6 Identifying impacts: how forest policies reduce emissions or enhance removals

To estimate the GHG impacts of a policy, it is important to understand how the policy is intended to be implemented and how it will achieve the desired GHG mitigation outcome. A causal chain is a conceptual diagram representing the sequence of changes that are expected to occur as a result of the policy. Implicitly, these changes are relative to a baseline scenario.

This chapter provides a method to develop a causal chain by considering how the policy will be implemented, who it will affect, its potential intermediate effects and how these effects cause GHG impacts. The intermediate effects are mapped in a causal chain to show how the policy leads to the intended GHG impacts. The causal chain serves as the basis for defining the GHG assessment boundary. This chapter also provides a method for defining the assessment period.

Checklist of key recommendations

- Identify all stakeholders affected by, or with influence on, the policy
- Identify the inputs and activities for implementing the policy
- Identify all intermediate effects of the policy
- Identify all potential GHG impacts of the policy
- Develop a causal chain
- Include all significant GHG impacts in the GHG assessment boundary
- Define the assessment period

6.1 Identify GHG impacts

To identify the GHG impacts of the policy, it is useful to first identify the stakeholders affected by, or with influence on, the policy, and the inputs and activities associated with implementing the policy. Inputs are resources that go into implementing the policy, while activities are administrative activities involved in implementing the policy. These inputs and activities lead to intermediate effects, which are changes in behaviour, technology, processes or practices that result from the policy. The intermediate effects then lead to the policy's GHG impacts.

A causal chain approach is used to understand how the policy, and its corresponding inputs and activities, cause intermediate effects and ultimately result in GHG impacts. A causal chain is a conceptual diagram tracing the process by which the policy leads to GHG impacts through a series of interlinked logical and sequential stages of cause-and-effect relationships. It allows users to visually understand how policies lead to changes in emissions. An example causal chain is provided in Figure 6.2.

The sections below provide a method for identifying intermediate effects (through identifying stakeholders, and inputs and activities), identifying potential GHG impacts and developing a causal chain. The causal chain provides the basis for defining the GHG assessment boundary (Section 6.2).

FIGURE **6.1**

Overview of steps in the chapter

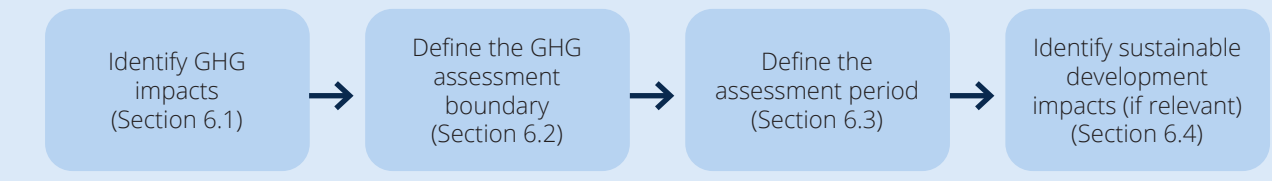
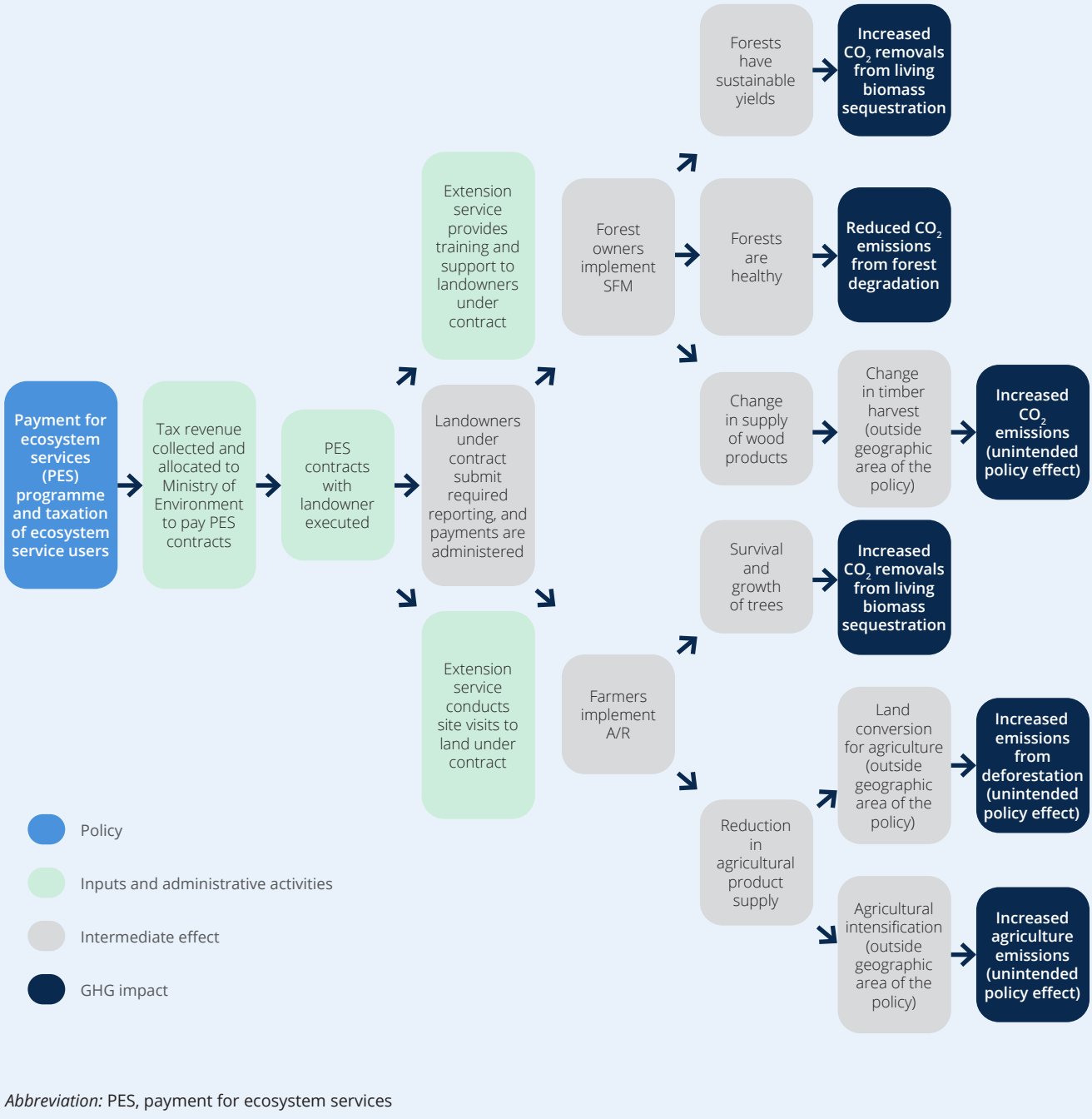


FIGURE **6.2**

Example of a causal chain



Abbreviation: PES, payment for ecosystem services

The causal chain is also used to estimate the GHG impacts of the policy ex-ante using the method in Chapter 8. Monitoring the intermediate effects can allow users to evaluate the performance of the policy and to attribute GHG impacts to policy implementation.

6.1.1 Identify intermediate effects

To identify intermediate effects, first identify the stakeholders of the policy, then the inputs and administrative activities associated with implementing the policy. Following this, identify and describe the intermediate effects of the policy. These three steps are described below.

Step 1: Identify stakeholders
It is a *key recommendation* to identify all stakeholders affected by, or with influence on, the policy. Stakeholders can be people, organizations, communities or individuals. They include different agencies and levels of government, as well as civil society and private sector organizations. Stakeholders may be affected by the policy or may influence the policy. Some typical stakeholders for the forestry sector include:

- communities, indigenous peoples or marginalized groups that are involved in, or affected by, forest resources
- producer associations
- NGOs or civil society organizations
- farmers and ranchers
- education and research institutions
- suppliers of equipment and inputs
- commercial forest companies
- other companies
- informal forest businesses
- national and subnational government agencies
- government entities responsible for forest management, and/or agriculture and livestock management
- financial institutions
- consumers.

Identifying stakeholders is necessary for estimating the likely implementation potential of the policy in Chapter 8, where barriers to implementation and economic implications of a policy from the perspective of stakeholders are evaluated.

A participatory process is helpful to identify the full range of stakeholders and understand how they may be affected by, or influence, the policy. The ICAT *Stakeholder Participation Guide* provides information on how to identify stakeholders (Chapter 5), including marginalized people or groups. Users may also identify affected stakeholders from existing stakeholder mapping exercises.

Step 2: Identify inputs and administrative activities
It is a *key recommendation* to identify the inputs and activities for implementing the policy. Table 6.1 provides definitions and examples of inputs and administrative activities.

Where feasible, when describing inputs, specify the amount of money that goes into implementing the policy and is paid out as part of the administrative activities. Identifying inputs and administrative activities is necessary for determining the economic feasibility of the policy in Chapter 8.

Step 3: Identify and describe intermediate effects
It is a *key recommendation* to identify all intermediate effects of the policy. Intermediate effects can be characterized by how stakeholders are expected to respond to the inputs or administrative activities, or to other intermediate effects of the policy. Intermediate effects can also include the measures that are enabled or incentivized by the policy. The following are examples of how stakeholders may respond to inputs, administrative activities or other effects:

- Comply with regulations.
- Access subsidies or incentives.
- Sign up or commit to programmes.
- Purchase new equipment in order to comply with a policy.
- Plant trees with payments received.

TABLE **6.1**

Summary of inputs and activities

	Definition	Examples
Inputs	Resources that go into implementing a policy	• Money allocated to training and education programmes • Money allocated to research programmes • A new programme authorized out of the national budget • Private financing secured to co-fund a government programme
Administrative activities	Administrative activities involved in implementing the policy (undertaken by the authority or entity that implements the policy)	• Payments from a government agency for tree planting • Establishment of tree nurseries by a government agency • Payment from a government agency to communities to develop grazing management plans and for fences for implementation of the plans • Grants offered to extend training in new cultivation methods • Additional staff hired to work with farmers on technology transfer • Prohibitions placed on tree cutting for a given size class • Improvement in enforcement of forestry standards • Easing of credit access by a government agency for technology adoption by farmers and ranchers

Source: Adapted from WRI (2014).

- Sign up for training and increase knowledge of technologies or practices.

- Change forest management strategies (e.g. increase rotation age or increase harvest efficiency by reducing damage to unfelled trees).

Intermediate effects can also be characterized as land based or market based:

- **Land-based effects** occur when a land use shifts from one land category to another – for example, when agriculture expands into forest land.

- **Market-based effects** occur when the policy reduces the production of a commodity, causing a change in the supply and market demand equilibrium that results in a shift of production elsewhere to make up for the supply. For example, when timber production decreases as a result of a restriction on the minimum age of trees on public lands, timber production may increase on private lands to compensate for the loss of supply.

Intermediate effects can be characterized as intended or unintended. Unintended intermediate effects occur as a result of compensating actions (i.e. rebound effects). Unintended effects can impact other sectors and members of society not targeted by the policy. In particular, forest policies can have unintended effects on the agriculture sector. Users should consider both intended and unintended intermediate effects.

When identifying intermediate effects, it may help to consider this general framing question: If effect X happens, what do we expect the reactionary effect to be? For completeness, confirm that all types of mitigation practices, and technology or land-use changes enabled or incentivized by the policy are included as activities or intermediate effects.

Consultations with stakeholder groups can help to identify a full range of intermediate effects, and to identify and address possible unintended or negative impacts early on. Refer to the ICAT *Stakeholder Participation Guide* (Chapter 8) for information on designing and conducting consultations.

Users should describe each intermediate effect according to the following characteristics:

- affected land category

- affected activities

- direction and amount of effect
- geographic location of effect
- timing of effect.

It is useful to create a table of effects to describe these characteristics. Example tables (Tables 6.2 and 6.3) for describing intermediate effects are provided at the end of this section.

Affected land category

Intermediate effects can be a change in how land is used or managed. When this occurs, describe the affected land area by its size and using the land categories found in the IPCC 2006 GL, volume 4, Chapter 2.[11] Using the IPCC land categories will help with estimating GHG emissions in Chapters 7 and 8. Use the following IPCC land categories to describe land upon which the intermediate effect occurs:

- forest land
- cropland
- grassland
- wetlands
- settlements
- other land.

When intermediate effects are a change in how land is used, describe the change in terms of a land category being converted from one type to another – for example:

- land converted to cropland; more specifically, forest land converted to cropland, and grassland converted to cropland
- land converted to grassland; more specifically, forest land converted to grassland
- land converted to forest land; more specifically, cropland converted to forest land, and grassland converted to forest land
- land converted to settlements
- land converted to other land (category).

When intermediate effects are a change in how land is managed, describe the change as a conversion from one type of management to another within a land category (the land category does not change) – for example:

- forest land remaining forest land; more specifically, reducing the impact of logging on land managed for timber.

Affected activities

Intermediate effects can also be a change in activity, practice or technology, such as a reduction in the amount of timber harvested. These effects should be described by the activity data categories that are used to prepare national GHG inventories according to IPCC guidelines. The activity data categories are used to estimate GHG emissions following the method in Chapters 7 and 8.

Direction and amount of effect

When labelling intermediate effects, identify the direction of the effect. For example, label the activity as "increase" if the policy leads to an increase in an identified activity, such as an increase in area of forest land.

Where known, include the intended amount of the effect in the description of the intermediate effect. The intended amount of the effect may have been determined as part of the policy design process. For example, if a policy aims to incentivize reforestation of 10,000 ha of cropland, the intermediate effect can be described as "increase the amount of cropland converted to forest land by 10,000 ha". The direction of the effect is to increase. With this example, note the use of IPCC land categories in the description "cropland converted to forest land".

Geographic location

Describe the geographic location where the intended intermediate effects are likely to occur. The geographic location of intended effects is likely to be within the jurisdiction of the policy. For example, for a policy that aims to reforest degraded land, if a specific geographic location is targeted by the policy, the effect can be described as "increase the amount of degraded land converted to forest land in the tropical dry forest in the north coast region of the jurisdiction by 10,000 ha".

Information on geographic location will be relevant for collecting activity data and selecting emission factors when estimating GHG emissions, and for monitoring impacts ex-post.

[11] Available at: www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html.

Unintended intermediate effects can occur outside the intended jurisdiction of the policy. Where the policy causes a shift in activity to outside the jurisdiction, the effect can be described as out-of-jurisdiction.

Timing of the effect
Effects can occur in both the short term and the long term. Describe effects as short term or long term. The distinction between short term and long term can be defined based on the policy being assessed. Some effects may also be temporary, whereas others are permanent. If known, identify when the effect is likely to occur using specific years or with reference to the start date of a policy. For example, a policy may seek to affect a certain group of stakeholders or actions during the first five years and then a different group during the last five years. This information will be used for estimating GHG emissions and monitoring implementation ex-post.

To continue with the policy example above, if a specific time frame is targeted by the policy, that characteristic can be added to the description as "increase the amount of cropland converted to forest land in the southern tropical region of the jurisdiction by 10,000 ha by 2030".

Example of describing intermediate effects
Table 6.2 provides an example of how to describe inputs and administrative activities, and Table 6.3 provides an example of how to describe intermediate effects.

6.1.2 Identify potential GHG impacts

Intermediate effects can lead to GHG impacts. For example, increasing the area of cropland that is reforested is an intermediate effect that leads to an increase in the amount of carbon sequestered by an area of land.

A/R activities can increase carbon sequestration and/or reduce carbon dioxide (CO_2) emissions by establishing, increasing or restoring above-ground biomass. SFM activities increase carbon sequestration and/or reduce CO_2 emissions on forest lands managed for wood products (e.g. timber, pulpwood, fuelwood) by increasing biomass carbon stocks through improving forest management practices. Reduced deforestation/degradation activities reduce net CO_2 emissions by avoiding the conversion of forest land to another land-use category with lower carbon stock.

It is a *key recommendation* to identify all potential GHG impacts of the policy. To ensure a complete assessment, users should consider all identified intermediate effects and associate them with specific GHG impacts.

All potential GHG impacts should be identified at this stage so that they can be used to develop the causal chain following the method in Section 6.1.3. A subset of GHG impacts will be identified and included in the GHG assessment boundary following the method in Section 6.2.

6.1.3 Develop a causal chain

It is a *key recommendation* to develop a causal chain. Users should start by drawing links from the policy to the inputs and activities. Links are also drawn from inputs and activities to affected stakeholders and intermediate effects. There may be a series of intermediate effects in the causal chain until it leads to a GHG impact. All the detailed information about affected stakeholders, inputs, activities and intermediate effects, from the steps in Sections 6.1.1 and 6.1.2, should be included in the causal chain. Figure 6.2 provides an example causal chain to illustrate the process.

A causal chain represents the sequence of intermediate effects expected to occur as a result of the policy. Implicitly, these changes are relative to a baseline scenario. For example, if an intermediate effect is that 10,000 ha of cropland will be converted to forest land, this means that 10,000 more hectares of cropland will be converted to forest land than in the scenario without the policy intervention (i.e. in the baseline scenario).

Consultations with stakeholders can help with developing and validating the causal chain by integrating stakeholder insights on cause–effect relationships between the policy, behaviour change and expected impacts. Refer to the ICAT *Stakeholder Participation Guide* (Chapter 8) for information on designing and conducting consultations.

TABLE **6.2**

Example of how to describe inputs and administrative activities

	Detail/explanation	Geographic location of effect	Timing of effect
Inputs			
Legislation is passed to allow taxation of ecosystem service users.	Legislative body enacts a tax for users of ecosystem services (water and hydroelectric utilities, tourism companies and others).	National scale	2021
Tax revenue is allocated to Ministry of Environment to pay PES contracts.	National government allocates tax revenue to Ministry of Environment, to make payments to landowners who have executed and complied with PES contract terms.	National scale	Annually, 2022–2030
Administrative activities			
Annual tax revenue from ecosystem service users is generated.	Ecosystem users pay taxes.	National scale	Annually, 2021–2030
Landowners execute PES contracts.	Landowners voluntarily sign contracts to participate in the programme.	Privately owned forest land or low-productivity cropland	Rolling enrolment, 2021–2030
Extension service provides training and support to landowners under contract.	Extension service provides SFM and A/R training, and monitoring and reporting support to landowners who are under contract.	Privately owned forest land or low-productivity cropland	Ongoing, based on landowner needs, 2021–2030
Landowners under contract submit required reporting.	Landowners submit year 1 and year 10 forest inventory reports, and annual harvest data.	Regions where payments have been dispersed	Annually, 2022–2030
Extension service conducts site visits to land under contract.	Extension service specialists conduct routine site visits to verify forest inventory and harvest reports submitted by landowners.	Regions where payments have been dispersed	Ongoing, 2022–2030
Payments are administered to landowners who comply with the terms of PES contracts.	Ministry of Environment pays contractual rates for SFM and A/R activities. Rates are based on number of hectares where sustainable harvest regimes, general tree planting, tree planting with endangered species, and/or natural regeneration occur.	Privately owned forest land or low-productivity cropland	2022–2030

Abbreviation: PES, payment for ecosystem services

TABLE **6.3**

Example of how to describe intermediate effects

Intermediate effect	Details	Affected parameter	Direction of effect	Amount of effect	Geographic location of effect	Timing of effect
Forests have sustainable yields	Management changes such as increasing the minimum age or tree diameter at cutting result in increases in merchantable volumes and higher average growth rates.	Forest land remaining forest land under SFM	Increase	150,000 ha	Contracted land	At least one harvest cycle
Forests are healthy	Management changes such as extending the re-entry period for selective harvesting and improving the selection of trees for harvesting decrease the chances of degradation from selective harvesting.	Forest land remaining forest land under SFM	Increase	150,000 ha	Contracted land	At least one harvest cycle
Change in supply of wood products	SFM leads to decreased harvest rates in the near term, reducing the supply of wood products.	Wood removals	Decrease	Unknown	Contracted land	Contract period
Change in area of timber harvest	Market forces from the decrease in supply of harvested wood products drive increased timber harvesting elsewhere.	Wood removals, and forest land converted to another land category	Increase	Unknown	Unknown, outside areas enrolled in programme	Contract period
Low-productivity cropland owners implement A/R	Low-productivity cropland owners implement A/R activities on low-productivity cropland converted to forest land.	Cropland converted to forest land	Increase	60,000 ha	Contracted land	Contract period
Survival and growth of trees	Tree planting, removing competing species and removing ongoing disturbances that prevent natural regeneration result in viable forests that accumulate carbon in forest carbon pools.	Cropland converted to forest land	Increase	60,000 ha	Contracted land	Contract period
Change in agricultural product supply	Conversion of cropland to forest land results in a near-term decrease in supply of agricultural products.	Crop and other product output	Decrease	Unknown	Contracted land	Contract period
Land conversion for agriculture	Market forces from the decrease in supply of agricultural products drive increased land conversion for agriculture elsewhere.	Land converted to cropland	Increase	Unknown	Unknown, outside areas enrolled in programme	During and after contract period
Agricultural intensification	Market forces from the decrease in supply of agricultural products drive agricultural intensification on existing cropland.	Cropland remaining cropland	Increase	Unknown	Unknown, outside areas enrolled in programme	During and after contract period

6.2 Define the GHG assessment boundary

It is a *key recommendation* to include all significant GHG impacts in the GHG assessment boundary. The GHG assessment boundary defines the range of GHG impacts that are included in the policy assessment. Not all GHG sources or carbon pools associated with GHG impacts in the causal chain will need to be included in the GHG assessment boundary. In this step, users determine which GHG sources and/or carbon pools[12] are significant and should be included in the analysis. This is done by evaluating the likelihood and relative magnitudes of each of the GHG impacts identified in Section 6.1, using the following steps:

- Step 1. Assess the likelihood that each GHG impact will occur.
- Step 2. Assess the expected magnitude of each GHG impact.
- Step 3. Determine the significance of each GHG impact.

Step 1: Assess the likelihood that each GHG impact will occur

For each GHG impact identified in Section 6.1, assess the likelihood that it will occur by classifying each impact according to the options in Table 6.4. For ex-ante assessments, this involves predicting the likelihood of each impact occurring in the future as a result of the policy. For ex-post assessments, it involves assessing the likelihood that the impact occurred in the past as a result of the policy – impacts may have occurred during the assessment period for reasons unrelated to the policy being assessed. If a given impact is unlikely to occur, the subsequent impacts that follow from that impact can also be considered unlikely to occur. Where the likelihood is unknown or cannot be estimated, the impact should be classified as "possible".

As far as possible, the likelihood classification should be based on evidence, such as published literature, prior experience, modelling results, risk management methods, consultation with stakeholders, expert judgment or other methods.

TABLE **6.4**

Assessing likelihood of GHG impacts

Likelihood	Description	Approximate likelihood (rule of thumb)
Very likely	Reason to believe the impact will happen (or did happen) as a result of the policy.	≥90%
Likely	Reason to believe the impact will probably happen (or probably happened) as a result of the policy.	66–89%
Possible	Reason to believe the impact may or may not happen (or may or may not have happened) as a result of the policy. About as likely as not. Cases where the likelihood is unknown or cannot be determined should be considered possible.	33–65%
Unlikely	Reason to believe the impact probably will not happen (or probably did not happen) as a result of the policy.	10–32%
Very unlikely	Reason to believe the impact will not happen (or did not happen) as a result of the policy.	<10%

Source: Adapted from WRI (2014).

[12] The term "carbon pools" is used here instead of "sinks" because the quantification methods for sinks are based on specific carbon pools and the GHG boundary needs to be identified at the level of the carbon pool.

Users should consult stakeholders when assessing the likelihood of impacts. Refer to the ICAT *Stakeholder Participation Guide* (Chapter 8) for more information on how to consult with stakeholders.

Step 2: Assess the magnitude of each GHG impact

Next, classify the magnitude of each GHG impact as major, moderate or minor according to Table 6.5. This involves approximating the change in GHG emissions and removals resulting from each GHG impact. GHG emissions and removals do not need to be accurately calculated in this step, but the relative magnitude should be categorized.

The relative magnitude of each GHG impact depends on the size of the GHG source or carbon pool affected and the magnitude of the change expected. The size of the GHG source or carbon pool can be estimated based on GHG inventories or other sources. The relative magnitude of each GHG impact should be estimated based on the absolute value of total change in GHG emissions and removals, taking into account both increases and decreases.

This determination requires some level of expert judgment and should be done in consultation with stakeholders. If it is not possible to classify the magnitude of an impact as major, moderate or minor (e.g. due to lack of data or capacity), users can classify a given impact as "uncertain" or "cannot be determined", as appropriate. Users can also estimate changes in activity data rather than changes in emissions to assess the magnitude of the GHG impact, where relevant.

Step 3: Determine the significance of each GHG impact

Once the likelihood and magnitude of each impact have been determined, review the classifications for likelihood and magnitude to determine whether each impact is significant. In general, users should consider impacts to be significant unless they are either minor in size or unlikely or very unlikely to occur (see Figure 6.3). Impacts that were considered to be minor in size or unlikely or very unlikely to occur at the time of an ex-ante assessment should be re-evaluated for significance during an ex-poste assessment.

Table 6.6 provides additional considerations for evaluating which GHG sources and carbon pools to include in the GHG assessment boundary.

The ICAT *Agriculture Methodology* lists considerations for which GHG sources and carbon pools to include in a GHG assessment boundary for mitigation activities that lead to enhanced CO_2 sequestration and reduced CO_2 emissions in the soil carbon pool in pasture, grazing lands and croplands.

TABLE **6.5**

Estimating relative magnitude of GHG impacts

Relative magnitude	Description	Approximate relative magnitude (Rule of thumb)
Major	The change in the GHG source or carbon pool is (or is expected to be) substantial in size (either positive or negative). The impact significantly influences the effectiveness of the policy.	>10%
Moderate	The change in the GHG source or carbon pool is (or is expected to be) moderate in size (either positive or negative). The impact somewhat influences the effectiveness of the policy.	1–10%
Minor	The change in the GHG source or carbon pool is (or is expected to be) insignificant in size (either positive or negative). The impact is inconsequential to the effectiveness of the policy.	<1%

Source: Adapted from WRI (2014).

TABLE **6.6**

Considerations for evaluating significance of GHG sources and carbon pools

Source or carbon pool	GHG	Considerations
Biomass carbon	CO_2	This source should be considered significant for all policies with interventions that target forest carbon.
Soil carbon	CO_2	Generally, soil carbon stocks will not decline significantly as a result of a forest policy. Consider including this source for forest policies that affect land-use change (reduced deforestation and A/R) because, in some cases, gains in soil carbon stocks can occur. For example, soil carbon stocks can increase significantly in reduced deforestation projects when (a) initial forest soil carbon stock is moderately large and (b) the policy helps to avoid a shift to conventional tillage agriculture. However, it is conservative to exclude this pool from the policy assessment.
Dead organic matter	CO_2	In most cases, this pool is expected to have a relatively minor effect and can be excluded. Consider including this pool if the policy interventions impact peatland or wetland ecosystems.
Harvested wood products – intended and within geographic area of the policy	CO_2	Consider including this source when forest management policies aim to promote more production of long-term HWP than a baseline of dominant short-term HWP, and when A/R results in an increased supply of long-term HWP that would not occur in the baseline. In most other forest policy scenarios, it is likely that the relative magnitude of the effect will be small.
Harvested wood products – unintended and outside geographic area of the policy	CO_2	Consider including this source if changes in forest management inside the geographic area of the policy will significantly reduce timber supply and lead to increases in timber harvesting outside the geographic area of the policy.
Biomass burning	CO_2, CH_4, N_2O	Forest policies are not likely to intentionally increase biomass burning compared with baseline. They may intentionally reduce biomass burning compared with baseline; however, it is conservative to exclude this source in that situation. If unintended land conversions are likely (see below), consider including biomass burning because it may increase as a result of the unintended land-use change.
Fuel combustion	CO_2	There may be some emissions related to site preparation and planting for A/R projects. However, these are likely to be relatively minor in magnitude and can be excluded.
Unintended land conversions to cropland or grassland	CO_2	This may be significant for forest polices that are intended to affect land-use change (i.e. reduced deforestation and A/R). If food supply is decreased as a result of the policy, unintended land-use change is possible. This may occur when the policy intervention reduces crop outputs compared with baseline. As part of its Jurisdictional and Nested REDD+ programme, the Verified Carbon Standard Program provides guidance for quantifying the effective area needed to maintain production, in the Verra *Global Commodity Leakage Module: Effective Area Approach*;[a] and guidance for evaluating the volume of foregone commodity production, in the *Global Commodity Leakage Module: Production Approach*.[b] Both these resources can be adapted to assess the significance of a forest policy on food supply or demand. If unintended land conversion is considered to be significant, it is recommended to include the estimation of converted land area within the policy land stratification of affected land categories.

Abbreviations: CH_4, methane; HWP, harvested wood products; N_2O, nitrous oxide

[a] Verra (2014a).

[b] Verra (2014b).

FIGURE **6.3**

Recommended approach for determining significance based on likelihood and magnitude

<table>
<tr><th rowspan="2">Relative magnitude</th><th colspan="3">Magnitude</th></tr>
<tr><th>Minor</th><th>Moderate</th><th>Major</th></tr>
<tr><td>Very likely</td><td rowspan="5">Insignificant</td><td colspan="2" rowspan="3">Significant</td></tr>
<tr><td>Likely</td></tr>
<tr><td>Possible</td></tr>
<tr><td>Unlikely</td><td colspan="2" rowspan="2"></td></tr>
<tr><td>Very unlikely</td></tr>
</table>

Source: Adapted from WRI (2014).

6.3 Define the assessment period

It is a *key recommendation* to define the assessment period. The assessment period is the time period over which impacts resulting from the policy are assessed. The starting date and the duration of the assessment period may vary depending on whether an ex-ante or ex-post assessment will be conducted.

Where possible, users should align the assessment period with other assessments being conducted using ICAT methodologies. For example, where users are assessing the forest policy's sustainable development impacts using the ICAT *Sustainable Development Methodology* in addition to assessing GHG impacts, the assessment period should be the same for both the sustainable development and GHG impact assessments.

6.3.1 Ex-ante assessment

For ex-ante assessment, users should consider the assessment objectives and stakeholders' needs when determining the assessment period. Where the objective is to understand the expected contribution of the policy towards achieving a country's NDC, it may be most appropriate to align the assessment period with the NDC implementation period (e.g. ending in 2030). To align with longer-term trends and planning, users should select an end date such as 2040 or 2050.

The ex-ante assessment period is usually determined by the longest-term impact included in the GHG assessment boundary. The assessment period can continue until the policy implementation period ends or for longer, as some significant GHG impacts can occur after the policy implementation period ends. The assessment period should be defined to include all significant GHG impacts included in the GHG assessment boundary, based on when they are expected to occur (as described in Section 6.1.1, step 3).

To determine the end of the assessment period, users can choose from the following approaches, among others:

- a time frame or date that is directly specified in the policy goal or target (e.g. reduce emissions by 50% by 2020)
- the length of time for which the policy is funded or expected to be funded
- a period that has otherwise been identified as the policy implementation end date
- 20-year assessment period (based on the rationale below).

When determining the assessment period, GHG emission and removal dynamics should be considered for GHG impacts that involve carbon sequestration in soils and/or biomass. For example, changes in land use or land management can change soil carbon sequestration rates until a new equilibrium is reached. The IPCC suggests a default 20-year transition period for soil carbon dynamics

to reach a new equilibrium.[13] Generally, when establishing new forests or when forests regrow after harvest and disturbance, the initial rate of carbon gain in the biomass pool is higher than later, when the forest reaches maturity. Also, forest biomass is removed or lost as a result of multiple factors. Forest harvesting, which occurs in close to 20-year cycles, results in removal of biomass from forest stands, and the end use of the harvested wood determines the amount of carbon loss over time.

Policies that impact carbon sequestration should be evaluated over a sufficiently long assessment period to capture, as far as possible, the net impact of gains and losses in carbon pools. If practicable, given the IPCC 20-year transition period for soils and an approximate 20-year harvest cycle for forests, it is recommended that users set the assessment period to a minimum of 20 years, even if this extends the assessment period beyond the policy implementation period.

Assumptions about baseline and policy scenarios become more uncertain the further forward in time the assumptions are projected. Therefore, it is also recommended that the assessment period is not extended much further than 20 years. Rather, users can define multiple discrete assessment periods that cover the length of the policy implementation period, with each assessment period not exceeding 20 years. For example, where the policy implementation period is 2020–2060, there can be two assessment periods: 2020–2040 and 2041–2060.

6.3.2 Ex-post assessment

For an ex-post assessment, the assessment period can be the period between the date the policy is implemented and the date of the assessment, or a shorter period between these two dates. The assessment period for a combined ex-ante and ex-post assessment should consist of both an ex-ante assessment period and an ex-post assessment period.

In addition, users can separately estimate and report impacts over any other time periods that are relevant. For example, if the assessment period is 2020–2040, a user can separately estimate and report impacts over the periods 2020–2030, 2031–2040 and 2020–2040.

[13] IPCC (2006).

6.4 Identify sustainable development impacts (if relevant)

Forest policies have broader sustainable development impacts, in addition to their GHG impacts. Sustainable development impacts are changes in environmental, social or economic conditions that result from a policy, such as changes in air quality, water quality, health, quality of life, employment or income.

Refer to the ICAT *Sustainable Development Methodology* for the method for conducting an assessment of sustainable development impacts. Table 6.7 lists examples of sustainable development impacts that may be associated with forest policies, categorized according to the ICAT *Sustainable Development Methodology*. The SDGs most directly relevant to each impact category are indicated in parentheses.

TABLE **6.7**

Examples of sustainable development impacts and indicators relevant to forest policies

Impact categories	Indicators
Environmental impacts	
Biodiversity of terrestrial ecosystems (SDG 15)	• Species diversity (number of species or species richness) • Change in threat status of species (abundance of selected key species, invasive alien species or endangered species) • Proportion of terrestrial area protected • Damage to ecosystem (potential affected fraction of species) • Extinction rate • Biodiversity intactness index • Quality of ecosystem services
Land-use change, including deforestation, forest degradation and desertification (SDG 15)	• Annual change in degraded or desertified arable land (% or hectares) • Area of forested land as a percentage of original or potential forest cover • Proportion of land area covered by forests • Area of forest under sustainable forest management • Arable and permanent cropland area • Area under organic farming
Soil quality (SDG 2)	• Net emissions of sulfur dioxide, ammonia and nitrogen oxides (NO_x) (tonnes/year) • Soil organic matter • Acidity (pH) • Extent of soil erosion
Social impacts	
Access to land (SDG 2)	• Percentage of population with access to land
Indigenous rights (SDG 2, SDG 4, SDG 10)	• Extent of recognition of ancestral land titles • Extent of free, prior and informed consent • Extent of protection of Indigenous traditional knowledge
Resilience to dangerous climate change and extreme weather events (SDG 13)	• Reduction of natural disaster risks
Economic productivity (SDG 8, SDG 2)	• Agricultural productivity (harvested crop yields per hectare)

Source: Adapted from ICAT *Sustainable Development Methodology.*