

V Assessment of Investment & Financial Flows for Mitigation in the Forest Sector



5.1 Introduction

In terms of the national GHG inventories forestry mitigation options belong to the AFOLU sector, namely Agriculture, Forestry and Other Land Uses. Previously, forestry options were included in the LULUCF sector (Land Use, Land Use Change and Forestry). In this chapter all possible forest-based mitigation options are considered. They include those options that are already integrated in the current mitigation regime (LULUCF in the Kyoto Protocol) and those that are under discussion in the ongoing negotiation process for a post 2012 climate change mitigation regime.

According to the Intergovernmental Panel on Climate Change (IPCC), a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks in the long term, while producing an annual sustained yield of timber, fibre or energy from the forest, will generate the largest sustained mitigation benefit.⁵⁸

Carbon is sequestered in five carbon pools including (i) above ground biomass, (ii) below ground biomass, (iii) deadwood, (iv) litter and (v) soil organic matter and they can be increased by a variety of management interventions. The existing stored carbon in the forest can also be enhanced by targeting at higher carbon density in these five pools and especially in the above ground biomass. Forest products are carbon neutral and can substitute steel, aluminum, plastics and other materials thereby contributing to reduced emissions. Forest based bioenergy (fuelwood, charcoal and other forms) can substitute fossil fuels to a certain extent with similar effects to climate change mitigation.

Thus, there are three main *management options* for climate change mitigation that can be potentially considered in an investment and financial flow analysis:

- 1) reducing emissions from deforestation and forest degradation (REDD) by protection of existing high-density carbon forests and their sustainable management increasing their carbon density by restoration, rehabilitation and other silvicultural measures;
- 2) increasing sinks by protection of existing forests and their sustainable management (including increasing their carbon density by restoration, rehabilitation and other

⁵⁸ Intergovernmental Panel on Climate Change (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.

- silvicultural measures) and by creation of new forests through afforestation and reforestation; and
- 3) increasing bio-fuel⁵⁹ and wood fiber production to substitute other materials by harvested wood products.

Table 5-1 summarizes the mitigation options in forestry.

Table 5-1: Mitigation options in forestry

Mitigation options (general)	Mitigation options in the UNFCCC or Kyoto Protocol (LULUCF)
Reduction of GHG emissions (REDD)	Reducing emissions from deforestation and forest degradation in developing countries (REDD) through committing forests as carbon pools (protection and sustainable management of existing forests)
Carbon sequestration (A/R)	Reducing degradation through the management of existing forests for enhancing existing carbon pools (restoring lost carbon pools)
	Afforestation* (A) ⁶⁰ on non forest land (Creating new carbon pools)
	Reforestation* (R) on non forest land (Creating new carbon pools)
Carbon substitution	Biofuel plantation for fossil fuel substitution
	Substitution through increased use of harvested wood products for energy, timber and long-term use of wood-based products

* Afforestation and Reforestation are meant as defined by the UNFCCC Marrakesh Accords

Source: Elaboration by the authors.

At present, the Kyoto Protocol allows only afforestation and reforestation (A/R) activities to be applied under the Clean Development Mechanism (CDM). The role of reducing emissions from deforestation and forest degradation, enhancement of forests through, forest conservation and sustainable forest management (including forest restoration) in a post 2012 mitigation regime is recognized under the Bali Action Plan (BAP) agreed in the UNFCCC COP13. As these activities may become recognized mitigation options in the international climate change regime in a near future, considerations for the calculation of their I&FF are covered in this guidebook.

5.2 Application of the I&FF Methodology to Forestry Sector Mitigation

This section describes how the I&FF methodology described in Chapter II would be applied to mitigation in the forestry sector. Some of the information provided in Chapter II that is relevant

⁵⁹ The creation (forest-based) biofuel plantation is potentially an important mitigation option, but due to the trade aspect and lack of international rules for accounting it is momentarily questionable to develop substitution of other forest products further than recognizing it here in the beginning.

⁶⁰ A/R defined according to the Marrakech accords.

to all sectors is not repeated here, so the reader should read Chapter II before reading this chapter.

Step #1: Establish Key Parameters of 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 specialists. The team needs a good level of understanding of the possibilities and requirements of the forest sector (e.g., a profound knowledge about the national forest programme) and the associated impacts concerning strategic options in the country for climate change mitigation as defined in the current UNFCCC deliberations and the Kyoto Protocol.

Estimating investments and financial needs for implementing forest-based mitigation options are difficult to undertake. Two main components need to be considered⁶¹:

- investment and financial flow needs to conserve existing carbon pools, to manage existing forests for enhanced carbon density, and to create new forests; and
- investment and financing needs for necessary complementary investment in capacity building, research, technology transfer, information systems, development of financing mechanisms and other related costs.

The present chapter of the guidelines will concentrate on the estimation of investment needs and financial flows on forest mitigation options. This includes to conserve, restore and enhance existing carbon pools in forests and to create new carbon pools through planting trees. General guidelines for estimating the third component in forest mitigation (substitution) are difficult to provide due to the wide variety of country situations in terms of their policy and institutional framework and socio-economic conditions.

>>> Define detailed scope of the sector

In this step, the scope of mitigation options in forestry needs to be determined and defined. This primarily entails determining the specific subsectors that will be included (e.g., natural forest management, forest plantation development, agro-forestry development in non-forested areas). It is also important here to determine which social groups, processes, activities, entities, and geographic regions are included in the sector.

Land-use planning documents, forest development plans, national forest programme or similar policy and planning documents can be used for defining the scope of the sector for climate change mitigation. Other information sources, include, e.g., the IPCC GHG Inventory sectoral

⁶¹ Another component that is not considered in this listing refers to the opportunity costs of preventing deforestation and forest degradation, thus the indirect costs to protect and conserve forests and their existing carbon stocks. This is an important dimension to consider in an overall REDD approach that uses a payment scheme for “not to deforest” or to “not to degrade”.

structure can be a useful reference for analyses of mitigation I&FF. However, rather than necessarily relying on existing sectoral structures that often have been prepared before recognizing the role of forests in climate change mitigation and adaptation, it is important that the sectoral scope be appropriate to the specific national circumstances, especially regarding data availability, the capacities and structure of the national entities responsible for forest policy and management and other assessment taken outside the forestry sector (e.g., National Communications, Technology Needs Assessments (TNAs), National Adaptation Programmes of Action (NAPAs)).

In the proposed scope it is important to well characterize the local conditions, such as, *inter alia*, forest land tenure and access rights; existing forest ecosystems and their conditions⁶²; 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 the national sustainable development priorities.

Table 5-2 illustrates different forest-based mitigation options and potentials as related to two parameters, the relative importance of forest cover and the rate of deforestation. The table can help to reflect about the strategic opportunities in different situations with regard to the extent of forest resources and socio-economic pressures exercised on them. However, the table is only illustrative and a detailed assessment is required in each case.⁶³

⁶² Forest condition: human-induced development stage of a forest e.g., primary forest (no human intervention); degraded (forests in different stages of environmental degradation); secondary (forest regrowing after complete deforestation).

⁶³ All these options are considered in the ongoing negotiations within the BAP. 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*. United Nations Development Programme. Bureau for Development Policy. Environment and Energy Group. New York.

Table 5-2: Initial qualitative assessment of forest mitigation potentials by country groups*

Forest dynamics	Low-forest cover countries (< 25% of forest cover)	High-forest cover countries (>50% of forest cover)
Countries with high deforestation rate in the past 5-10 years, ha^{-1} (2% and more)	REDD: medium to high potential (depending on the definition of degradation) A/R: medium to high potential Restoration: medium to high potential Forest-based bioenergy: medium	REDD: high potential A/R: low to medium potential Restoration: high potential Forest-based bioenergy: medium to high potential (availability of wood)
Countries with low deforestation rate in the past 5-10 years ha^{-1} (less than 1%)	REDD: low to medium potential (low if conversion concerns high opportunity costs for REDD) A/R: medium potential Restoration: high potential Forest-based bioenergy: medium potential.	REDD: medium to high potential (depending of the future DD scenarios) A/R: low potential Restoration: low to medium potential Forest-based bioenergy: high potential
Countries with zero deforestation rate and with net increasing forest area in the past 5 to 10 years in ha^{-1}	REDD: no potential A/R: medium to high potential (high potential if land is available) Restoration: medium potential Forest-based bioenergy: high potential (if technology standard is high)	REDD: low to medium potential** A/R: low potential (particularly if natural forest management is practiced) Restoration: low potential Forest-based bioenergy: high potential (if technology standard is high)

* Based on an approach proposed by Simula for qualitative assessment of investment potentials, modified (2008)

**high potential if keeping existing carbon pools are considered as a REDD option

Source: Elaboration by the authors.

National teams need first to define which forest mitigation options will be included in the analysis of the investment and financial flows (I&FF) needs.

- 1) Reducing emissions from deforestation and forest degradation (REDD)
- 2) Addressing forest degradation by enhancements of carbon density of degraded and other existing forests through SFM/forest restoration (FR)
- 3) Afforestation and reforestation (A/R) as defined in the CDM framework, which includes agroforestry and silvo-pastoral systems
- 4) Substitution through wood and non-wood products (an CDM Energy option, e.g., replacing fossil fuels by forest-based biofuels).

These four mitigation options relate to land-based options than can be applied on forested land (REDD, SFM/forest restoration) and non-forested land (A/R, (forest-based)-biofuel plantations)⁶⁴.

⁶⁴ There are more options that a country might want to consider as mitigation options, i.p. substitution through harvested wood products. However, at present, this option is yet methodologically not fully understood and therefore left out of the present analysis.

The assessment team also needs to define the geographic scope in which forest mitigation options can take place. This can be made based on three criteria:

- 1) mitigation option;
- 2) current land cover; and
- 3) current land use (including legally forest land that is not forested).

Table 5-3 will help the country teams to clarify relevance of each forest mitigation option in a country by combining these three criteria. By using the table countries will have a first approximation area available for each forest mitigation option and can give their estimated importance. At this stage the assessment is mainly qualitative and is aimed at defining the scope of the I&FF assessment.

Table 5-3: Land availability as per forest mitigation option

Forest mitigation options	Type of land (defined by forest cover)	Current land use (Indicate reference year)	Area in the country (in ha) Based on expert judgment (time period)	Estimated importance Highly relevant (5) Relevant (3) Not relevant (0) (indicate time period considered)
Reducing emissions from deforestation and forest degradation (REDD)	Closed and open forest, woodland, savannah	Forest (threatened by deforestation and/or under degradation)		
Reducing degradation combined through forest enhancement (SFM), (FR)	Forest (degraded) degraded forest land	Used/Unmanaged forest		
Afforestation/reforestation (A/R)	Non-forest (since 1990 for reforestation or since 50 years for afforestation)	Grassland, unproductive pasture		
		Marginal cropland		
		Waste / abandoned land		
Substitution (of fossil fuel by forest-based biofuel)	Forest or non-forest (for bioenergy production)	Forest, grassland, cropland, waste / abandoned land		

Source: Elaboration by the authors.

It is encouraged to develop additional assumptions to be included in the analysis, such as an assessment of the needs for new enabling conditions that are required to implement successful forest-based mitigation options (e.g., institutional issues, forest law compliance and enforcement), operational constraints that need to be overcome (capacity gaps, knowledge

gaps, improvement of the local governance); nevertheless, they remain at the discretion of the national assessment teams.

>>> Specify assessment period and base year

The assessment period and base year need to be selected for the I&FF analysis. Selection criteria should include the forest sector scope (e.g., forest conservation, natural forest management/forest restoration, A/R), national and sectoral planning horizons (e.g., as stipulated in forest development plans) and data availability. In general terms, in forestry, an assessment period of 2005 (the base year) through 2030 is possible and appropriate. 2005 as the base year is also suitable as 2005 is a default year of the 5 years global forest resource assessment of FAO.

>>> Identify preliminary mitigation measures

Based on Table 5-4, the Expert Team should identify the preliminary set of **forest/land management options** that, according to their expert judgement, are the most relevant for the respective country and estimate I&F and O&M costs. This preliminary list of measures is needed to assess which analytical approaches can incorporate the measures. The team should consider, as far as possible, the experience (success, failure, costs) of existing programs and projects that already include such forest/land management options. For each classified forest/land management option, the team should estimate the total area concerned, an average initial investment cost per ha, and the average subsequent costs, called here financial flows (per ha) to deliver mitigation benefits for at least ten years.

Table 5-4: Mitigation options in forestry by forest management option

Mitigation options (general)	Mitigation options in the UNFCCC or its KP (LULUCF)	Possible classification of Forest/Land Management Options	Area (ha)	Average Investment Costs* (per ha)	Financial flows (per ha) X years
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 DD threat			
		Committed forests for REDD, including protected areas			
Carbon sequestration	Addressing deforestation through forest enhancement	SFM/Restoration: ecological restoration, enrichment planting, guided natural regeneration, etc			
	Reforestation (R) Afforestation (A)	Planted forest on deforested forest land 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>Pongomia</i> sp.)			

*Prepare annex with calculation basis and deviation of figures

Source: Elaboration by the authors.

>>> Select analytical approach

There are several analytical options available for the assessment of I&FF in the forestry sector, including using a sectoral model or plan to assess current situation (assuming no change) or projections. Approaches range from simple spreadsheet models that can be applied by members of the project team to sophisticated dynamic forest management models that are designed to provide a detailed tracking of annual investment costs across multiple scenarios (e.g., COMAP/GCOMAP; GORCAM). An overview of the range of models that are available is included in Table 5-5. More details are presented in Part III of this Guidebook.

A useful starting point for the analysis could be a sectoral plan (e.g., a national forest programme, a forest master plan) which typically includes description of the current situation applying relevant indicators (assuming no change) and projections of trends in forest area by type, production and consumption of forest products etc. In this regard two sources are

especially relevant for selecting the analytical approach for the forestry sector in developing countries; the information provided in climate change reports at the national level (e.g., National Strategy Studies⁶⁵ or the National Communications) or national plans in the forest sector, e.g., the National Forest Programmes⁶⁶ and particularly forest investment plans that are often associated to them; the national action plans for the Forest and Law Enforcement and Governance Programme (FLEG)⁶⁷ that look into a specific subset of I&FF. More recently, the so-called REDD Readiness plans prepared within the framework of the Forest Carbon Partnership Facility (FCPF)⁶⁸ of the World Bank might also give some indications on analytical approaches to assess I&FF.

Note: In a lot of developing countries forestry data are disparate from one service to another and present big differences. In this case it would be interesting to refer to the FAO data base.

⁶⁵ For more information:

<http://web.worldbank.org/wbsite/external/topics/environment/extcc/0,,contentmdk:20484441~menupk:1172646~pagepk:148956~pipk:216618~thesitepk:407864,00.html>

⁶⁶ For more information: <http://www.fao.org/forestry/nfp/en/>

⁶⁷ For more information:

<http://web.worldbank.org/wbsite/external/topics/environment/0,,contentmdk:20128186~pagepk:1497618~pipk:217854~thesitepk:244381,00.html>

⁶⁸ Webpage Worldbank for FCPF: www.wbcarbonfinance.org/router.cfm?page=fcpf&fid=34267&itemid=34267

Table 5-5: Forestry sector analytical tools and methods

Name	Developer	Platform	Methodology	Web Site/Contact	Description
COMAP, GCOMAP	Lawrence Berkeley National Laboratory	Windows*	Tool/Model	http://ies.lbl.gov/gcomap	Three models evaluate forest sector options, as well as carbon sequestration. Recommended by IPCC. COMAP is a spreadsheet tool and GCOMAP is a partial equilibrium global model.
GORCAM (Graz / Oak Ridge Carbon Accounting Model)	Joanneum Institute, Oak Ridge National Lab.	Windows*	Tool	www.joanneum.at/gorcam.htm	A spreadsheet model considering: <ul style="list-style-type: none"> • changes of carbon (C) stored in C pools, • reduction of C emissions because biofuels replace fossil fuels, • C storage in wood products, • reduction of C emissions because wood products replace energy-intensive materials • recycling or burning of waste-wood, • auxiliary fossil fuels used for production of biofuels.
FAO Forest Plantation profitability model	FAO	Windows*	Model	http://www.fao.org/forestry/11867/en	Long rotation forest plantation model that generates account price sized curves and yield models. Data can be adapted for any country.
FAO Harvesting Cost Model	FAO	Windows*	Model	N/A	Model that calculates production cost for harvesting in natural forest. Data can be easily input for any country.
ITFMP Forest concession and forest industry models	FAO	Windows	Model	http://www.fao.org/forestry/11869/en/	Models analyze forest concessions as well as cash flows for incomes and expenditures. Data can be easily input for any country.

Source: Elaboration by the authors.

>>> Assess externalities

In addition to climate benefits, forest mitigation options usually provide considerable environmental co-benefits, such as water and soil protection, food production, biodiversity conservation, etc. Socio-economic co-benefits have been mentioned in the literature and reported by project experiences. Similarly there is a potential for negative environmental and other socio-economical impacts. Quantifying these externalities goes beyond the scope of this guidance. Participatory approaches during the planning and implementing phases are recommended to maximize co-benefits and reduce potential conflicts.

Forest mitigation measures, well planned and implemented, will have an impact on reducing the vulnerability of ecosystems and people to climate change and thus have the potential to positively contribute to the climate change adaptation agenda of a country. More advice is provided in the chapter on forest in adaptation.

Sustainable forest management is an obvious and highly cost efficient measure to contribute to both, mitigation and adaptation. National teams reviewing the forest sector with a focus on mitigation should flag possible linkages to vulnerability and adaptation and, as far as possible, assess the efficiency of using such linkage. Most of the forest mitigation measures have a direct or indirect effect on forest-based adaptation options. Thus, the sectoral analysis should consider this linkage and integrate them, as far as possible in the I&FF analysis.

Step #2: Compile Historical IF, and FF, and O&M Cost Data, Subsidy Cost Data (if included explicitly), and Other Input Data for Scenarios

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

Historical I&FF data are needed to provide a historical basis from which to develop possible future scenarios. The historical data will give assessment teams an understanding of past investment patterns and a context for public and private plans for the sector, which can be used when developing the scenarios and estimating the associated cost estimates. In the methodology chapter the requirements for compiling annual historical IF and FF data have been clarified. Thus this section focuses on how and where to obtain the data required for fulfilling a proposed template for one year of historical I&FF Data as outlined in Table 2-4. The project team shall decide to use either historical trend or future scenarios or both according to the circumstances in your country. Historical trend refers to the extrapolation of the past trend to the future, while the development of future scenarios implies the modelling of different variables according to changes expected in the future. When using historical trends the project team will only have one future scenario, while through modelling different scenarios can be developed. Modelling future scenarios is especially useful if major changes in the sector performance are expected (i.e., as a result of a new legislation)

Ideally historical data should be on hand in the country. Such information is generally available through governmental agencies, e.g., ministries or departments specifically dealing with forests (e.g., Forest Departments), forest research centres, or Ministries of Territorial Planning, Agriculture, Environment, or national statistics office or special governmental agencies dealing with development related statistics. Especially relevant here is the amount of ODA (multi- and bilateral) that has been invested in the sector.

However, country information about investments and financing flows in the forestry sector is often scattered and not centrally available. In such cases data from some generic database can eventually be used such as:

- FAO's Forest Economics and Policy Division maintains a series of publicly available databanks that provide information on forest finance including investment costs in forest management and trade of forest products⁶⁹. The databases can be founded under FAOSTAT: <http://faostat.fao.org/site/291/default.aspx>. The National Forest Programme Facility includes country information on future plans in the forest sector⁷⁰.
- Information from research institutions can also be useful. CIFOR provides information on potential or real costs of different forestry options. As CIFOR has started a program on climate change and forest in 2007, former research activities were already focused on this subject, CIFOR provides good analytical data⁷¹. CATIE has built up a good knowledge basis⁷², as well as the European Forest Institute⁷³.
- The World Bank offers information on forest and forest based investments for each country⁷⁴ and information on carbon compensation⁷⁵.

However, wherever available preference should be given to nationally accepted data.

⁶⁹ <http://www.fao.org/statistics/>

⁷⁰ <http://www.fao.org/forestry/nfp/en/>

⁷¹ <http://www.cifor.cgiar.org/>

⁷² http://www.catie.ac.cr/magazin_eng.asp?codidioma=eng

⁷³ <http://www.efi.int/portal/newsevents/pressreleases/?id=41>

⁷⁴ <http://web.worldbank.org/wbsite/external/countries/0,,pagepk:180619~thesitepk:136917,00.html>

⁷⁵ <http://web.worldbank.org/wbsite/external/topics/environment/extcarbonfinance/0,,menupk:4125909~pagepk:64168427~pi pk:64168435~thesitepk:4125853,00.html>

Table 5-6: An approach to develop the baseline scenario from historical data

Forest Mitigation Options	Baseline scenario	
	Historical trend	Future scenario
REDD	Continuation of the deforestation and degradation trend at the measured rate	<ol style="list-style-type: none"> 1. Constant DD rate 2. Acceleration of DD 3. Deceleration of DD
REDD + Forest Restoration	Continued degradation of forested areas	<ol style="list-style-type: none"> 1. Constant degradation 2. Acceleration of degradation 3. Deceleration of degradation/ restoration
Afforestation/ reforestation	Continuation of grazing land at the measured productivity rate	<ol style="list-style-type: none"> 1. Grassland with increased/decreased productivity rate 2. Change to cropland or wasteland 3. Change to other land use (e.g., settlements) 4. Change to other land use (e.g., settlements)
	Continuation of cropland at the measured productivity rate	<ol style="list-style-type: none"> 1. Grazing land with increased/decreased productivity rate 2. Change to grazing land or wasteland 3. Change to other land use (e.g., settlements)
Substitution through harvested wood products (S-HWP)	Maintaining current use at the same productivity	<ol style="list-style-type: none"> 1. Land use change 2. Change in productivity rate
Substitution through non-wood products (S-NWP) (bioenergy)	Maintaining current use at the same productivity	<ol style="list-style-type: none"> 1. Land use change 2. Change in productivity rate

Source: Elaboration by the authors.

Table 5-7: Compilation of historical data as a basis to develop the Baseline scenario in the forestry sector, with examples for the measures

Category of Investment Entity	Cumulative Discounted IF, FF, & O&M Estimates For Mitigation/Adaptation Scenario (million 2005US\$)																							
	Investm. Type 1: Tenure			Investm. Type 2: Management system			Investm. Type 3: Law compliance & Monitoring			Investm. Type 4: Labour costs			Investm. Type 5: Training			Investm. Type 6: Infrastructure			Investm. Type 7: Machinery & equipment			Investm. Type 8: Miscellaneous		
	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	IF	FF	O&M Costs	IF	FF	O&M Costs	IF	FF	O&M Costs
Households																								
Corporations																								
Government																								
Total																								

Explanatory comments to Table 5-7

- Establishment/clarification of tenure is an investment cost. The activity usually takes more than a year depending on the size of the area and possible conflicts/overlapping rights related to it. The costs to be covered include both the administrative process and demarcation of the designated area.
- Management Systems refers to the particular sustainable forest management approach applied. Investments can be needed for restoring degraded national forests or launching afforestation programmes.
- Forest law compliance and Monitoring: the investment component is needed to design the system, to procure necessary equipment, and to arrange initial training, which the government carries out itself. Cost for law compliance and annual monitoring costs for mitigation measures would be recurrent expenditure (annual financial flow). If the government decides to outsource monitoring, there will be no investment cost, and all the costs would be recurrent.
- Labor costs: The costs of work input can be partly investment and partly recurrent. For example, the initial year plantation cost includes an element of labor input which is classified as investment cost. Annual labour costs in forest activities are related to e.g., forest guards, annual silvicultural operations, etc and will be financial costs/flows.
- Training includes both investment and recurrent elements. Investment is related to basic training in the initial phase. Continuous refresher training can be considered recurrent costs if not specifically related to the project.
- Infrastructure. Construction is an investment cost and maintenance is a recurrent cost.

- Machinery and equipment: These costs are by definition investment costs. However, usually the services of construction of roads or buildings are procured from a contractor and therefore cost data is not necessarily broken down into components (labor, machinery and equipment, etc.). Depending on the scope of the contract, it can be either investment or recurrent cost.
- Miscellaneous. These costs are mostly recurrent costs.

The columns in Table 5-7 are illustrative and may be adjusted depending on the type of operation and national standards.

>>> Compile historical O&M data, disaggregated by investment entity and source

Historical O&M data are also needed to provide a historical basis from which to estimate future O&M costs for new physical assets, as well as to provide data for the first year of the scenarios. Annual O&M costs for assets purchased during the historical period, and for assets purchased prior to the historical period but that are still in operation, should be collected. The number of years for which historical O&M cost data are compiled should be the same as is done for historical I&FF data.

Similar as in the step above, we recommend establishing O&M per forest mitigation option per year per category and after that disaggregate this information by investment entity and source.

>>> Compile historical annual subsidy cost data, if subsidies are included in the assessment

The explicit inclusion of subsidy costs in the I&FF assessment is optional because discriminating subsidy costs from other costs may not always be possible. However, if a country chooses to include subsidies explicitly, they should include them for both categories, investment and financial flows, in the historical data set. Historical subsidy data will be helpful when estimating future subsidy costs, and will be needed for the first year of the scenarios. Table 2-5 in the methodological section illustrates the disaggregation of three years of historical subsidy cost data for IF, FF.

>>> Compile other input data for scenarios

In addition to historical I&FF cost data, the characterization of the scenarios and estimation of annual costs for the scenarios will require the collection of other historical and present/current data relevant to the sector. What data are needed will depend on the analytical approach chosen and the sectoral scope.

For example, if a model is to be used, basic socioeconomic and technological data may be needed for model inputs (e.g., population pressure on forest resources, economic growth projections, demand forecasts for forest products, in particular timber and services, development of harvesting patterns, e.g., the future use of lesser-known species, etc). **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 appropriate forest mitigation scenarios will also require information about past, current, and expected future GHG emissions, impacts and vulnerabilities on trees and forest ecosystems.

Step #3: Define Baseline Scenario

This step entails characterizing the forestry sector over the assessment period (e.g., 2005 – 2030), assuming business-as-usual conditions, i.e., it is a description of what is likely to occur in the sector in the absence of *new* policies to address climate change, and given current sectoral plans. The baseline scenario should describe expected changes in forest land use, socioeconomic trends, technological change, public and private investment trends that affect forest and forest land use, relevant national plans, and expected investments (i.e., physical assets and programs) in the forest sector, including the nature, scale, and timing of those investments. The baseline scenario should be consistent with trends reflected in the historical data collected in the previous step, unless sectoral or broader national plans dictate otherwise.

Mitigation options in the forestry sector include activities that will take place either on forested or on non-forested land. Activities related to REDD, forest restoration or forest (silvicultural) management take place on forested land, while reforestation and afforestation activities takes place on non-forested land (e.g., permanently unstocked forest land, agricultural land, grazing land, wasteland, etc.). Countries can use either UNFCCC⁷⁶ definition or national definition for the land use type, particularly to make the distinction between forest and non-forested land.

There are two types of trends that are needed to consider when assessing the “business-as-usual” trends in the forestry sector for the assessment period. Either the historical trend in natural forest development and plantation development will be maintained or a different future scenario will occur. This “future scenario” represents a set of assumptions about likely changes in land-use and land-cover⁷⁷. A typical situation that changes the historical trend is when new development programs in other sectors affect the land use. For example the construction of a new road can have a decisive impact on the rate of deforestation and forest degradation when passing close or through natural (managed or unmanaged) forest. Thus, the project team needs to look beyond the forest sector and integrate new planning elements or trends in respect to the development in other sectors, such as transport, infrastructure, energy, agriculture and water in order to determine the baseline of the type of “future scenario”.

If the “future scenario needs” are required to be considered for some of the forest mitigation options (i.e. continuation of historical trend is not assumed), it is recommended to use the same approach and categories presented in step 5 for the mitigation scenario. For assessing the costs in the baseline scenario (historical trends and/or future scenario) it is recommended

⁷⁶ The forest definition used in the Kyoto Protocol is based on the FAO definition. It states the following: forest is a minimum area of land of 0.05.1.0 hectare with tree crown cover (or equivalent stocking level) of more than 10-30 % with trees with the potential to reach a minimum height of 2-5 meters at maturity in situ. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 % or tree height of 2-5 meters are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest.

⁷⁷ Sathaye et al., 2009

to use the categories presented in step 5. Project teams will need to define baseline approach (historical trend and/or future scenario) for the mitigation options selected for the country. Table 5-8 offers guidance for this definition.

Furthermore, teams need to consider the appropriateness of doing the assessment by ecological zones. It is probable that for the same forest mitigation option activities and I&FF costs vary according to ecological zone in which activities will take place. Consequently, the project team should consider the need to develop the information in the proposed tables consistently for each ecological zone in your country.

Table 5-8: A proposed classification to be used for the baseline (business-as-usual) scenario 2005-2030

Type of land in the current situation (defined by forest cover)	Current land use	Baseline scenario	
		Historical trend	Future scenario
Forest ("virgin", "intact")	Sustainable (production forest/protected area) management	Secured protected area or sustained yield management	a) Without deforestation and degradation threat (DD) b) Acceleration of DD c) Constant?
Forest (gradually degrading)	Unsustainable forest management in production and multi-use forests	Continuation of the deforestation and degradation trend at the same rate	a) Acceleration of DD (deforestation and degradation) b) Deceleration of DD c) Constant?
Forest (that has lost most of its initial carbon stock)	Unsustainable forest management (continuously threatened by deforestation and/or under degradation)	Continuation of increase in degradation	a) Acceleration/deceleration of forest degradation b) Change to other land use (e.g., cropland)
Non-forest (since 1990 for reforestation or since 50 years for afforestation)	(Extensively used) Grazing land	Continuation of grazing land at the same productivity rate	a) Grazing land with increased/decreased productivity rate b) Change to cropland or wasteland c) Change to other land use (e.g., settlements) d) Undertaking A/R activity?
	(Extensively used) Cropland	Continuation of cropland at the same productivity rate	a) Cropland land with increased/decreased productivity rate b) Change to other non-forest land use
	Waste / abandoned land	Continuation as wasteland	a) Waste land with increased/decreased productivity rate b) Commercial forestry c) Change to other non-forest land use
Forest or non-forest	Forest plantations, grazing land, cropland, waste / abandoned land	Maintaining current use at the same productivity	a) Land use change b) Change in productivity rate

Step #4: Estimate Annual IF, FF, and O&M Costs, and Subsidy Costs if included explicitly, for Baseline Scenario

>>> *Estimate 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 estimated. Costs should be in real terms (i.e., inflation adjusted), ideally in constant 2005 US\$, should be reported in the year in which they are expected to be incurred, and should be discounted using both appropriate public and private discount rates. The annual IF and FF estimates 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/or financial flows for each investment type for the entire assessment period, by investment entity and funding source. These data should be organized as outlined in chapter 2, Table 2-3, i.e., there would be a set of data for each year compiled in the format of Table 2-3.

The source of these data, or method of estimation, will depend on the analytical approach, the scope, and the types of investment entities that are relevant. The I&FF estimates may be the output from a sectoral model, and/or might be obtained from a planning document or from several documents, and/or might be derived from the historical data. If a model is not used, information may be available from the investment entities, and/or forest administration or statistical agencies, and/or forest and economic research institutions.

For each chosen forest mitigation option, the analysis should identify the additional investment by source, e.g., along the following lines:

- *Domestic public 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;
- *International public funding* through bilateral ODA (grants by Official Development Assistance), multilateral ODA (including grants, investment lending, investment guarantees); multilateral targeted programs such as the Forest Carbon Partnership Facility (FCPF), UN-REDD, Global Environment Facility (GEF), CDM and voluntary carbon market, etc; and
- *Private investment funding* (which include foreign direct investment by forest industries, FDI; investments by financial institutions and institutional investors, philanthropic funding and targeted funding through international conservation funds), etc. from 2005 up through 2030.

A country could choose to go into further details in respect to funding sources, but at a minimum, the three categories proposed above should be used.

>>> Estimate annual O&M cost for each IF, disaggregated by investment entity and funding source

Annual estimates of O&M costs for the baseline scenario are also 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 Table 2-4), and also be divided into O&M for assets purchased during the assessment period, and for assets purchased prior to the assessment period.

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 I&FF data, O&M estimates may be from the output from a sectoral model, and/or might be obtained from a planning document or from several documents, and/or might be derived from the historical data. If a model is not used, information may be available from the investment entities, and/or relevant government ministries or statistical agencies, and/or research institutions.

>>> Estimate annual subsidy costs for each investment type and for IF, FF, and O&M costs, if subsidies are included explicitly in the assessment

If a country chooses to include subsidies explicitly in their assessment, annual subsidy costs for the baseline scenario need to be estimated. Subsidies should be estimated for each relevant investment type, and for all categories of cost (IF, FF), as in Table 2-5. Costs should be in real terms (i.e., inflation adjusted), ideally in constant 2005 US\$, 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 estimates may be from the output from a sectoral model, and/or might be obtained from a planning document or from several documents, and/or might be derived from the historical data. If a model is not used, information may be available from the investment entities, and/or relevant government ministries or statistical agencies, and/or research institutions.

Step #5: Define Forest Mitigation Scenario

This step entails developing a description of what is likely to occur in the forest sector, over the assessment period, in the presence of new policies to address climate change. The forest mitigation 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.

According to the forest mitigation options selected in your country a number of issues need to be addressed when quantifying a mitigation scenario Table 5-9 illustrates a number of those specific issues that need particular attention in quantifying I&FF for forest mitigation options.

Table 5-9: Activity needed to introduce a forest mitigation option

Activity needed to introduce a forest mitigation option	Proposed scope of activities
Finalization of international negotiations	Preparing and analyzing national data for different negotiation options, participation in the negotiation processes of modalities and procedures, developing specific methodologies for a given forest mitigation options
Development of enabling conditions	Development of national plans and agreements and specific projects within the forest sector and with other sectors affected by the implementation of forest mitigation options (e.g., agriculture) , analysis and development of data ; Consultation process (workshops and stakeholder facilitation.);
Development and Establishment of a Monitoring and Verification System	Based on existing initiatives and relevant satellite monitoring and ground-truthing experiences being tested elsewhere.
Markets and Financing, Negotiation and testing of Payment Distribution Mechanisms	Development of equitable payment and distribution mechanisms: Further exploration and negotiation financial mechanisms (including market and non-market ones) Pilot experiences
Identification of carbon marketing opportunities	
Spatial Forest Land Use Planning	A clear, integrated and secure spatial mitigation scenario is essential to ensure permanence of the mitigation effects, prevent leakage as well as long-term investments in forest carbon
Clarifying rights, roles, liabilities and responsibilities for implementation of forest mitigation options and review forest law compliance mechanisms	Key issues for resolution include clarification of land tenure and forest management rights, governing revenue distribution and the respective roles of national and local government, civil society, the private sector and independent entities in carbon trading, regulation and fund management

Table 5-10: Issues to consider when quantifying I&FF for forest mitigation scenarios, with examples from the activities above

Category of Investment Entity	Cumulative Discounted IF, FF, & O&M Estimates For Mitigation/Adaptation Scenario (million 2005US\$)				
	Investm. Type 1: Preparing and analyzing national data	Investm. Type 2: Development of national plans	Investm. Type 3: Development of equitable payment and	Investm. Type 4: include clarification of land tenure and	Investm. Type 5: ...

							distribution mechanisms			forest management rights					
	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															
Total															

In the first stage of this step, the preliminary set of the forest mitigation measures that were identified in step 1 should be re-evaluated, given the analytical approach chosen in step #1, the data compiled in step 2, and the baseline analysis completed in step #3, and revised if needed. Countries should also undertake an initial prioritization of the mitigation measures, based on national development priorities, local conditions, sectoral development priorities, and national or regional climate change concerns. This initial prioritization will be re-evaluated, and priorities will be evaluated across sectors, in the final step of the sectoral assessment of I&FF (step 8).

If a model is being used in the analysis, it can be used to develop and define the climate change scenario. Otherwise, a sectoral plan, a projection of trends, or the current situation (assuming no change), or some combination, can be used as the basis of the projection. Prior work on climate change (e.g., National Communications, TNAs, NAPAs, GHG mitigation assessments, vulnerability assessments) should be utilized in this step.

The next step is to plan the concrete activities that the selected mitigation options imply. Table 5-11 presents guidance for doing this.

The most concrete level to do such planning is the nationally identified forest management unit (FMU⁷⁸). The clearer and complete the activities are described at FMU level, the more accurate the I&FF assessment for the sector will be. Activities to be undertaken could be specified, for example, according to the following categories (see also Table 5-5):

- **Clarification of land and carbon tenure:** Clarification of land and carbon tenure and access rights are relevant to all forest options in the mitigation scenario and can imply

⁷⁸ A Forest Management Unit (FMU) is a clearly defined forest area that is managed for a set of explicit objectives and according to a long-term forest management plan.

major costs, depending on the specific circumstances in the country or in the region where a forestry option takes place.

- **Defining the delivery system of forest mitigation options:** It includes inter alia, species selection and silviculture, forest management system, characterization of the expected products (timber, firewood, NWFP, agricultural crops, livestock production, etc) length of the rotation, management activities over time (tilling, fertilizing, etc)
- **Forest law compliance, enforcement and monitoring C stock changes:** In a mitigation scenario, increased efforts at the level of forest law compliance and law enforcement are needed in order to guarantee permanence of the measures undertaken. Forest mitigation benefits also need to be monitored over time. Costs of monitoring C can have a major impact on both I&FF (equipment, satellite imagery, labour, etc). It is recommended to treat assessing and monitoring of carbon stocks separately as a category, particularly in respect to REDD.
- **Labour:** depending on the forestry option selected for the mitigation scenario, labour can be one of the major cost items (e.g., in planting forests and managing planted forests over time). Besides it would have an important socio-economic benefit that countries would probably like to account for. Thus it is recommended to consider labour when establishing the activities in a forest management plan.
- **Training:** As the proposed forest mitigation options are either new, or different in type, scale and intensity in a given country or region, there will need to train people in managing the (new) forest or conserving the (existing) forest as well as in obtaining new products and eventually participating in new markets (e.g., if you plan to have ecotourism as a REDD option). Monitoring and verification in the required scale are also new activities that need trained manpower. Considerable investment thus has to be brought at the level of capacity building.
- **Infrastructure:** It is possible that you will need to build new roads and/or buildings (e.g., construction of watchtowers for effective protection of the area, developing ecotourism, producing bio-energy, etc. as a REDD activity). As the development of such infrastructure can have major impacts on the assessment of the I&FF and O&M it is recommended to consider this category separately.
- **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 can be substantial.
- **Miscellaneous:** This category is meant to include other activities that will imply costs (e.g., direct related research to introduce a REDD scheme, costs of forest certification to improve readiness for REDD, etc).
- Defining the boundaries of forest based on types.

If more categories are necessary for a given country the project team should establish these beforehand and include them systematically in the assessment.

Table 5-11: Definition of the mitigation scenario

Forest mitigation options	Type of land (defined by forest cover)	Current land use	Mitigation scenario*	
			Forestry option (some examples)	Categories to be considered for activities in the forest management plan for each forest mitigation option
Reducing emissions from deforestation and forest degradation (REDD)	Forest	Conservation areas and managed production and protection forests (threatened by deforestation and/or under degradation)	<ul style="list-style-type: none"> a) Forest conservation through SFM (e.g., using the committed forest approach) b) Sustained yield management c) Reduced impact logging 	<ul style="list-style-type: none"> Clarification of land and carbon tenure Defining the system FLC and Monitoring Labour Training Infrastructure Machinery and equipment Miscellaneous
Reducing deforestation by enhancement of forests (Forest restoration) ("REDD+")	Forest land (including degraded and secondary forest)	Accessible used/unsustainably managed forest (legal or illegal)	<ul style="list-style-type: none"> a) Enrichment planting b) Guided natural regeneration c) Ecological restoration 	
Afforestation/reforestation	Non-forest (since 1990 for reforestation or since 50 years for afforestation)	Grassland	CDM A/R Plantations; including: <ul style="list-style-type: none"> a) Planted forest b) Agro-forestry c) Sylvo-pastoral systems 	
		Cropland		
		Waste / abandoned land		
Substitution through harvested wood products (S-HWP)	Forest or non-forest	Forest plantations, grazing land, cropland, abandoned land	Forest plantations for wood production	
Substitution through non-wood products (S-NWP)	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)	

* Clarification of land and carbon tenure and access rights are relevant to all forestry options in the mitigation scenario and can imply major costs, depending of the specific circumstances in the country or in the region where a forestry option takes place

Step #6: Estimate Annual IF, FF, O&M Costs, and Subsidy Costs if included

In this step, annual IF and FF for the proposed forest mitigation scenario are estimated. The methodological steps are outlined in chapter 2, step 6. The more holistic inclusion of forest mitigation options (and the production of REDD credits in particular) will require a change in the way forest land or a forest industry sector is managed compared to business-as-usual (baseline) practice. Recommendations for strategic forest management strategies that would reduce emissions below business-as-usual levels and increase carbon sequestration beyond business-as-usual level have been developed in Step 5. These recommendations form the basis for a potential investment program that would also achieve many of the objectives of a long-term wider forest sector development programme. Thus, mitigation option selected will get its costs attached to it, as well as the investments and financial flows it requires.

As an illustration, Table 5-12 presents, an analysis of issues and a preliminary estimation of the scale of investment which could effectively drive an initial five year phase of a long term (20 years) integrated forest mitigation program. Investment figures that are attributed in such an analysis represent scales of magnitude and need generally be based on professional experience and consensus.

Table 5-12: Activity needed to achieve standards

Activity needed to achieve standards	Focus might include
Implementation of strategies for more effective conservation and management of Forest Protected Areas (REDD)	<ul style="list-style-type: none"> • <u>Review of national conservation plan</u> • Completion of gazettal • Investment in training and professional capacity • Development of effective management of protected areas. • Development of collaborative management arrangements and ecosystem restoration • Implementation of demonstration projects (Plantations, conservation projects, etc)
Implementation of strategies for more effective management of Production Forests	<ul style="list-style-type: none"> • <u>FLEG related initiatives to contain illegal logging (FLEG: Forest Law Enforcement and Governance Programme)</u> • Voluntary codes by private sector companies • Outcome based third-party certification • Investment in Reduced Impact Logging
Revised strategies for forest harvesting and management to supply the timber requirements of the country	
Strategies for enhancement of degraded forests by forest restoration (forest enhancement)	<ul style="list-style-type: none"> • <u>Decentralization of forest management</u> • Silviculture (natural regeneration, enrichment planting) • Ecological restoration • Investment in Reduced Impact Logging
Revised Strategies for increasing upstream watershed protection and combating soil degradation through intensive use of CDM	<ul style="list-style-type: none"> • <u>Inventory of all CDM eligible land</u> • CDM A/R on agricultural land (household, community level) • Planted forests (timber and NTFP) • Watershed/desertification greening • Improving investment conditions for specific plantation systems

Activity needed to achieve standards	Focus might include
A/R	
Enhancement of the capacity of community groups, including communities to take control of forest management.	<ul style="list-style-type: none"> The main objectives would be to improve quality of life of low income families, living in or adjacent to natural forests, to protect the rights of forest dependent indigenous peoples, reducing encroachment, forest degradation by subsistence activities and reducing forest fire.
Total for initial 5 years program	

Table 5-13: Issues to consider when quantifying I&FF for forest mitigation scenarios, with examples from activities above

Category of Investment Entity	Cumulative Discounted IF, FF, & O&M Estimates For Mitigation/Adaptation Scenario (million 2005US\$)														
	Investm. Type 1: Review of national conservation plan			Investm. Type 2: FLEG related initiatives to contain illegal logging			Investm. Type 3: Decentralization of forest management			Investm. Type 4: Inventory of all useable land			Investm. Type 5: ...		
	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															
Total															

Step #7: Calculate the Changes in IF, FF, and O&M Costs, and in Subsidy Costs needed to Implement Mitigation

The changes in IF, FF, and O&M costs that are needed to implement the mitigation measures in the forest sector are calculated according to the general methodology as outlined in Step 7 in Chapter 2 of this Guidelines. The changes in investments and financial flows are obtained by simply subtracting baseline scenario costs from climate change scenario costs. There are two primary objectives of this step: 1) to determine how *cumulative* IF, FF, and O&M costs would change; and 2) to determine how *annual* IF, FF, and O&M costs would change. Five separate sets of calculations should be completed – two for estimating changes in cumulative IF, FF, and O&M, and three for estimating changes in annual IF, FF, and O&M. In addition, 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 as models for developing country-specific worksheets for performing these calculations.

Step #8: Evaluate Policy Implications

The purpose of this step is to evaluate the policy implications of the results of changes in investments and financial flows which are due to the implementation of the mitigation measures in the forestry sector. It is recommended that at this stage, countries first re-evaluate their initial prioritization of the forest mitigation measures that was undertaken in step 5, based upon the incremental cost estimates that have been derived in step 7. It is not recommended that cost be the most important criterion for prioritizing climate change measures, but instead that incremental costs be added to the set of evaluation criteria that a country is using to evaluate and prioritize climate change measures. The forestry sector is very particular in this respect, as all forest-based mitigation options have the potential of co-benefits, including e.g., reducing vulnerability due to climate change and variability, increasing land protective functions (soil, water) and potentially increasing biodiversity values. Thus, the entire benefit package will go beyond the estimated costs of mitigation in the forest sector.

The incremental I&FF results from step 7, in conjunction with the possible re-prioritization of forest-based climate change measures, should be used to determine which investment entities are responsible for the most significant changes in I&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, need to 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) or carbon market.

Forestry sector policies are likely to be needed to induce the relevant entities identified in the assessment to implement the proposed measures and incur the related I&FF. It will be important to convene a discussion among all relevant stakeholders in the forestry sector, including e.g., government entities (forestry, agriculture, environment, water), private sector, environmental and social NGOs, and communities regarding the set of regulations or incentives necessary to influence investment decisions. When addressing the policy options, social, economic and environmental benefits should be assessed qualitatively.

When considering the entire package of forest mitigation options, a key feature that must underpin any investment of the magnitude proposed is partnership. Partnership has to happen at national level to introduce and implement the wider set of forest-based mitigation options and among multilateral and bilateral donors to ensure that the sources of funding most appropriately fit the projects which they support. Partnership and collaboration needs to be established particularly among national regulatory agencies. It will also need to engage representatives of local communities, conservation agencies, leading forest industrial and agri-business, as well as forest industrial associations.

The main risks of investment failure are political constraints to implementation of the essential forest land tenure and other policy reforms needed to engage local communities, difficulties of controlling the negative impacts of unregulated activities in the forest sector and difficulties in curtailing the influence of pressure to forests, due either by commercial interests for land conversion or pressure by the poorer segment of the countries' population for food and shelter.