by forest restoration (forest enhancement)</b>	<ul style="list-style-type: none"> <li>➤ Decentralize forest management</li> <li>➤ Silviculture (natural regeneration, enrichment planting)</li> <li>➤ Ecological restoration</li> <li>➤ Invest in reduced impact logging</li> </ul>
<b>Revised strategies for increasing upstream watershed protection and combating soil degradation through intensive use of CDM A/R</b>	<ul style="list-style-type: none"> <li>➤ Inventory all CDM eligible land</li> <li>➤ CDM A/R on agricultural land (household, community level)</li> <li>➤ Planted forests (timber and non-timber forest products)</li> <li>➤ Regreen watershed and desertification</li> <li>➤ Improve investment conditions for specific plantation systems</li> </ul>
<b>Enhancement of the capacity of community groups, including communities to take control of forest management</b>	<ul style="list-style-type: none"> <li>➤ Improve quality of life of low-income families living in or adjacent to natural forests, protect the rights of forest-dependent indigenous peoples, reduce encroachment, forest degradation by subsistence activities and reducing forest fire</li> </ul>

The most concrete level for carrying out such planning is a 'forest management unit.' A forest management unit is a clearly defined forest area that is managed according to a long-term forest management plan with explicit objectives. The clearer activities are described at the forest management unit level, the more accurate the financial assessment for the sector will be. Activities to be undertaken can be specified according to the below categories.

- **Clarification of land and carbon tenure.** Clarification of land and carbon tenure and access rights are relevant to all forest options in the target scenario and can imply major costs, depending on local circumstances.
- **Defining the delivery system of forest mitigation options.** This includes species selection and silviculture, forest management system, characterization of expected products (timber, firewood, non-wood forest products, agricultural crops, livestock production, etc.), management activities over time (tilling, fertilizing, etc.)
- **Forest law compliance, enforcement and monitoring carbon stock changes.** Increased efforts for forest law compliance and law enforcement help ensure permanence of the measures undertaken. Monitoring carbon stocks can have a major impact on investment and financial flows (for equipment, satellite imagery, labour, etc.).
- **Labour.** Depending on the forestry option selected, labour can be a major cost item (e.g. in planting forests and managing forests). At the same time job creation along forestry measures can help creating acceptance, income and local ownership of measures taken.
- **Training.** As forest mitigation measures may be new, training will be required, e.g. for managing the new forest or conserving the existing forest as well as in obtaining new products and eventually participating in new markets (e.g., in terms of REDD+ or ecotourism). Also, monitoring and verification of activities require training.
- **Machinery and equipment.** According to the forest mitigation option selected (e.g., reduced impact logging, intensive plantation development, remote sensing monitoring of REDD+, etc.), investment in machinery and equipment or seedlings can be substantial.

The projection of the target scenario can be based on a sectoral plan, a projection of trends or a sectoral model. Prior work on climate change (e.g. National Communications, technology needs assessments, GHG mitigation assessments, vulnerability assessments, nationally- appropriate mitigation actions, national adaptation plans) should be utilized in this step.

Table 5.9 shows forestry mitigation options for different types of land use.

**Table 5.9: Defining a target scenario**

Forest mitigation options	Type of land (defined by forest cover)	Current land use	Forestry option (examples)	Activities in forest management plan for each forest mitigation option
<b>Reducing emissions from deforestation and forest degradation (REDD)</b>	Forest	Conservation areas and managed production and protection forests (threatened by deforestation and/or under degradation)	<ul style="list-style-type: none"> <li>› Forest conservation through sustainable forest management (e.g., using the committed forest approach)</li> <li>› Sustained yield management</li> <li>› Reduced impact logging</li> </ul>	<ul style="list-style-type: none"> <li>› Clarification of land and carbon tenure</li> <li>› Define the system</li> <li>› Monitoring</li> <li>› Labour</li> <li>› Training</li> <li>› Machinery and equipment</li> </ul>
<b>Reducing deforestation by enhancement of forests (forest restoration) (“REDD+”)</b>	Forest land, including degraded and secondary forest	Accessible used/unsustainably managed forest (legal or illegal)	<ul style="list-style-type: none"> <li>› Enrichment planting</li> <li>› Guided natural regeneration</li> <li>› Ecological restoration</li> </ul>	
<b>Afforestation/reforestation</b>	Non-forest	Grassland Cropland Waste/abandoned land	CDM A/R plantations; including: <ul style="list-style-type: none"> <li>› planted forest</li> <li>› agro-forestry</li> <li>› sylvopastoral systems</li> </ul>	
<b>Substitution through harvested wood products</b>	Forest or non-forest	Forest plantations, grazing land, cropland, abandoned land	Forest plantations for wood production	
<b>Substitution through non-wood products</b>	Forest or non-forest	Forest plantations, grazing land, cropland, waste/abandoned land	Forest/energy plantations for non-wood products, e.g. Jathropha, oil palm, sugar cane	

## Step 6.



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

In this step, annual investment and financial flows and O&M costs for the target scenario are identified. Each activity defined in Step 5 for the target scenario will need to have IF, FF and O&M costs attached to it (see the example in Table 5.10).

**Table 5.10: Target scenario: cumulative investment and financial flows and O&M, examples from the forestry sector**

**Cumulative discounted IF, FF and O&M for the target scenario** (million 2025 US\$)

Investment entity	Investment type 1: Development of sustainable forest management plan			Investment type 2: Forest law enforcement and governance related initiatives to contain illegal logging			Investment type 3: Decentralization of forest management			Investment type 4: Inventory of all useable land			Investment type 5: Development of equitable payment and distribution mechanisms		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
Households															
Corporations															
Government															
<b>Total</b>															

## 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 that are needed to implement the target scenario in the forest sector are calculated according to the general methodology in Chapter II, Step 7 of this Guideline. The changes in investments and financial flows are obtained by simply subtracting baseline scenario costs from the target scenario costs.

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. In addition, if subsidy costs are included explicitly in the assessment, the changes in subsidy costs may be calculated. The accompanying Chapter XVI on reporting (Reporting Guidelines for the Assessment of Investment and Financial Flows to Address Climate Change) contains worksheets that can be used for performing these calculations.

## Step 8.



### Identify policy implications.

The purpose of this step is to identify the policy implications to induce the required changes and increases in investment and financial flows resulting from Step 7.

The incremental investment and financial flow results from Step 7 should be used to determine which investment entities are responsible for the most significant changes in IF and FF and the predominant sources of their funds. Then, the policy measures that might be used to 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, must be evaluated. It will be particularly 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 regulations, incentives and education. New sources of funds include both domestic options, e.g., taxes, and foreign options, e.g., ODA, carbon fund(s) and carbon markets.

Forestry sector policies are needed to induce the relevant entities identified in the assessment to implement the proposed measures and incur the related investment and financial flows. Common challenges in the forestry sector are land tenure issues requiring policy reforms and ensuring the buy-in of local communities to forestry measures, as well as controlling the impacts of unregulated forest activities and curtailing the commercial interests in forests. It will therefore be important to engage relevant stakeholders in the forestry sector, including government entities (forestry, agriculture, environment, water), private sector entities, environmental and social nongovernmental organizations and communities regarding the set of regulations or incentives necessary to influence investment decisions.

When identifying policy options, it is important to keep in mind that forest-based mitigation options have potential social, economic and environmental co-benefits, such as reducing vulnerability due to climate change and variability, increasing land protective functions (including protecting soil and water) and potentially increasing biodiversity values. Thus, the entire benefit package will go beyond the identified costs of mitigation in the forest sector. These co-benefits should also be articulated qualitatively when determining policy options.



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

---

[www.undp.org](http://www.undp.org)  
[@UNDP](https://twitter.com/UNDP)  
[climatepromise.undp.org](http://climatepromise.undp.org)  
[@UNDPplanet](https://twitter.com/UNDPplanet)