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Forest Guidance

Guidance for assessing the greenhouse gas impacts of forest policies

First Draft, 26 July 2017

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1 PART I: INTRODUCTION, OBJECTIVES, KEY STEPS AND OVERVIEW 2 OF FOREST POLICIES

3 1. INTRODUCTION

4 *With the adoption of the Paris Agreement in 2015, governments around the world are increasingly*
 5 *focused on implementing policies and actions that achieve greenhouse gas (GHG) mitigation objectives.*
 6 *The agriculture, forestry and other land use (AFOLU) sector contributes to approximately one quarter of*
 7 *anthropogenic GHG emissions.¹ In the forestry sector, emissions are mainly from deforestation. Cost-*
 8 *effective mitigation options in forestry are afforestation, sustainable forest management and reducing*
 9 *deforestation. There is an increasing need to assess and communicate the multiple impacts of forest*
 10 *policies to ensure they are effective in delivering GHG mitigation and helping countries meet their social*
 11 *targets and commitments.*

12 Purpose of the guidance

13 This document provides methodological guidance for assessing the GHG impacts of forest policies that
 14 enable or incentivise afforestation and reforestation, sustainable forest management, and avoided
 15 deforestation and/or degradation activities to increase carbon sequestration and reduce GHG emissions.

16 This guidance is part of the Initiative for Climate Action Transparency (ICAT) series of guidance for
 17 assessing the impacts of policies and actions. It is intended to be used in combination with any other
 18 ICAT guidance documents that users choose to apply. The series of guidance is intended to enable users
 19 that choose to assess GHG impacts, sustainable development impacts and transformational impacts of a
 20 policy to do so in an integrated and consistent way within a single impact assessment process. Refer to
 21 the ICAT *Introductory Guide* for more information about the ICAT guidance documents and how to apply
 22 them in combination.

23 Intended Users

24 This guidance is intended for use by policymakers and practitioners seeking to estimate GHG mitigation
 25 impacts in the context of Nationally Determined Contribution (NDC) development and implementation,
 26 national low carbon strategies, Nationally Appropriate Mitigation Actions (NAMAs) and other mechanisms.
 27 The primary intended users are developing country governments and their partners who are
 28 implementing and assessing forest policies. Throughout the guidance, the term “user” refers to the entity
 29 implementing the guidance.

30 The main emphasis of the guidance is on the assessment of GHG impacts. Impact assessment can also
 31 inform and improve the design and implementation of policies. Thus, the intended users include any
 32 stakeholders involved in the design and implementation of forest policies, strategies, NDCs or NAMAs,
 33 including research institutions, businesses and non-governmental organisations.

¹ IPCC 2014.

1 Scope and applicability of the guidance

2 This guidance provides general principles, concepts and procedures for estimating GHG impacts of forest
3 policies² that increase carbon sequestration and/or reduce GHG emissions from the following activities
4 (which are further described in Chapter 4):

- 5 • **Afforestation and/or reforestation (A/R):** Increase carbon sequestration and/or reduce
6 emissions by establishing, increasing or restoring vegetative cover through the planting, sowing
7 or human-assisted natural regeneration of trees.
- 8 • **Sustainable forest management (SFM):** Increase carbon sequestration and/or reduce
9 emissions on forest lands managed for wood products such as sawtimber, pulpwood and
10 fuelwood by increasing biomass carbon stocks through improving forest management practices.
- 11 • **Avoided deforestation and/or degradation:** Reduce net GHG emissions by preventing the
12 conversion of forest lands with high carbon stocks to forest or non-forest lands with lower carbon
13 stocks.

14 This guidance details a process for users to follow when conducting a GHG assessment of forest policies.
15 It provides guidance on defining the assessment, an approach to GHG assessment including ex-ante
16 (forward-looking) assessments and ex-post (backward-looking) assessments, and monitoring and
17 reporting. Throughout the document, examples and case studies [to be developed] are provided to
18 illustrate how to apply the guidance.

19 This guidance is applicable to users that have defined the individual policy instruments and mitigation
20 practices and/or technologies that will be implemented to reduce GHG emissions. Examples of relevant
21 policy instruments and mitigation practices and/or technologies are further described in Chapter 3.
22 Policies that are not well-defined or have not undergone a policy development process can be difficult to
23 assess since the level of detail needed to estimate GHG impacts may not be available without further
24 policy development.

25 This guidance is designed for countries that have a GHG inventory for the forestry sector that is relevant
26 to the jurisdiction of the policy under consideration. The steps for estimating emission reductions and
27 removals are based on the 2006 IPCC *Guidelines for National Greenhouse Gas Inventories*, referred to
28 throughout this guidance as IPCC 2006 GL.³

29 The guidance is applicable to policies:

- 30 • At any level of government (national, subnational, municipal) in all countries and regions
- 31 • That are planned, adopted or implemented
- 32 • That are new policies, or extensions, modifications or eliminations of existing policies

² Throughout this guidance, where the word “policy” is used without “action,” it is used as shorthand to refer to both policies and actions. See Glossary for definition of “policies or actions”.

³ Available at: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>

1 When to use the guidance

2 The guidance can be used at multiple points in time throughout a policy design and implementation
3 process, including:

- 4 • **Before policy implementation:** To assess the expected future impacts of a policy (through ex-
5 ante assessment)
- 6 • **During policy implementation:** To assess the achieved impacts to date, ongoing performance
7 of key performance indicators, and expected future impacts of a policy
- 8 • **After policy implementation:** To assess what impacts have occurred as a result of a policy
9 (through ex-post assessment)

10 Depending on individual objectives and when the guidance is applied, users can implement the steps
11 related to ex-ante assessment, ex-post assessment or both. The most comprehensive approach is to
12 apply the guidance first before implementation, regularly during policy implementation, and again after
13 implementation.

14 Key recommendations

15 The guidance includes *key recommendations* that represent recommended steps to follow when
16 assessing and reporting impacts. These recommendations are intended to assist users in producing
17 credible impact assessments that are high quality and are based on the principles of relevance,
18 completeness, consistency, transparency and accuracy.

19 In keeping with ICAT guidance being non-prescriptive, the key recommendations focus on the key steps
20 that users are recommended to follow, rather than on any specific methods, models or tools they should
21 use. Key recommendations focus more on “what” users should do rather than “how” they should do it.
22 The guidance that accompanies each key recommendation provides the “how.”

23 Key recommendations are indicated in subsequent chapters by the phrase “It is a *key recommendation*
24 to...” All key recommendations are also compiled in a checklist at the beginning of each chapter.

25 Key recommendations are provided as an option to users that want to assess and report impacts
26 according to a consistent set of steps and approaches. Users that want to follow a more flexible approach
27 can choose to use the guidance without adhering to the key recommendations.

28 The ICAT *Introductory Guide* provides further description of how and why key recommendations are used
29 within the ICAT guidance documents, as well as more information about following either the “flexible
30 approach” or the “key recommendations” approach when using the guidance. Refer to the *Introductory*
31 *Guide* before deciding on which approach to follow.

32 Relationship to other guidance and resources

33 This guidance uses and builds on existing resources mentioned throughout the document. This includes
34 the IPCC 2006 GL, Volume 4, Agriculture, Forestry and Other Land Use.⁴

⁴ Available at: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>

1 The guidance is consistent with the Greenhouse Gas Protocol *Policy and Action Standard* which provides
2 guidance on estimating the greenhouse gas impacts of policies and actions and discussion on many of
3 the accounting concepts in this document such as baseline and policy scenarios.⁵ The guidance adapts
4 the structure and some of the tables, figures and text from the *Policy and Action Standard* where relevant.
5 Figures and tables adapted from the *Policy and Action Standard* are cited, but for readability not all text
6 taken directly or adapted from the standard is cited.

7 A full list of references is provided at the end of this document.

8 Process for developing the guidance

9 This guidance is being developed through an inclusive, multi-stakeholder process convened by the
10 Initiative for Climate Action Transparency. The development is led by the Greenhouse Gas Management
11 Institute (technical lead) and VCS (co-lead), which serves as the Secretariat and guide the development
12 process. The draft was developed by drafting teams, which are a subset of a broader Technical Working
13 Group and the Secretariat. The Technical Working Group (TWG) consists of experts and stakeholders
14 from a range of countries identified through a public call for expressions of interest. The TWG contributes
15 to the development of the technical content for the guidance through participation in regular meetings and
16 written comments.

17 The forestry activities that are the focus of this guidance (i.e., afforestation/reforestation, sustainable
18 forest management and avoided deforestation/degradation) were selected based on a set of criteria
19 compiled with input from the TWG. The selection was reached after all options were ranked against a set
20 of criteria which included:

- 21 • The role of the activity in countries' NDCs
- 22 • The role of the activity in proposed NAMAs
- 23 • Gaps in available guidance
- 24 • Contribution of the activity to staying under a 1.5-2°C temperature goal
- 25 • Contribution of the activity to a large percentage of countries' emissions

26 A Review Group will provide written feedback on multiple drafts of the guidance. The drafts will also be
27 circulated for public consultation more broadly. The draft guidance will be tested with ICAT participating
28 countries and other interested countries to ensure that it can be practically implemented, gather feedback
29 for its improvement and provide case studies for the final publication. Anyone interested in testing the
30 guidance is encouraged to get in touch with the ICAT team.

31 ICAT's Advisory Committee provides strategic advice to the initiative. More information about the
32 guidance development process, including governance of the initiative and the participating countries, is
33 available on the ICAT website.

34 All contributors are listed in the "Contributors" section.

35

⁵ WRI 2014. Available at: <http://www.ghgprotocol.org/policy-and-action-standard>

2. OBJECTIVES OF ESTIMATING GHG IMPACTS

This chapter provides an overview of objectives users may have in assessing the GHG impacts of forest policies. Determining the assessment objectives is an important first step, since decisions made in later chapters should be guided by the stated objectives.

Checklist of key recommendations

- Determine the objectives of the assessment at the beginning of the impact assessment process

Assessing the GHG impacts of policies is a key step towards developing effective GHG mitigation strategies. Impact assessment supports evidence-based decision making by enabling policymakers and stakeholders to understand the relationship between policies and expected or achieved GHG impacts. It is a *key recommendation* to determine the objectives of the assessment at the beginning of the impact assessment process.

Examples of objectives for assessing the GHG impacts of a policy are listed below. The ICAT *Sustainable Development Guidance* can be used to assess the broader sustainable development impacts of forest policies and users should refer to that guidance for objectives for assessing such impacts.

Objectives of assessing impacts before policy implementation

- Inform policy selection** by comparing policy options based on their expected future impacts
- Improve policy design and implementation** by understanding the impacts of different design and implementation choices
- Inform goal setting** by assessing the potential contribution of policy options to national goals, such as NDCs and NAMAs
- Report** on the multiple expected future impacts of policies, domestically and/or internationally
- Access financing** for policies under consideration by demonstrating expected future results

Objectives of assessing impacts during or after policy implementation

- Assess policy effectiveness** by determining whether policies are delivering the intended results
- Improve policy implementation** by determining whether policies are being implemented as planned
- Inform future policy design** and decide whether to continue current actions, enhance current actions or implement additional actions
- Learn from experience** and share best practices about the impacts of policies
- Track progress toward national goals** such as NDCs and SDGs and understand the contribution of policies toward achieving them
- Report** on the multiple impacts of policies achieved to date, domestically and/or internationally
- Meet funder requirements** to report on impacts of policies, if relevant

1 Users should also identify the intended audience of the assessment report. Possible audiences include
2 policymakers, the general public, NGOs, companies, funders, financial institutions, analysts, research
3 institutions, or other stakeholders affected by or who can influence the policy. For more information on
4 identifying stakeholders, refer to the ICAT *Stakeholder Participation Guidance* (Chapter 5).

5 Subsequent chapters provide flexibility to enable users to choose how best to assess the impacts of
6 policies in the context of their objectives, including which impacts to include in the GHG assessment
7 boundary and which methods and data sources to use. The appropriate level of accuracy and
8 completeness is likely to vary by objective. Users should assess the impacts of their policies with a
9 sufficient level of accuracy and completeness to meet the stated objectives of the assessment.

10

3. OVERVIEW OF FOREST POLICIES

This chapter provides an overview of the types of forest policy instruments and mitigation practices and technologies to which this guidance can be applied. The forestry sector together with the agriculture sector present a large opportunity for countries to meet their commitments to the Paris Agreement and to reduce and remove GHG emissions from the atmosphere. This guidance is primarily designed to assess specific policy instruments and associated mitigation practices and/or technologies in the forestry sector. In this document, policies are instruments that enables or incentivize the implementation of GHG mitigation measures. Measures are the practices and/or technologies that reduce emissions.

3.1 Forest policy instruments

This guidance can be used to assess the GHG impacts of a range of policy instruments that enable or incentivise reducing or removing emissions in the forestry sector. Table 3.1 presents examples of common policy instruments to which this guidance can be applied. Further information about types of policies and actions is provided in the ICAT *Introductory Guide*.

Table 3.1 Common policy instruments applicable to the forestry sector

Type of policy Instrument	Description	Examples of policy instruments
Regulations and standards	Rules or standards that specify abatement technologies (technology standard) or minimum requirements for pesticide application, pollution output, or other activities (performance standard). They typically include legal penalties for noncompliance.	<ul style="list-style-type: none"> Standards for timber management practices Standards for implementing agroforestry or silvopastoral systems Conservation mandate requiring landowners to reforest an area equivalent to 10% of cultivated lands into conservation reserve Laws that promote connectivity between natural ecosystems Moratorium on new land concessions Moratorium on exporting forest risk commodities from deforestation risk regions (e.g., Brazil municipality black list) New systems to effectively enforce existing or new environmental regulation (e.g., improve coordination of observation, enforcement, and prosecution agencies against illegal logging and land grabbing)
Subsidies and incentives	Direct payments, tax reductions, price supports or the equivalent thereof from a government to an entity for implementing a practice or performing a specified action.	<ul style="list-style-type: none"> Payments for setting aside agricultural land Payments for ecosystem services
Voluntary agreements or actions	Agreements, commitments or actions undertaken voluntarily by public or private sector actors,	<ul style="list-style-type: none"> Zero net-deforestation commitments Ecosystem restoration commitments (e.g.,

	either unilaterally or jointly in a negotiated agreement. Some voluntary agreements include rewards or penalties associated with participating in the agreement or achieving the commitments.	<p>Bonn Challenge)</p> <ul style="list-style-type: none"> • Agroforestry agreements with landowners • National programmes to reduce emissions in a sector (e.g., NAMA) • Low carbon development projects
Information instruments	Requirements for public disclosure of information. These include labeling programmes, emissions reporting programmes, rating and certification systems, benchmarking, and information or education campaigns aimed at changing behaviour by increasing awareness.	<ul style="list-style-type: none"> • Programmes requiring standardised labeling on environmental attributes of agricultural and forest products
Trading programmes	A programme that establishes a limit on aggregate emissions or pollutants from specified sources, requires sources to hold permits, allowances, or other units equal to their actual emissions or pollution, and allows permits to be traded among sources	<ul style="list-style-type: none"> • Nutrient trading programmes • Cap-and-trade programmes
Research, development and deployment policies	Policies aimed at supporting technological advancement, through direct government funding or investment, or facilitation of investment, in technology research, development, demonstration, and deployment activities	<ul style="list-style-type: none"> • Efforts to strengthen formal education of land managers, provide training and introduce new technologies or practices, provided by extension services or other programmes supported by the government to support improved practices, technology adoption, and even monitoring of activities • Training modules about sustainable production and climate change disseminated through extension agents • Regional workshops for land managers
Financing and investment	Public or private sector grants or loans (for example, those supporting low-carbon development strategies or policies)	<ul style="list-style-type: none"> • Low-interest rate loans for forest land managers that implement sustainable timber management practices

1 3.2 Mitigation practices or technologies

2 This guidance can be used to assess a range of mitigation practices or technologies that reduce and/or
3 remove emissions in the forestry sector. Box 3.1 below lists common mitigation practices in the forestry
4 sector that reduce and/or remove emissions from afforestation/reforestation, sustainable forest

- 1 management and avoided deforestation/degradation, and to which this guidance is applicable. These
- 2 mitigation practices are enabled or incentivised by the policy instruments described above.

3 *Box 3.1 Common mitigation practices in the forestry sector*

Common mitigation practices that reduce or remove emissions through afforestation/reforestation

- Planting trees/woody biomass (including agroforestry and silvopasture)
- Removing vegetation that competes with trees
- Making sites suitable for natural regeneration (e.g., protecting mother trees and seedlings)
- Removing ongoing disturbances that prevent reforestation or natural regeneration

Common mitigation practices that reduce or remove emissions through sustainable forest management

- Improving forest management practices (e.g., increasing the minimum age or the minimum diameter of cutting thresholds, extending the re-entry period for selective harvesting, improving the selection of trees for harvesting, implementing a sustainable harvest modeling, or implementing stocking retention requirements)
- Enhancing productivity (e.g., supplemental planting and thinning or introducing tree species with higher growing rates)
- Improving harvest efficiency (e.g., reducing damage or felling of other trees, and reducing the size of logging roads)
- Improving mill efficiency and utilisation of wood products

Common mitigation practices that reduce or remove emissions from avoided deforestation/degradation

- Conserving forests on public or private land
- Providing alternative sources for fuelwood (e.g., woodlots for fuel or gas kerosene for cooking)
- Converting logged forests to protected forests
- Increasing sustainable agricultural intensification to reduce conversion of forest lands

4. STEPS AND ASSESSMENT PRINCIPLES

This chapter provides an overview of the steps involved in assessing the GHG impacts of forest policies, and outlines assessment principles to help guide the assessment.

Checklist of key recommendations

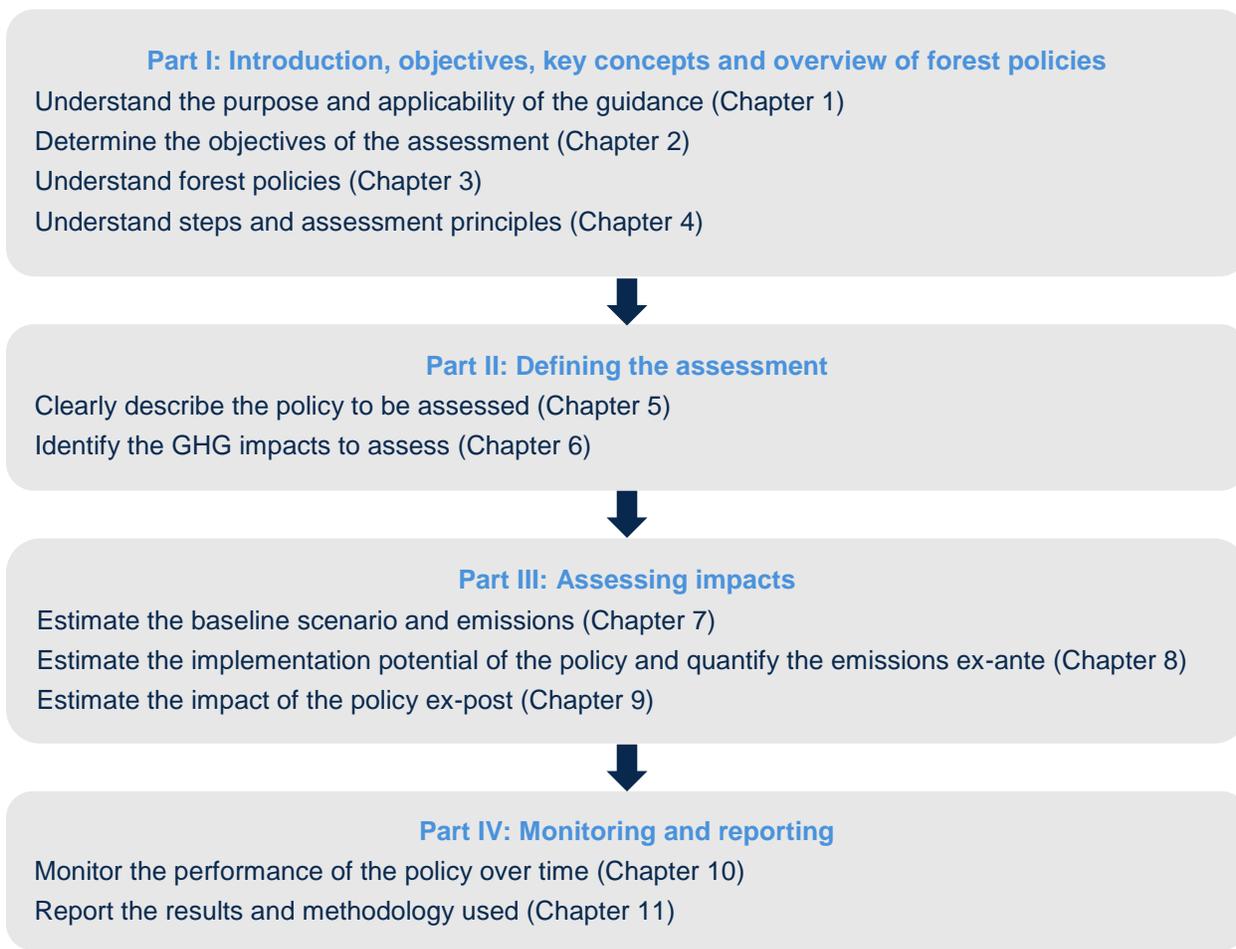
- Base the assessment on the principles of relevance, completeness, consistency, transparency and accuracy

4.1 Overview of steps

4.1.1 General overview of steps

This guidance is organised according to the steps a user follows in assessing the GHG impacts of a policy (see Figure 4.1). Depending on when the guidance is applied and the approach chosen, users can skip certain chapters. For example, if the user is assessing impacts ex-ante but not ex-post, the user can skip Chapter 9.

Figure 4.1: Overview of steps



12

1 4.1.2 Steps for assessing the GHG impacts of forest policies

2 This guidance provides two approaches for estimating the GHG impacts of forest policies ex-ante:

- 3 • **Scenario approach:** This compares the difference in GHG emissions and removals between the
4 policy scenario and baseline scenario. The difference between policy and baseline scenario
5 emissions and removals is the net change in GHG impact resulting from the policy.
- 6 • **Deemed estimates approach:** This focuses on estimating the effect of the policy on activity data
7 by estimating the expected increase or decrease in the area of land in a land category or in the
8 adoption of a mitigation practice that is triggered by the policy. The emissions associated with the
9 increase or decrease in activity data are estimated to give the expected net change in GHG
10 impact resulting from the policy.

11 Scenario approach

12 In this method, users determine the most likely baseline scenario for land use, land-use change and/or
13 timber management practices, and estimate baseline emissions and removals (Chapter 7). Users then
14 develop the most likely policy scenario by determining the likely implementation potential of the policy
15 (Sections 8.2 – 8.5). Policy scenario emissions and removals are quantified by using the same method
16 that was used to estimate the baseline emissions and removals with parameter values that are adjusted
17 for the policy scenario. The net change in GHG emissions and removals is the difference between policy
18 and baseline emissions and removals.

19 Deemed estimates approach

20 In this approach, users estimate the maximum implementation potential of the policy (following the
21 guidance in Chapter 8) based on the causal chain that is developed in Chapter 6. The maximum
22 implementation potential is estimated in terms of activity data. The activity data used for this approach is
23 a parameter that is expected to change in value as a result of the policy. Users then evaluate how
24 barriers to implementation and other factors may limit the policy’s overall effectiveness, and determine its
25 likely implementation potential.

26 The likely implementation potential represents the effects that are expected to occur as a result of the
27 policy (most likely policy scenario). The implementation potential is the area of land in a land category
28 that will be impacted by the policy (e.g., the hectares of degraded land that are planted with trees) or the
29 expected adoption of a mitigation practice (e.g., the percentage of timber land managers increasing the
30 diameter cutting threshold). Implicitly, these effects are relative to the baseline scenario.

31 The GHG emissions and removals are estimated based on the increase or decrease in activity data
32 (Section 8.6) with emission factors that are updated to represent the policy scenario. Estimating baseline
33 emissions is optional when using this approach and the GHG impacts of the policy can be calculated
34 directly, without explicitly determining separate baseline and policy scenarios. In such cases, users can
35 skip Chapter 7.

36 4.1.3 Expert judgment

37 Expert judgment is defined by the IPCC as a carefully considered, well-documented qualitative or
38 quantitative judgment made in the absence of unequivocal observational evidence by a person or

1 persons who have a demonstrable expertise in the given field.⁶ The user can apply their own expert
2 judgment or consult experts.

3 When consulting experts, information can be obtained through methods that help to avoid bias known as
4 “expert elicitation.” The IPCC 2006 GL provides a procedure for expert elicitation, including a process for
5 helping experts understand the elicitation process, avoiding biases, and producing independent and
6 reliable judgments.

7 Expert judgment can be associated with a high level of uncertainty. As such, experts can be consulted to
8 provide a range of possible values and the related uncertainty range, or they can be consulted to help
9 select suitable values from a range of values. Expert judgment can be informed or supported through
10 broader consultations with stakeholders.

11 Assumptions or expert judgment will likely be required in order to complete the assessment where
12 information is not available to make a reasonable assumption about the value of a parameter. When
13 doing so, it is important to document the reason that no data sources are available and the rationale for
14 the value chosen.

15 4.1.4 Planning for the assessment

16 Users should review this guidance and plan the steps, responsibilities and resources needed to meet
17 their objectives for assessing GHG impacts of forest policies in advance. The time and human resources
18 required to implement the guidance and carry out an impact assessment depend on a variety of factors,
19 such as the complexity of the policy being assessed, the extent of data collection needed and whether
20 relevant data has already been collected, and the desired level of accuracy and completeness needed to
21 meet the objectives of the assessment.

22 Planning stakeholder participation

23 Stakeholder participation is recommended in many steps throughout the guidance. It can strengthen the
24 impact assessment and the contribution of policies to GHG mitigation goals in many ways, including by:

- 25 • Providing a mechanism through which people who are likely to be affected by a given policy or
26 who can influence the policy are provided with an opportunity to raise issues and to have these
27 issues considered before and after the policy implementation
- 28 • Raising awareness and enabling better understanding of complex issues for all parties involved,
29 building their capacity to contribute effectively
- 30 • Building trust, collaboration, shared ownership and support for policies among stakeholder
31 groups, leading to less conflict and easier implementation
- 32 • Addressing stakeholder perceptions of risks and impacts and helping to develop measures to
33 reduce negative impacts and enhance benefits for all stakeholder groups, including the most
34 vulnerable

⁶ IPCC 2000.

- 1 • Enhancing the credibility, accuracy and comprehensiveness of the assessment, drawing on
2 diverse expert, local and traditional knowledge and practices
- 3 • Enhancing transparency, accountability, legitimacy and respect for stakeholders' rights
- 4 • Enabling enhanced ambition and financing by strengthening the effectiveness of policies and
5 credibility of reporting

6 Various sections throughout this guidance explain where stakeholder participation is recommended—for
7 example, in identifying the impacts of the policy (Chapter 6), estimating the baseline scenario and
8 emissions (Chapter 7), estimating GHG impacts ex-ante (Chapter 8) and monitoring performance over
9 time (Chapter 10).

10 Before beginning the assessment process, consider how stakeholder participation can support identified
11 objectives and include relevant activities and associated resources in assessment plans. It may be helpful
12 to combine stakeholder participation for GHG impacts assessment with other participatory processes
13 involving similar stakeholders for the same or related policies, such as those being conducted for
14 assessment of sustainable development and transformational impacts and for technical review.

15 It is important to ensure conformity with national legal requirements and norms for stakeholder
16 participation in public policies, as well as the requirements of specific donors and of international treaties,
17 conventions and other instruments to which the country is party. These are likely to include requirements
18 for disclosure, impact assessments and consultations, and may include specific requirements for certain
19 stakeholder groups (e.g., UN Declaration of the Rights of Indigenous Peoples, International Labour
20 Organisation Convention 169) or specific types of policies (e.g., UNFCCC guidance on safeguards for
21 activities reducing emissions from deforestation and degradation in developing countries).

22 During the planning phase, identify stakeholder groups that may be affected by or may influence the
23 policy. Appropriate approaches should be identified to engage with the identified stakeholder groups,
24 including through their legitimate representatives. To facilitate effective stakeholder participation, consider
25 establishing a multi-stakeholder working group or advisory body consisting of stakeholders and experts
26 with relevant and diverse knowledge and experience. Such a group may advise and potentially contribute
27 to decision making to ensure that stakeholder interests are reflected in design, implementation and
28 assessment of policies, including on stakeholder participation in the assessment of GHG impacts of a
29 particular policy. It is also important to ensure that stakeholders have access to a grievance redress
30 mechanism to secure adequate protection of stakeholders' rights related to the impacts of the policy.

31 Refer to the ICAT *Stakeholder Participation Guidance* for more information, such as how to plan effective
32 stakeholder participation (Chapter 4), identify and analyse different stakeholder groups (Chapter 5),
33 establish multi-stakeholder bodies (Chapter 6), provide information (Chapter 7), design and conduct
34 consultations (Chapter 8) and establish grievance redress mechanisms (Chapter 9). Appendix A
35 summarises the steps in this guidance where stakeholder participation is recommended along with
36 specific references to relevant guidance in the ICAT *Stakeholder Participation Guidance*.

37 Planning technical review (if relevant)

38 Before beginning the assessment process, consider whether technical review of the assessment report
39 will be pursued. The technical review process emphasises learning and continual improvement and can
40 help identify areas for improving future impact assessments. Technical review can also provide
41 confidence that the impacts of policies have been estimated and reported according to ICAT key

1 recommendations Refer to the ICAT *Technical Review Guidance* for more information on the technical
 2 review process.

3 4.2 Assessment principles

4 Generally accepted principles are intended to underpin and guide the impact assessment process,
 5 especially where the guidance provides flexibility. It is a *key recommendation* to base the assessment on
 6 the principles of relevance, completeness, consistency, transparency and accuracy, as follows:

- 7 • **Relevance:** Ensure the assessment appropriately reflects the GHG impacts of the policy and
 8 serves the decision-making needs of users and stakeholders, both internal and external to the
 9 reporting entity. Applying the principle of relevance depends on the objectives of the assessment,
 10 broader policy objectives, national circumstances and stakeholder priorities.
- 11 • **Completeness:** Include all significant impacts in the GHG assessment boundary, including both
 12 positive and negative impacts. Disclose and justify any specific exclusions.
- 13 • **Consistency:** Use consistent assessment approaches, data collection methods and calculation
 14 methods to allow for meaningful performance tracking over time. Transparently document any
 15 changes to the data sources, GHG assessment boundary, methods, or any other relevant factors
 16 in the time series.
- 17 • **Transparency:** Provide clear and complete information for internal and external reviewers to
 18 assess the credibility and reliability of the results. Disclose and document all relevant methods,
 19 data sources, calculations, assumptions and uncertainties. Disclose the processes, procedures
 20 and limitations of the assessment in a clear, factual, neutral, and understandable manner with
 21 clear documentation. The information should be sufficient to enable a party external to the
 22 assessment process to derive the same results if provided with the same source data.
- 23 • **Accuracy:** Ensure that the estimated impacts are systematically neither over nor under actual
 24 values, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve
 25 sufficient accuracy to enable users and stakeholders to make appropriate and informed decisions
 26 with reasonable confidence as to the integrity of the reported information. If accurate data for a
 27 given impact category is not currently available, users should strive to improve accuracy over
 28 time as better data becomes available. Accuracy should be pursued as far as possible, but once
 29 uncertainty can no longer be practically reduced, conservative estimates should be used. Box 4.1
 30 provides guidance on conservativeness.

31 In addition to the principles above, users should follow the principle of comparability if it is relevant to the
 32 assessment objectives, for example if the objective is to compare multiple policies based on their GHG
 33 impacts or to aggregate the results of multiple impact assessments and compare the collective impacts to
 34 national goals (described further in Box 4.2).

- 35 • **Comparability:** Ensure common methods, data sources, assumptions and reporting formats
 36 such that the estimated impacts of multiple policies can be compared.

37 *Box 4.1: Conservativeness*

Conservative values and assumptions are those more likely to overestimate negative impacts or underestimate positive impacts resulting from a policy. Users should consider conservativeness in

addition to accuracy when uncertainty can no longer be practically reduced, when a range of possible values or probabilities exists (for example, when developing baseline scenarios), or when uncertainty is high.

Whether to use conservative estimates and how conservative to be depends on the objectives and the intended use of the results. For some objectives, accuracy should be prioritised over conservativeness in order to obtain unbiased results. The principle of relevance can help guide what approach to use and how conservative to be.

1 *Box 4.2: Applying the principle of comparability when comparing or aggregating results*

Users may want to compare the estimated impacts of multiple policies, for example to determine which has the greatest positive impacts. Valid comparisons require that assessments have followed a consistent methodology, for example regarding the assessment period, the types of impact categories, impacts, and indicators included in the GHG assessment boundary, baseline assumptions, calculation methods, and data sources. Users should exercise caution when comparing the results of multiple assessments, since differences in reported impacts may be a result of differences in methodology rather than real-world differences. To understand whether comparisons are valid, all methods, assumptions and data sources used should be transparently reported.

Comparability can be more easily achieved if a single person or organisation assesses and compares multiple policies using the same methodology. If the objective is to compare the results of unrelated assessments carried out independently, users should exercise caution in comparing the results, since differences in reported impacts may be a result of differences in methods.

Users may also want to aggregate the impacts of multiple policies, for example to compare the collective impact of multiple policies in relation to a national goal. Users should likewise exercise caution when aggregating the results if different methods have been used and if there are potential overlaps or interactions between the policies being aggregated. In such a case, the sum would either over or underestimate the impacts resulting from the combination of policies. For example, the combined impact of a local energy efficiency policy and a national energy efficiency policy in the same country is likely less than the sum of the impacts had they been implemented separately, since they affect the same activities. Chapter 4 provides more information on policy interactions.

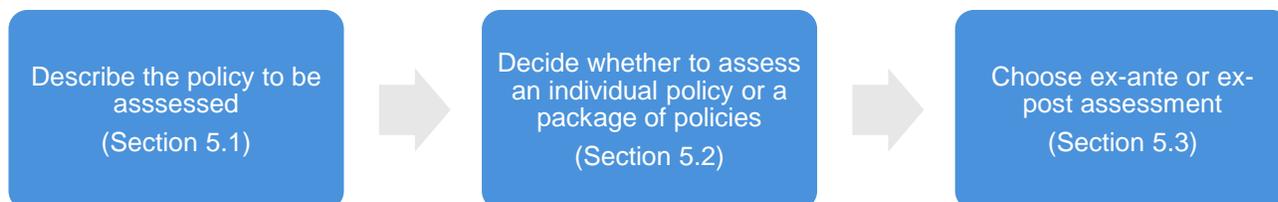
- 2 In practice, users may encounter trade-offs between principles when developing an assessment. For
 3 example, a user may find that achieving the most complete assessment requires using less accurate data
 4 for a portion of the assessment, which could compromise overall accuracy. Users should balance trade-
 5 offs between principles depending on their objectives. Over time, as the accuracy and completeness of
 6 data increases, the trade-off between these principles will likely diminish.

PART II: DEFINING THE ASSESSMENT

5. DESCRIBING THE POLICY

This chapter provides guidance on describing the policy. In order to assess the GHG impacts of a policy, users need to describe the policy that will be assessed, decide whether to assess an individual policy or a package of related policies, and choose whether to carry out an ex-ante and/or ex-post assessment.

Figure 5.1: Overview of steps in the chapter



Checklist of key recommendations

- Clearly describe the policy (or package of policies) that is being assessed

5.1 Describe the policy to be assessed

In order to effectively carry out an impact assessment in subsequent chapters, it is necessary to have a detailed understanding and description of the policy being assessed. It is a *key recommendation* to clearly describe the policy (or package of policies) that is being assessed. Table 5.1 provides a checklist of recommended information that should be included in a description to enable an effective assessment. Table 5.2 outlines additional information that may be relevant depending on the context.

Users that assess a package of policies should use these tables to either document the package as a whole or document each policy within the package separately. If assessing a package of policies, it may be easiest to do the first two steps in this chapter (Sections 5.1 and 5.2) together or iteratively. Users that are assessing the sustainable development and/or transformational impacts of the policy should describe the policy in the same way to ensure a consistent and integrated assessment.

Table 5.1: Checklist of recommended information to describe the policy being assessed

Information	Description	Example
Title of the policy	Policy name	Payment for Ecosystem Services (PES) system and tax for ecosystem service users
Type of policy	The type of policy, such as those presented in Table 3.1, or other categories of policies that may be more relevant	Subsidies and incentives Taxes and charges
Description of specific interventions	The specific mitigation practice and/or technology carried out as part of the policy or action, such as those presented in Box 3.1.	Reducing emissions and enhancing removals, through (a) sustainable forest management, and/or (b) afforestation/reforestation. (a) SFM strategies: increasing the minimum age of tree diameter of cutting thresholds, extending the re-entry

		<p>period for selective harvesting, and improving the selection of trees for harvesting</p> <p>(b) A/R strategies: planting trees/woody biomass, planting endangered tree species, removing vegetation that competes with trees, removing ongoing disturbances that are preventing natural regeneration</p> <p>Under the new PES system, the Ministry of Environment will engage stakeholders in voluntary contracts to provide ecosystem services on a total of 60% of private forest lands and 25% of low productivity cropland over 10 years.</p> <p>The policy specifically intends to implement sustainable forest management on private forest land and afforestation/reforestation activities on cropland. Voluntary contracts aim to promote these types of practices: sustainable harvest regimes, general tree planting, tree planting with endangered species, and natural regeneration, with land owner payments for each practice of USD 500 per hectare, USD 1,000 per hectare, USD 1,500 per hectare, and USD 500 per hectare, respectively.</p> <p>A new tax system will be enacted to fund the ecosystem service payments. Under the new tax system, a national legislative body will enact a new tax for all users of ecosystem services (primarily for water and hydroelectric utilities, but other sectors may be included such as tourism companies). The national taxing agency will collect the tax, which will fund the new PES programme (estimated to be about 1-2% annual revenue) to provide programme incentives, as well as administrative and operational expenses.</p>
Status of the policy	Whether the policy is planned, adopted or implemented	The national government is evaluating whether to implement this policy.
Date of implementation	The date the policy comes into effect (not the date that any supporting legislation is enacted)	Expected 2021
Date of completion (if relevant)	If relevant, the date the policy ceases, such as the date a tax is no longer levied or the end date of an incentive scheme with a limited duration (not the date that the policy no longer has an impact)	Expected 2030
Implementing entity or entities	The entity or entities that implement(s) the policy, including the role of various local, subnational, national, international or any other entities	National Legislative Body and Ministry of Environment
Objectives and intended impacts or benefits of the policy	The impact(s) or benefit(s) the policy intends to achieve (for example, the purpose stated in the legislation or regulation)	<p>The goals for PES programme are to: 1) expand SFM activities, and 2) promote A/R through tree planting or natural regeneration. Specifically to:</p> <ul style="list-style-type: none"> • Increase forest carbon stocks on private forest

		<p>land</p> <ul style="list-style-type: none"> • Increase forest carbon stocks on low productivity cropland • Decrease soil erosion • Increase economic output for ecosystem services, including water retention/runoff and biodiversity • Reduce degradation pressure on private forest lands • Accelerate adoption of improved sustainable forest management on a widespread basis by demonstrating ecosystem service benefits of improving forest carbon stocks
Level of the policy	The level of implementation, such as national level, subnational level, city level, sector level or project level	National
Geographic coverage	The jurisdiction or geographic area where the policy is implemented or enforced, which may be more limited than all the jurisdictions where the policy has an impact	Based on data from the latest national forest census, the total area of privately owned forest land in the country is 250,000 hectares; 60% of this area is 150,000 hectares. From national agriculture statistics it is known that the total area of low productivity cropland is 240,000 hectares; 25% of that is 60,000 hectares.
Sectors targeted	Which sectors or subsectors are targeted	Interventions will target private forest and cropland owners.
Greenhouse gases targeted	Which GHG the policy aims to control, which may be more limited than the set of GHG that the policy affects	Increase CO ₂ sequestration in forests
Other related policies or actions	Other policies or actions that may interact with the policy being assessed	<p>The regional Non-Industrial Private Forest programme, funded by a non-profit organisation, aims to encourage sustainable harvest practices through capacity building in a region containing 10,000 hectares of private forest land.</p> <p>The Forest Protection Act (FPA) of 2010 improves enforcement of laws preventing illegal logging. Monitoring and evaluation of FPA indicates it has reduced illegal logging by approximately 5%. The FPA has the potential to discourage forest degradation on private forest land.</p>

1 Table 5.2: Checklist of additional information that may be relevant to describe the policy being assessed

Information	Description	Example
Intended level of mitigation to be achieved and/or target level of other indicators	If relevant and available, the total emissions and removals from the sources and sinks targeted; the target amount of emissions to be reduced or removals to be enhanced as a result of the policy, both annually and cumulatively over the life of the policy (or by	<p>The goal of the policy is that 150,000 more hectares of forest land be brought into sustainable forest management and 60,000 more hectares of cropland be converted to forest land as a result of the policy:</p> <ul style="list-style-type: none"> • SFM: 150,000 ha • Tree Planting: 15,000 ha

	stated date); and/or the target level of key indicators (such as hectares of land to conserve)	<ul style="list-style-type: none"> Natural Regeneration: 40,000 ha Tree Planting with Endangered Species: 5,000 ha
Title of establishing legislation, regulations, or other founding documents	The name(s) of legislation or regulations authorising or establishing the policy (or other founding documents if there is no legislative basis)	<p>Pending legislation</p> <p>Ministry of Environment Draft PES contract template</p>
Monitoring, reporting and verification procedures	References to any monitoring, reporting, and verification procedures associated with implementing the policy	Annual forest land and crop land visits conducted by forest and extension specialists to all land owners receiving payment. Specialists to verify implementation of practices according to annual reports submitted by participants. See “enforcement mechanisms” for more information on reporting.
Enforcement mechanisms	Any enforcement or compliance procedures, such as penalties for noncompliance	Participation in the programme is voluntary. However, to receive payments, landowners must submit a year-1 and year-10 forest inventory report. Likewise, owners must also submit annual harvesting records. Reports are submitted to the Ministry of Environment and can be filled out and submitted with assistance from extension specialists.
Reference to relevant documents	Information to allow practitioners and other interested parties to access any guidance documents related to the policy (for example, through websites)	Ministry of Environment private land owner forest inventory report template.
The broader context or significance of the policy	Broader context for understanding the policy	The policy is part of the package of actions that is being considered for the purpose of fulfilling the aspirational goal (as described in the NDC submitted to the UNFCCC) to reduce the growth of total national GHG emissions in 2035 from 35% to 17.5% above the 2010 levels. It is anticipated that the policy will account for a minimum of 20% of the total GHG reductions required in order to achieve the NDC goal.
Outline of sustainable development impacts of the policy	Any anticipated sustainable development benefits other than GHG mitigation	Land-use change, water quality, endangered species and biodiversity improvement
Key stakeholders	Key stakeholder groups affected by the policy	Private forest land owners, farmers, users of ecosystem services (primarily water and hydroelectric utilities)
Other relevant information	Any other relevant information	If this policy is successful, there may be a decrease in supply of agricultural products from a decrease in available cropland. A decrease in cropland or a decrease in harvest timber may result in forest degradation on non-participating lands.

1 5.2 Decide whether to assess an individual policy or a package of 2 policies

3 If multiple policies are being developed or implemented in the same timeframe, users can assess the
4 policies either individually or together as a package. When making this decision, consider the assessment

1 objectives, the feasibility of assessing impacts individually or as a package, and the degree of interaction
 2 between the policies.

3 In subsequent chapters, users follow the same general steps, whether they choose to assess an
 4 individual policy or a package of related policies. Depending on the choice, the impacts estimated in later
 5 chapters will either apply to the individual policy assessed or to the package of policies assessed.

6 5.2.1 Types of policy interactions

7 Policies can either be independent of each other or they can interact with each other. Policies interact if
 8 their total impact, when implemented together, differs from the sum of their individual impacts had they
 9 been implemented separately. Policies interact if they affect the same GHG source or carbon pool. For
 10 example, national and subnational policies in the same sector are likely to interact since they likely affect
 11 the same GHG sources and carbon pools. Two policies implemented at the same level may also interact.
 12 Policies do not interact if they do not affect the same GHG sources and carbon pools, either directly or
 13 indirectly.

14 Policies can be independent, overlapping, reinforcing, or both overlapping and reinforcing. Table 5.3 and
 15 Figure 5.2 provide an overview of four possible relationships between policies, and further information is
 16 available in the *Policy and Action Standard*.

17 *Table 5.3: Types of relationships between policies*

Type	Description
Independent	Multiple policies do not interact with each other. The combined effect of implementing the policies together is equal to the sum of the individual effects of implementing them separately.
Overlapping	Multiple policies interact, and the combined effect of implementing the policies together is less than the sum of the individual effects of implementing them separately. This includes policies that have the same or complementary goals (such as national and subnational energy efficiency standards), as well as counteracting policies that have different or opposing goals (such increasing food production and reducing emissions from agriculture).
Reinforcing	Multiple policies interact, and the combined effect of implementing the policies together is greater than the sum of the individual effects of implementing them separately.
Overlapping and reinforcing	Multiple policies interact, and have both overlapping and reinforcing interactions. The combined effect of implementing the policies together may be greater than or less than the sum of the individual effects of implementing them separately.

18 *Source:* WRI 2014.

1 *Figure 5.2: Types of relationships between policies*



2
3 *Source:* Adapted WRI 2014.

4 **5.2.2 Determining whether to assess an individual policy or package of policies**

5 To assess the extent of policy interactions when deciding whether to assess an individual policy or a
6 package of policies, follow these steps:

- 7
- Step 1: Characterise the type and degree of interaction between the policies under consideration
 - Step 2: Apply criteria to determine whether to assess an individual policy or a package of policies
- 8

9 **Step 1: Characterise the type and degree of interaction between the policies under**
10 **consideration**

11 Potentially interacting policies can be identified by identifying activities targeted by the policy, then
12 identifying other policies that target the same activities. Once these are identified, assess the relationship
13 between the policies (independent, overlapping or reinforcing) and the degree of interaction (minor,
14 moderate or major). The assessment of interaction can be based on expert judgment, published studies
15 of similar combinations of policies, or consultations with relevant experts. The assessment should be
16 limited to a preliminary qualitative assessment at this stage.

17 **Step 2: Apply criteria to determine whether to assess an individual policy or a package**
18 **of policies**

19 Where policy interactions exist, there can be advantages and disadvantages to assessing the interacting
20 policies individually or as a package (see Table 5.4). To help decide, apply the criteria in Table 5.5. In

1 some cases, certain criteria may suggest assessing an individual policy, while other criteria suggest
 2 assessing a package. Users should exercise judgment based on the specific circumstances of the
 3 assessment. For example, related policies may have significant interactions (suggesting a package), but
 4 it may not be feasible to model the whole package (suggesting an individual assessment). In this case, a
 5 user can undertake an assessment of an individual policy (since a package is not feasible), but
 6 acknowledge in a disclaimer that any subsequent aggregation of the results from individual assessments
 7 would be inaccurate given the interactions between the policies.

8 Users can also conduct assessments for both individual policies and packages of policies. Doing so will
 9 yield more information than conducting only one option or the other. Undertaking both individual
 10 assessments and assessments for combinations of policies should be considered where the end-user
 11 requires information on both, resources are available to undertake multiple analyses and undertaking
 12 both is feasible.

13 Where users choose to assess both an individual policy and a package of policies that includes the
 14 individual policy assessed, define each assessment separately and treat each as a discrete application of
 15 this guidance in order to avoid confusion of the results.

16 *Table 5.4: Advantages and disadvantages of assessing policies individual or as a package*

Approach	Advantages	Disadvantages
Assessing policies individually	Shows the effectiveness of individual policies, which decision makers may require to make decisions about which individual policies to support May be simpler than assessing a package in some cases, since the causal chain and range of impacts for a package may be significantly more complex	The estimated impacts from assessments of individual policies cannot be straightforwardly summed to determine total impacts, if interactions are not accounted for
Assessing policies as a package	Captures the interactions between policies in the package and better reflects the total impacts of the package May be simpler than undertaking individual assessments in some cases, since it avoids the need to disaggregate the effects of individual policies	Does not show the effectiveness of individual policies May be difficult to quantify

17 *Source:* Adapted from WRI 2014.

18 *Table 5.5: Criteria for determining whether to assess policies individual or as a package*

Criteria	Questions	Guidance
Objectives and use of results	Do the end users of the assessment results want to know the impact of individual policies, for example, to inform choices on which individual policies to implement or continue supporting?	If “Yes” then undertake an individual assessment
Significant interactions	Are there significant (major or moderate) interactions between the identified policies, either overlapping or reinforcing, that will be difficult to estimate if policies are assessed individually? For example, policies that target other sectors can	If “Yes” then consider assessing a package of policies

	<p>co-exist and reinforce forest policies that focus on reducing drivers of deforestation and/or degradation. These include policies that:</p> <ul style="list-style-type: none"> • Promote agricultural intensification • Support the use of alternative fuels • Reform transportation networks 	
Feasibility	Is it possible (e.g., is data available) to assess a package of policies?	If “No” then undertake an individual assessment
	For ex-post assessments, is it possible to disaggregate the observed impacts of interacting policies?	If “No” then consider assessing a package of policies

1 Source: Adapted from WRI 2014.

2 5.3 Choose ex-ante or ex-post assessment

3 Choose whether to carry out an ex-ante assessment, an ex-post assessment, or a combined ex-ante and
 4 ex-post assessment. Choosing between ex-ante or ex-post assessment depends on the status of the
 5 policy. Where the policy is planned or adopted, but not yet implemented, the assessment will be ex-ante
 6 by definition. Alternatively, where the policy has been implemented, the assessment can be ex-ante, ex-
 7 post, or a combination of ex-ante and ex-post. In this case, users would carry out an ex-post assessment
 8 if the objective is to estimate the impacts of the policy to date; an ex-ante assessment if the objective is to
 9 estimate the expected impacts in the future; or a combined ex-ante and ex-post assessment to estimate
 10 both the past and future impacts. An ex-ante assessment can include historical data if the policy is
 11 already implemented, but it is still an ex-ante rather than an ex-post assessment if the objective is to
 12 estimate future effects of the policy.

13

6. IDENTIFYING IMPACTS: HOW FOREST POLICIES REDUCE OR REMOVE EMISSIONS

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 guidance for how to develop a causal chain by considering how the policy will be implemented, who will be affected by the policy, what the potential intermediate effects of the policy will be, and how these effects cause GHG impacts. The intermediate effects are mapped in a causal chain to illustrate the logical model for how the policy leads to the intended GHG impacts. The causal chain serves as the basis for defining the GHG assessment boundary. Guidance is also provided for defining the assessment period.

Figure 6.1: Overview of steps in the chapter



Checklist of key recommendations

- Identify all stakeholders affected by or with influence on the policy
- Identify the inputs and activities that go into 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

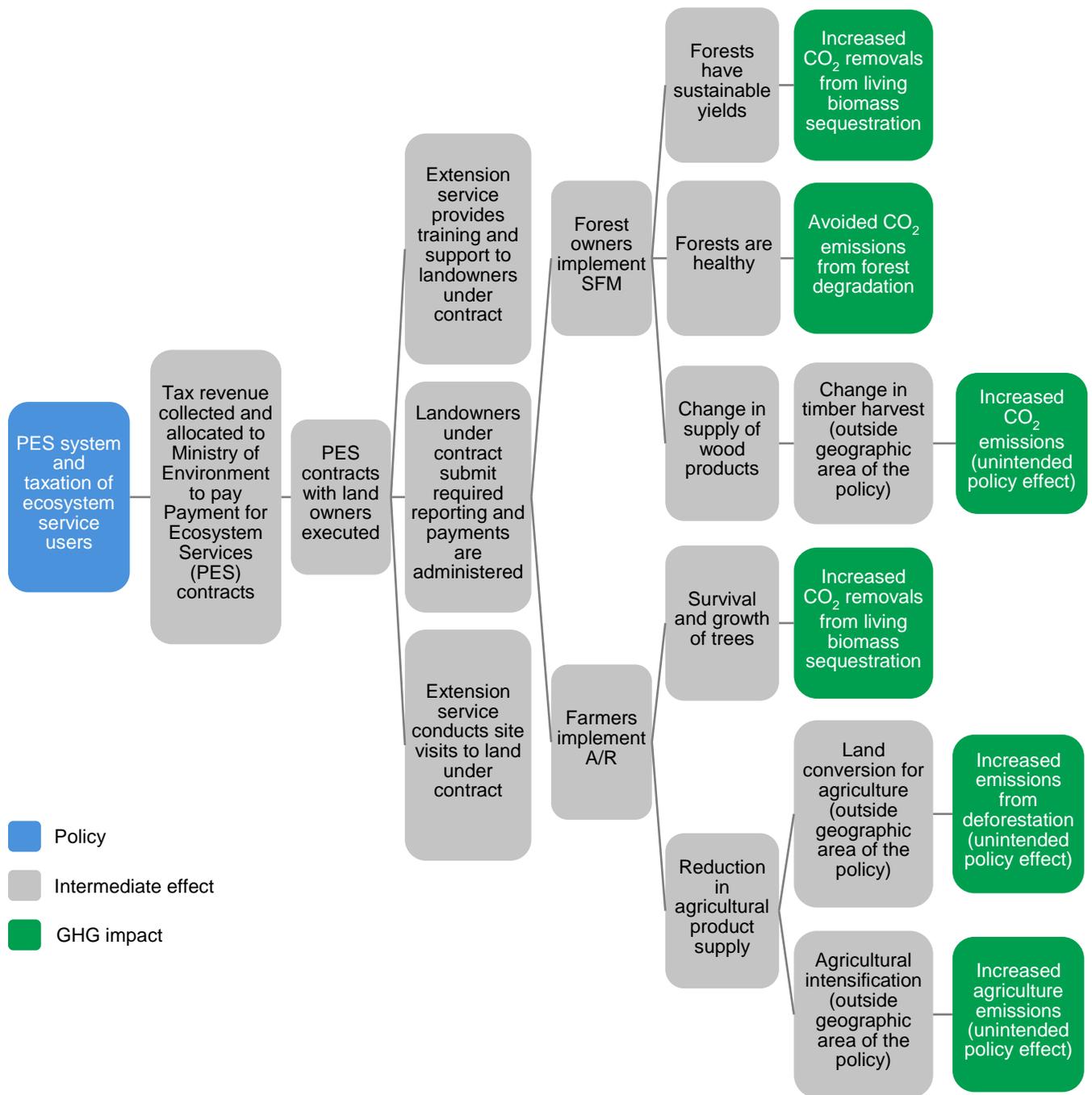
6.1 Identify GHG impacts

In order 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. These 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

- 1 tracing the process by which the policy leads to GHG impacts through a series of interlinked logical and
- 2 sequential stages of cause-and-effect relationships. An example causal chain is provided below in Figure
- 3 6.2.
- 4 The sections below provide guidance on identifying intermediate effects (through identifying stakeholders,
- 5 and inputs and activities), identifying potential GHG impacts and developing a causal chain. This causal
- 6 chain then provides the basis for defining the GHG assessment boundary (Section 6.2).
- 7 The causal chain is also used to estimate the GHG impacts of the policy ex-ante following the guidance in
- 8 Chapter 8. Monitoring the intermediate effects can allow users to evaluate the performance of the policy
- 9 and to attribute GHG impacts to policy implementation.

1 Figure 6.2: Examples of a causal chain



2

3 6.1.1 Identify intermediate effects

4 In order to identifying intermediate effects, first identify the stakeholders of the policy, then the inputs and
 5 activities associated with implementing the policy. Following this, identify and describe the intermediate
 6 effects of the policy. These three steps are described below.

1 Step 1: Identify stakeholders

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

- 7 • Communities, indigenous peoples, or marginalised groups that are involved in or affected by
8 forest resources
- 9 • Producer associations
- 10 • NGOs or civil society organisations
- 11 • Farmers and ranchers
- 12 • Education and research institutions
- 13 • Suppliers of equipment and inputs
- 14 • Commercial forest companies
- 15 • Other companies
- 16 • Informal forest businesses
- 17 • National and subnational government agencies
- 18 • Government entities responsible for forest and/or agriculture and livestock management
- 19 • Financial institutions
- 20 • Consumers

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

24 It is helpful to use a participatory process to identify a full range of stakeholders and to understand how
25 they may be affected by or influence the policy. The ICAT *Stakeholder Participation Guidance* provides
26 information on how to identify stakeholders (Chapter 5), including marginalised people or groups.

27 Step 2: Identify inputs and activities

28 It is a *key recommendation* to identify the inputs and activities that go into implementing the policy. Table
29 6.1 provides definitions and examples of inputs and activities.

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

1 Table 6.1: Summary of inputs and activities

	Definition	Examples
Inputs	Resources that go into implementing a policy	<ul style="list-style-type: none"> • Money allocated to training and education programmes • Money allocated to research programmes • A new programme authorised out of the national budget • Private financing secured to co-fund a government programme
Activities	Administrative activities involved in implementing the policy (undertaken by the authority or entity that implements the policy)	<ul style="list-style-type: none"> • A government agency offers payments for tree planting • A government agency establishes tree nurseries • A government agency pays communities to develop grazing management plans and offers payment for fences for implementation of those grazing management 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 • Enforcement of forestry standards improved • A government agency eases credit access for technology adoption by farmers and ranchers

2 Step 3: Identify and describe intermediate effects

3 It is a *key recommendation* to identify all intermediate effects of the policy. Intermediate effects can be
 4 characterised as how stakeholders are expected to respond to the inputs or activities or to other
 5 intermediate effects of the policy. Intermediate effects can also include the measures that are enabled or
 6 incentivised by the policy. The following are examples for how stakeholders may respond to inputs,
 7 activities or other effects:

- 8 • Comply with regulations
- 9 • Access subsidies or incentives
- 10 • Sign up or commit to programmes
- 11 • Purchase new equipment in order to comply with a policy
- 12 • Plant trees with payments received
- 13 • Sign up for training and increase knowledge level regarding technologies or practices
- 14 • Change forest management strategies (e.g., increase rotation age or increase harvest efficiency
 15 by reducing damage to unfelled trees)

16 Intermediate effects can also be characterised as land-based or market-based:

- 1 • **Land-based effects** occur when a land use shifts from one land category to another. For
2 example, when agriculture expands into forest land.
- 3 • **Market-based effects** occur when the policy reduces the production of a commodity causing a
4 change in the supply and market demand equilibrium that results in a shift of production
5 elsewhere to make up for the supply. For example, when the timber production decreases due to
6 a restriction on the minimum age of trees on public lands, timber production may increase on
7 private lands to compensate for the loss of supply.

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

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

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

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

- 22 • Affected land category
- 23 • Affected activities
- 24 • Direction and amount of effect
- 25 • Geographic location of effect
- 26 • Timing of effect

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

29 **Affected land category**

30 Intermediate effects can be a change in how land is used or how it is managed. When this occurs,
31 describe the affected land area by its size and using the land categories found in the IPCC 2006 GL,
32 Volume 4, Chapter 2.⁷ Using the IPCC land categories will help with the estimation of GHG emissions in
33 Chapters 7 and 8. Use the following IPCC land categories to describe land upon which the intermediate
34 effect occurs:

⁷ Land categories are set out in the IPCC 2006 GL, Volume 4, Chapter 2. Available at: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>.

- 1 • Forest land
- 2 • Cropland
- 3 • Grassland
- 4 • Wetlands
- 5 • Settlements
- 6 • Other land

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

- 9 • Land converted to cropland or, more specifically, forest land converted to cropland and grassland
10 converted to cropland
- 11 • Land converted to grassland or, more specifically, forest land converted to grassland
- 12 • Land converted to forest land or, more specifically, cropland converted to forest land and
13 grassland converted to forest land
- 14 • Land converted to settlements
- 15 • Land converted to other land (category)

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

- 19 • Forest land remaining forest land; more specifically, reducing the impact of logging on land
20 managed for timber

21 **Affected activities**

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

26 **Direction and amount of effect**

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

30 Where known, include the intended amount of the effect in the description of the intermediate effect. The
31 intended amount of the effect may have been determined as part of the policy design process. For
32 example, if a policy aims to incentivise reforestation of 10,000 hectares of cropland land, the intermediate
33 effect can be described as: “increase the amount of cropland converted to forest land by 10,000
34 hectares.” The direction of the effect is to increase. With this example, note the use of IPCC land
35 categories in the description “cropland converted to forest land.”

1 Geographic location

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

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

9 It is possible for unintended intermediate effects to occur outside of the intended jurisdiction of the policy.
 10 In cases where the policy causes a shift in activity to outside of the jurisdiction, the effect can be
 11 described as out-of-jurisdiction.

12 Timing of the effect

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

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

23 Example of describing intermediate effects

24 Table 6.2 provides an example table for how to describe intermediate effects of inputs and activities, and
 25 Table 6.3 provides an example table for how to describe other intermediate effects.

26 *Table 6.2: Example of how to describe intermediate effects of inputs and 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 allocated to Ministry of Environment to pay Payment for Ecosystem Services (PES) contracts	The national government allocates tax revenue to the Ministry of Environment, to make payments to landowners who have executed and complied with PES contract terms.	National scale	Annually 2022-2030
Activities			

Annual tax revenue from ecosystem service users is generated	Ecosystem users pay taxes.	National scale	Annually 2021-2030
Land owners execute PES contracts	Land owners voluntarily sign contracts to participate in the programme.	Privately owned forestland or low productivity cropland	Rolling enrolment 2021-2030
Extension service provides training and support to landowners under contract	The extension service provides SFM and A/R training and monitoring and reporting support to landowners who are under contract.	Privately owned forestland or low productivity cropland	On-going based on landowner needs 2021-2030
Landowners under contract submit required reporting	Landowners submit a year-1 and year-10 forest inventory report 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 land owners.	Regions where payments have been dispersed	On-going during 2022-2030
Payments 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 that sustainable harvest regimes, general tree planting, tree planting with endangered species, and/or natural regeneration occurs.	Privately owned forest land or low productivity cropland	2022-2030

1 Table 6.3: Example table to describe other intermediate effects

Intermediate effects	Detail/explanation	Affected parameter	Direction of effect	Amount of effect	Geographic location of effect	Timing of effect
Forest owners implement SFM	Forest owners implement sustainable harvest regimes on forest land remaining forest land	Forest land remaining forest land under SFM	Increase	150,000 hectares	Contracted land	Contract period
Forests have sustainable yields	Management changes such as increasing the minimum age or tree diameter at cutting will result in increases in merchantable volumes and higher average growth rates	Forest land remaining forest land under SFM	Increase	150,000 hectares	Contracted land	At least one harvest cycle
Forests are healthy	Management changes such as extending the re-entry period for	Forest land remaining forest land	Increase	150,000 hectares	Contracted land	At least one harvest

	selective harvesting and improving the selection of trees for harvesting decrease the chances of degradation from selective harvesting	under SFM				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 of areas enrolled in programme	Contract period
Low-productivity cropland owners implement A/R	Low productivity cropland owners implement afforestation and reforestation activities on low-productivity cropland converted to forest land	Cropland converted to forest land	Increase	60,000 hectares	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 hectares	Contracted land	Contract period
Change in agricultural product supply	The 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 of 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 of areas enrolled in programme	During and after contract period

1 6.1.2 Identify potential GHG impacts

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

5 A/R activities can increase carbon sequestration and/or reduce CO₂ emissions by establishing, increasing
6 or restoring aboveground biomass. SFM activities increase carbon sequestration and/or reduce CO₂
7 emissions on forest lands managed for wood products (e.g., timber, pulpwood, fuelwood) by increasing
8 biomass carbon stocks through improving forest management practices. Avoided
9 deforestation/degradation activities are those that reduce net CO₂ emissions by avoiding the conversion
10 of forest land to another land-use category with lower carbon stock.

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

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

17 6.1.3 Develop a causal chain

18 It is a *key recommendation* to develop a causal chain. Start by drawing links from the policy to the inputs
19 and activities. Draw links from inputs and activities to affected stakeholders and intermediate effects.
20 There may be a series of intermediate effects in the causal chain until it leads to a GHG impact. All of the
21 detailed information about affected stakeholders, inputs, activities and intermediate effects that was
22 described, following the steps in Sections 6.1.1 and 6.1.2, should be included in the causal chain. Figure
23 6.2, provides an example causal chain to illustrate the process.

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

29 Consultations with stakeholders can help with development and/or validation of the causal chain by
30 integrating stakeholder insights on cause-effect relationships between the policy, behaviour change and
31 expected impacts. Refer to the ICAT *Stakeholder Participation Guidance* (Chapter 8) for information on
32 designing and conducting consultations.

33 6.2 Define the GHG assessment boundary

34 It is a *key recommendation* to include all significant GHG impacts in the GHG assessment boundary. The
35 GHG assessment boundary defines the range of GHG impacts that are included in the policy
36 assessment. Not all GHG sources or carbon pools associated with GHG impacts in the causal chain will
37 need to be included in the GHG assessment boundary. In this step, users determine which GHG sources

1 and/or carbon pools⁸ are significant and should be included in the analysis. This is done by evaluating the
 2 likelihood and relative magnitudes of each of the GHG impacts identified in Section 6.1, using the
 3 following steps:

- 4 • Step 1: Assess the likelihood that each GHG impact will occur
- 5 • Step 2: Assess the expected magnitude of each GHG impact
- 6 • Step 3: Determine the significance of GHG impacts

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

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

16 *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.	<90% and ≥66%
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.	<66% and ≥33%
Unlikely	Reason to believe the impact probably will not happen (or probably did not happen) as a result of the policy.	<33% and ≥10%
Very unlikely	Reason to believe the impact will not happen (or did not happen) as a result of the policy.	<10%

17 *Source:* Adapted from WRI 2014.

18 The likelihood classification should be based on evidence to the extent possible, such as published
 19 literature, prior experience, modelling results, risk management methods, consultation with stakeholders,
 20 expert judgment, or other methods.

⁸ 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.

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

3 **Step 2: Assess the magnitude of each GHG impact**

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

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

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

18 *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%

19 *Source:* Adapted from WRI 2014

20 **Step 3: Determine the significance of GHG impacts**

21 Once the likelihood and magnitude of each impact has been determined, review the classifications for
 22 likelihood and magnitude to determine whether each impact is significant. In general, users should
 23 consider impacts to be significant unless they are either minor in size or unlikely or very unlikely to occur
 24 (see Figure 6.3). Table 6.6 provides additional guidance on what to considering when evaluating which
 25 GHG sources and carbon pools to include in the GHG assessment boundary.

1 The ICAT *Agriculture Guidance* lists considerations for which GHG sources and carbon pools to include
 2 in a GHG assessment boundary for mitigation activities that lead to enhanced CO₂ sequestration and
 3 avoided CO₂ emissions in the soil carbon pool in pasture, grazing and croplands

4 *Figure 6.3: Recommended approach for determining significance based on likelihood and magnitude*

Likelihood	Magnitude		
	Minor	Moderate	Major
Very likely	Insignificant	Significant	
Likely			
Possible			
Unlikely	Insignificant		
Very unlikely	Insignificant		

5 Source: Adapted from WRI 2014.

6 *Table 6.6: Considerations for evaluating significance of GHG sources and carbon pools*

Source/ Carbon pool	Gas	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 (avoided deforestation and afforestation/reforestation) because in some cases soil carbon stock gains can occur. For example, soil carbon stocks can increase significantly in avoided 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 (DOM)	CO ₂	Generally expected to have a relatively minor effect and can be excluded.
Harvested wood products – intended and within the geographic area of the policy	CO ₂	Consider including this source when: forest management policies aim to promote more production of long term HWP compared to a baseline of dominant short term HWP; and when afforestation and reforestation result 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 ₂ O	Forest policies are not likely to intentionally increase biomass burning compared to baseline. Forest policies may intentionally reduce biomass burning compared to baseline; however, it is conservative to exclude this source in that situation. If unintended land conversions are likely (see below), consider including biomass burning as 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 afforestation and reforestation 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 policies that are intended to affect land-use change (i.e., avoided deforestation and afforestation/reforestation). If food supply is decreased as a result of the policy, then unintended land-use change is possible. This may occur when the policy intervention reduces crop outputs compared to baseline. As part of its Jurisdictional and Nested REDD+ programme, the VCS Program provides guidance for quantifying the effective area needed to maintain production ⁹ and guidance for evaluating the volume of foregone commodity production. ¹⁰ Both of these resources can be adapted to assess the significance of a forest policy on food supply or demand.

1 6.3 Define the assessment period

2 It is a *key recommendation* to define the assessment period. The assessment period is the time period
3 over which impacts resulting from the policy are assessed. The starting date and the duration of the
4 assessment period may vary depending whether or not an ex-ante or ex-post assessment will be
5 conducted.

6 Where possible, users should align the assessment period with other assessments being conducted
7 using ICAT guidance. For example, where users are assessing sustainable development impacts using
8 the ICAT *Sustainable Development Guidance* in addition to assessing GHG impacts, the assessment
9 period should be the same for both the sustainable development and GHG impact assessments.

10 Ex-ante assessment

11 The ex-ante assessment period is usually determined by the longest-term impact included in the GHG
12 assessment boundary. The assessment period can continue until the policy implementation period ends
13 or it can be longer than the policy implementation period, as some significant GHG impacts can occur
14 after the policy implementation period ends. The assessment period should be defined to include all

⁹ Guidance for quantifying the effective area needed to maintain production is provided in the VCS *Global Commodity Leakage Module: Effective Area Approach*. Available at: <http://database.v-c-s.org/methodologies/global-commodity-leakage-module-effective-area-approach-v10>

¹⁰ Guidance for evaluating the volume of foregone commodity production in the document is available in the *Global Commodity Leakage Module: Production Approach*. Available at: <http://database.v-c-s.org/methodologies/global-commodity-leakage-module-production-approach-v10>

1 significant GHG impacts included in the GHG assessment boundary, based on when they are expected to
2 occur (as described in Section 6.1.1, Step 3).

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

- 5 • A timeframe or date that is directly specified in the policy goal or target (e.g., reduce emission by
6 50% by 2020)
- 7 • The length of time for which the policy is funded or expected to be funded
- 8 • A period in time that has otherwise been identified as the policy implementation end date
- 9 • 20-year assessment period (based on rationale discussed below)

10 GHG emission and removal dynamics should be considered for GHG impacts that involve carbon
11 sequestration in soils and/or biomass when determining the assessment period. For example, changes in
12 land use or land management can change soil carbon sequestration rates until a new equilibrium is
13 reached. IPCC suggests a default 20-year transition period for soil carbon dynamics to reach a new
14 equilibrium.¹¹ Generally, when establishing new forests or when forests regrow after harvest and
15 disturbance, the initial rate of carbon gain in the biomass pool is high compared to later when the forest
16 reaches maturity. Also, forest biomass is removed or lost due to multiple factors. Forest harvesting, which
17 occurs in close to 20-year cycles, results in removal of biomass from forest stands, and the end use of the
18 harvested wood determines the amount of carbon loss over time.

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

24 Assumptions about baseline and policy scenarios become more uncertain the further forward in time the
25 assumptions are projected. Therefore, it is also recommended that the assessment period is not
26 extended much further than 20 years into the future. Rather, users can define multiple discrete
27 assessment periods that cover the length of the policy implementation period, with each assessment
28 period not to exceed 20 years. For example, where the policy implementation period is 2020-2060, there
29 can be two assessment periods from 2020-2040 and 2041-2060.

30 Ex-post assessment

31 For an ex-post assessment, the assessment period can be the period between the date the policy or
32 action is implemented and the date of the assessment or it can be a shorter period between those two
33 dates. The assessment period for a combined ex-ante and ex-post assessment should consist of both an
34 ex-ante assessment period and an ex-post assessment period.

¹¹ IPCC 2006.

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

4 6.4 Identify sustainable development impacts (if relevant)

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

8 Refer to the ICAT *Sustainable Development Guidance* for guidance on conducting an assessment of
 9 sustainable development impacts. Table 6.7 lists examples of sustainable development impacts that may
 10 be associated with forest policies, categorised according to the ICAT *Sustainable Development*
 11 *Guidance*. The Sustainable Development Goals (SDGs) most directly relevant to each impact category
 12 are indicated in parentheses.

13 *Table 6.7: Examples of sustainable development impacts relevant to forest policies*

Dimension	Groups of impact categories	Impact categories
Environmental impacts	Air	<ul style="list-style-type: none"> • Air quality • Visibility
	Water	<ul style="list-style-type: none"> • Availability of freshwater (SDG 6) • Water quality (SDG 6, SDG 14) • Biodiversity of freshwater and coastal ecosystems (SDG 6, SDG 14)
	Land	<ul style="list-style-type: none"> • Biodiversity of terrestrial ecosystems (SDG 15) • Land-use change, including deforestation, forest degradation, and desertification (SDG 15) • Soil quality (SDG 2) • Soil erosion
	Other/cross-cutting	<ul style="list-style-type: none"> • Resilience of ecosystems to climate change (SDG 13) • Adverse effects of climate change • Energy (SDG 7) • Depletion of nonrenewable resources • Toxic chemicals released to air, water and soil • Terrestrial and water acidification (SDG 14) • Infrastructure damages from acid deposition
	Health and well-being	<ul style="list-style-type: none"> • Access to safe drinking water (SDG 6) • Access to land (SDG 2)
Social impacts	Education and culture	<ul style="list-style-type: none"> • Capacity, skills, and knowledge development (SDG 4, SDG 12) • Climate change education, public awareness, capacity-building and research • Preservation of local and indigenous culture and heritage (SDG 11)

	Institutions and laws	<ul style="list-style-type: none"> Strengthening land tenure Public participation in policy-making processes Access to information and public awareness (SDG 12)
	Welfare and equality	<ul style="list-style-type: none"> Poverty reduction (SDG 1) Protection of poor and negatively affected communities (SDG 12) Gender equality and empowerment of women (SDG 5) Indigenous rights
	Labour conditions	<ul style="list-style-type: none"> Labour rights (SDG 8) Quality of jobs (SDG 8) Fairness of wages (SDG 8)
	Communities	<ul style="list-style-type: none"> Community/rural development
	Peace and security	<ul style="list-style-type: none"> Resilience to climate change, including adaptation to dangerous climate change and extreme weather events (SDG 13)
	Overall economic activity	<ul style="list-style-type: none"> Economic activity (SDG 8) Economic productivity (SDG 8, SDG 2) Economic diversification (SDG 8)
Economic impacts	Employment	<ul style="list-style-type: none"> Jobs (SDG 8) Wages (SDG 8) Worker productivity
	Business and technology	<ul style="list-style-type: none"> New business opportunities (SDG 8) Innovation (SDG 8, SDG 9) Competitiveness of domestic industry in global markets Tourism and ecotourism (SDG 8)
	Income, prices and costs	<ul style="list-style-type: none"> Income (SDG 10) Prices of goods and services Costs and cost savings Market distortions (SDG 12) Internalisation of environmental costs/externalities Cost of policy implementation and cost-effectiveness of policies
	Trade and balance of payments	<ul style="list-style-type: none"> Balance of trade (imports and exports) Foreign exchange Government budget surplus/deficit

1

2

PART III: ASSESSING IMPACTS

7. ESTIMATING THE BASELINE SCENARIO AND EMISSIONS

When using the scenario approach, estimating the GHG impacts of a policy requires a reference case, or baseline scenario, against which impacts are estimated. The baseline scenario represents what would have happened in the absence of the policy intervention. Baseline emissions and removals are estimated according to the most likely baseline scenario that includes credible assumptions on land use, land-use changes and, timber management practices, and the associated emissions and removals that would have occurred without the implementation of the policy.

The guidance in this chapter can be used for determining the baseline scenario and estimating emissions ex-ante or ex-post. Estimating baseline emissions is optional; users can calculate the GHG impacts of the policy directly, without explicitly determining separate baseline and policy scenarios, using the deemed estimates approach. In such cases, users can skip to Chapter 8.

Figure 7.1: Overview of the steps in the chapter



Checklist of key recommendations

- Identify the intended policy outcomes and target drivers
- Stratify land by land-use category
- Estimate the area of land in each stratum
- Estimate the carbon stock change (i.e., emission factor) for each carbon pool in each land stratum
- Calculate the cumulative GHG emissions and removals for the baseline scenario over the assessment period

7.1 Determine the baseline scenario

The most likely baseline scenario is determined by drivers that are affecting emissions and carbon stocks. This step requires identifying parameters for these drivers and making reasonable assumptions about their most likely values in the absence of the policy.

When determining the baseline scenario, consider how the sector would have developed without the policy. For example:

- What mitigation practices or technologies would be implemented in the absence of the policy?
- Are there existing or planned policies, other than the policy being assessed that would likely have an impact on GHG emissions for the forestry sector?

- 1 • Are there non-policy drivers (e.g., market trends or non-anthropogenic processes) or other
- 2 sectoral trends that should be reflected in the baseline scenario? For example:
- 3 ○ Changes in the demand for harvested wood products
- 4 ○ Improvements in timber and forest management practices
- 5 ○ Land-use change (e.g., natural regeneration)
- 6 ○ Trends in the agriculture sector
- 7 ○ Trends in biofuel production
- 8 ○ Trends in development (e.g., settlements and infrastructure)

9 To the extent possible, users should identify a single baseline scenario that is considered to be the most
 10 likely. In certain cases, multiple baseline options may seem equally plausible. Users can develop multiple
 11 baselines, each based on different sets of assumptions, rather than just one set. This approach produces
 12 a range of possible emission reductions scenarios. Users can then conduct a sensitivity analysis to see
 13 how the results vary depending on the selection of baseline scenario. More guidance about conducting a
 14 sensitivity analysis is provided in Chapter 12 of the *Policy and Action Standard*.

15 Users that are assessing the sustainable development, transformational or other GHG impacts of the
 16 policy should use the same underlying assumptions about macroeconomic conditions, demographics and
 17 other non-policy drivers. For example, if GDP is a macro-economic condition needed for assessing both
 18 the job impacts and economic development impacts of an agriculture policy, users should use the same
 19 assumed value for GDP over time for both assessments.

20 7.1.1 Approaches to determining the baseline scenario

21 This section describes the various approaches to determining the most likely baseline scenario. There are
 22 multiple ways to project the baseline scenario, ranging from simple to complex. Depending on the
 23 availability and quality of forecasting data, any of the following of approaches can be used for determining
 24 the baseline scenario. Figure 7.2 illustrates the different baseline approaches.

25 Constant baseline

26 This approach assumes there will be no change in land use, land cover or forest management practices
 27 with respect to the situation prior to policy implementation. It represents the simplest approach as only
 28 historical data is required. Either the most recent available data, or an average of the data from three
 29 years prior to the start of the policy implementation, can be used to quantify the baseline parameters. This
 30 approach then assumes the parameters are held constant for the assessment period and the baseline is
 31 the continuation of the current or historical situation. For example, land will remain degraded under the
 32 baseline scenario.

33 Simple trend baseline

34 This baseline scenario approach assumes that land use, land cover and forest management practices will
 35 evolve in the same way as they have in the past. This approach typically uses a linear or exponential
 36 extrapolation of the historical trend for each baseline parameter. Users can employ a statistical regression
 37 analysis to estimate trends. This approach does not include any assumptions about future policy
 38 measures or future mitigation actions. This approach should use historical data from 5 to 10 years prior to

1 the implementation of the policy. More data points will strengthen the regression analysis. For example,
2 land-use change in the future can be estimated by assuming that the same rate change prior to policy
3 implementation continues in the baseline.

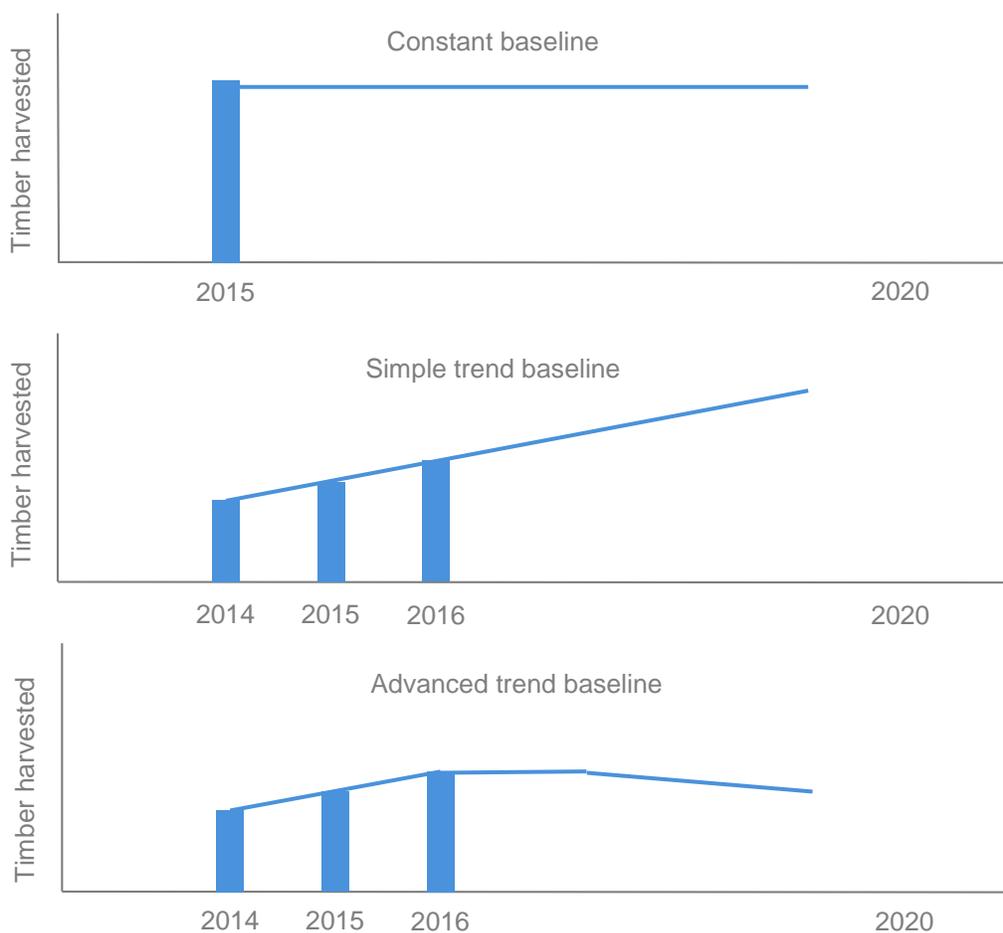
4 Advanced trend baseline

5 This approach models the future evolution of the key drivers of emissions and factors in the impact of
6 many interacting elements, including trends in macroeconomic conditions, demographics and other non-
7 policy drivers.

8 A modeled baseline can be top-down or bottom-up:

- 9 • **Top-down model:** This models how the economy or other exogenous factors (e.g.,
10 macroeconomic and demographic conditions) will impact the forestry sector. For example, the
11 approach may model how population growth will impact land use and then uses population
12 forecasts to predict baseline land-use change.
- 13 • **Bottom-up model:** This approach models the interaction of key drivers on specific land use,
14 land-use change and forest management practices. It can offer a more detailed projection of
15 specific GHG sources and carbon pools. This approach will likely require detailed data such as
16 forest inventory, drivers of land-use change or specific timber or forest management practices. It
17 is suitable in countries where emissions from this sector are small or where their economic output
18 is modest, because the expected trends in macroeconomic and demographic conditions may not
19 be a good indicator of land use or land-use change.

1 **Figure 7.2: Examples of constant, simple trend and advanced trend baselines**



- 2
- 3 A land use, land-use change and forestry (LULUCF) model projects the land use and land-use changes
- 4 that are expected to occur in the baseline. A comprehensive LULUCF model covers the following
- 5 dimensions:
- 6 • **Sectoral:** There is sufficient detail to identify targeted economic opportunities within and across
 - 7 the sectors (e.g., land-use change, forest management, agricultural management or biofuel
 - 8 production). The model could include a market-clearing price and resource competition to capture
 - 9 the impact of mitigating emissions where forest and agriculture products are affected.
 - 10 • **Spatial:** The model accounts for the heterogeneity of biophysical and economic conditions within
 - 11 and across regions as they relate to the production of food, fiber and fuel. For example, carbon
 - 12 sequestration rates can vary regionally. A spatial model could also model competition for region-
 - 13 specific resources, such as land and water which effects economic responsiveness in forestry
 - 14 and agriculture.
 - 15 • **Temporal:** The model has the ability to capture dynamic biophysical processes (e.g., soil and
 - 16 biomass carbon accumulation or fate of harvested wood products). It could also capture dynamic
 - 17 economic processes (e.g., investment, technological progress, demand trends or traditional
 - 18 commodity developments).

1 LULUCF models can be categorised according to their functional and methodological aspects, as follows:

- 2 • Statistical or econometric
- 3 • Spatial interaction models
- 4 • Optimisation models (which include linear, dynamic, hierarchical and non-linear programmes,
5 such as utility maximisation models and multi-criteria decision making models)
- 6 • Integrated models (gravity, simulation and entry-exit models)
- 7 • Models based on natural sciences
- 8 • Models based on GIS
- 9 • Models based on the Markov Chain (MAPS, 2015)

10 There are a number of existing models which can be used to project an advanced trend baseline. For
11 example, the Global Biosphere Management Model (GLOBIOM) is an economic partial equilibrium model
12 of the competition for global land use. In GLOBIOM, the demand for land is modeled based on
13 exogenously specified regional drivers (including gross domestic product (GDP) growth, population
14 growth, evolution of food diets and global bioenergy demand), and local characteristics of the land. Brazil
15 has considered a model that includes the dynamics of land use that will be affected by competition and
16 scale. It provides the results of land allocation to different regions and biomasses in the country, thereby
17 projecting the type of natural vegetation that is converted (deforested) into agricultural land. The
18 projections are based on country level plans up to 2030 (MAPS, 2015).

19 7.1.2 Data Sources

20 Multiple types of data can be used to develop baseline scenarios, including top-down and bottom-up:

- 21 • **Top-down data:** Macro-level data or statistics collected at the jurisdictional or sectoral level.
22 Examples include economic data on milk or meat consumption, land use maps, population and
23 GDP. In some cases, top-down data are aggregated from bottom-up data sources.
- 24 • **Bottom-up data:** Data that are measured, monitored or collected at the facility, entity or project
25 level. Examples include agricultural or livestock census data on current and/or historical livestock
26 population, species, feed intake or land-use categories classified by climate region, soil type and
27 management.

28 The key parameters for estimating baseline emissions and removals in forests are:

- 29 • **Activity data:** Hectares of forest land remaining forest land, non-forest land converted to forest
30 land, forest land converted to non-forest land.
- 31 • **Carbon stock change factor:** The net change in carbon stocks per hectare of land, which can
32 also be expressed as CO₂ emissions and removals per hectare of land. The carbon stock change
33 represents the emission factor for a land use or land management.

34 Historical data from national GHG inventories, National Communications and Biennial Update Reports,
35 which are prepared following IPCC guidelines, can be used for determining the baseline scenario and
36 estimating baseline emissions and removals. Sources of data for the key parameters include:

- 37 • Forest Cover maps and regionally specific data

- 1 • Country-level data from NAMA and low carbon development programmes
- 2 • Country-level REDD+ studies (e.g., national or subnational REDD+ forest reference emission
- 3 levels (FRELs) or forest reference levels (FRLs))
- 4 • Global Forest Watch (GFW)¹², US Geological Survey (USGS)¹³, FAO databases¹⁴

5 7.1.3 Choosing the approach to determine the baseline scenario

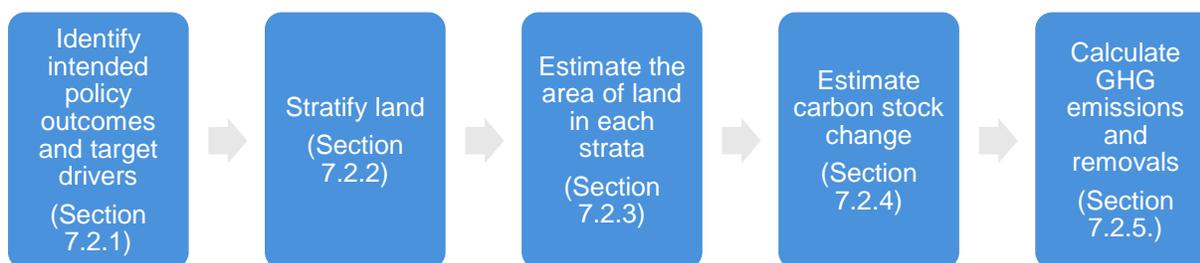
6 The choice of approach to determine the baseline scenario depends on users' resources, capacity,
 7 access to data, availability of models and methodologies, and the parameters that are expected to
 8 change. A constant baseline is the simplest option and may be appropriate when parameters are
 9 considered likely to remain stable over time. A simple trend baseline is most appropriate if the change in
 10 baseline parameter values is expected to remain stable over time. Advanced trend baseline approaches
 11 may yield more accurate results than other approaches, since they take into account various drivers that
 12 affect conditions over time. However, more complex baselines will only be more accurate if the underlying
 13 data and methods used to model the impacts of drivers are robust. Users should use methods and data
 14 that yield the most accurate results within a given context, based on the resources and data available.

15 7.2 Estimate baseline emissions

16 This section provides guidance on estimating baseline emissions. It provides suggestions for identifying
 17 data sources and methods for projecting key baseline scenario parameters. Figure 7.3 outlines the steps
 18 in this section.

19 The guidance can also be used to estimate policy scenario emissions for forest policies. To estimate
 20 policy scenario emissions, use the same method that was used to estimate baseline emissions with new
 21 parameter values derived following the guidance in Sections 8.2 – 8.5 and, if relevant, new emission
 22 factors that represent conditions under the policy scenario. The policy scenario can be estimated ex-ante
 23 or ex-post with these methods.

24 *Figure 7.3: Steps for estimating baseline emissions*



25

26 Changes in land use can lead to an increase or decrease in forest carbon. For example, conversion of
 27 cropland to forest land results in a net increase of forest carbon. Conversely, cropland converted to
 28 forests land (deforestation) results in net losses of forest carbon. Where land use remains the same over

¹² Global Forest Watch data is available at: <http://www.globalforestwatch.org/>

¹³ USGS land cover datasets are available at: <https://landcover.usgs.gov/globalandcover.php>

¹⁴ FAO databases are available at: <http://www.fao.org/faostat/es/>

1 time (e.g., forest land remaining forest land), changes in management (e.g., increasing the minimum age
 2 of cutting thresholds) can result in net increases or decreases in forest carbon. Policy impacts on forest
 3 carbon are estimated in terms of how the policy changes land use and management.

4 **7.2.1 Identify intended policy outcomes and target drivers**

5 It is a *key recommendation* to identify the intended policy outcomes and target drivers. There are
 6 generally four types of policy outcomes in the forestry sector. They include:

- 7 • Enhance forest carbon stocks by converting land to forests (afforestation/reforestation)
- 8 • Enhance forest carbon stocks in existing forests
- 9 • Reduce emissions from deforestation
- 10 • Reduce emissions from degradation

11 Drivers are a categorical description of agents and processes that lead to GHG emissions in the forestry
 12 sector in the baseline scenario. Policies enable or incentivise measures that are designed to affect target
 13 drivers. Table 7.1 provides examples of target drivers as they relate to intended policy outcomes. The
 14 target drivers need to be identified in the baseline scenario because assumptions about them are
 15 modified in order to develop the policy scenario.

16 Drivers that are not affected by the policy do not need to be analysed, because they are assumed to
 17 remain constant between the baseline and policy scenarios. For example, if the policy focuses on
 18 afforestation on degraded lands, it can be assumed that logging practices on lands managed for timber
 19 will remain the same.

20 The data for key parameters will vary depending on the intended policy outcome. Table 7.2 provides
 21 general descriptions of the key parameters associated with each type of policy outcome.

22 *Table 7.1: Example relationships between intended policy outcomes, target drives and policy measures*

Intended policy outcome	Example target drivers	Example policy measures
Enhance forest carbon stocks by converting land to forests	Barriers to natural regeneration	Plant trees Remove barriers to natural regeneration Make sites suitable for natural regeneration
Enhance forest carbon stocks with existing forests	Poor forest management	Encourage implementation of sustainable forest management Reduce the size of logging roads Reduce damage of other trees when logging
Reduce emissions from deforestation	Illegal logging Economic pressure for more agricultural production that requires agricultural land expansion	Introduce and improve systems to effectively enforce existing or new forest protection regulation Agricultural intensification

Reduce emissions from degradation	Unsustainable biomass removals from selective logging and fuelwood gathering Over-frequent burning	Introduce and improve systems to effectively enforce existing or new regulation on fuel wood collection
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1 *Table 7.2: Key parameters by policy outcome*

Intended policy outcome	Activity data	Carbon stock change
Enhance forest carbon stocks within existing forests	Area of forest land remaining forest land where management can be improved	CO ₂ removals/hectare from enhancements
Enhance forest carbon stocks by converting land to forests	Area of land converted to forest land	CO ₂ removals/hectare from biomass and soil from land conversion
Reduce emissions from deforestation	Area of forest land converted to non-forest land	CO ₂ emissions/hectare of deforestation
Reduce emissions from degradation	Area of forest land remaining forest land where degradation occurs	CO ₂ emissions/hectare of degradation

2 **7.2.2 Stratify land**

3 It is a *key recommendation* to stratify land by land-use category. Following guidance in Section 6.1.1,
4 Step 3, users should have identified the affected land categories where changes in land use and forest
5 management are expected to occur under the policy scenario. At a high level, the possible affected land
6 categories are:

- 7 • Forest land converted to non-forest land
- 8 • Forest land remaining forest land
- 9 • Non- forest land converted to forest land

10 For each of the land categories in the GHG assessment boundary, further divide them into subcategories
11 by climate information, forest types and forest management. Where available, country level stratification
12 of forest type and biomass values can be used.

13 The IPCC 2006 GL provide a land categorisation for forests that is compatible with Tier 1 estimation
14 methods. To use the IPCC categorisation, identify the ecological zones and forest management types
15 that correspond to the forest land in that category. Ecological zones are areas with relatively
16 homogeneous vegetation. The IPCC defines ecological zones based on climate domain and climate
17 region; where climate domain is an area of relatively homogeneous temperature, and climate region is an
18 area with a relatively similar climate in terms of both moisture and temperature. Some ecological zones
19 are, for example: tropical rain forest, subtropical humid forest, temperate oceanic forest and boreal
20 coniferous forest. IPCC definitions of ecological zones according to climate domain and climate region
21 are provided in Table 4.1 of the IPCC 2006 GL, Volume 4, Chapter 4.

22 Within each ecological zone, further define subcategories of forest land in terms of how the forests are
23 managed. The IPCC provides two categories for this: natural and plantation forest. Natural forests are

1 generally naturally re-growing stands with reduced or minimum human intervention. Plantation forests are
 2 intensively managed (including planted, managed, harvested and replanted). The IPCC provides Tier 1
 3 estimated biomass values for natural and plantation forests for all ecological zones (Table 4.12 of the
 4 IPCC 2006 GL, Volume 4, Chapter 4). Use the IPCC biomass values and information about forest
 5 management and forest biomass in your country to develop criteria for classifying forests into natural and
 6 plantation and document the criteria you have used.

7 The subcategories outlined above (i.e., ecological zone and management type), are recommended
 8 because they are compatible with using IPCC Tier 1 emission factors for estimating the carbon in forest
 9 biomass. The land categorisation can be done in differently where Tier 2 or 3 emission factors are
 10 available or can be derived to estimate CO₂ emissions/removals for each land category.

11 7.2.3 Estimate the area of land in each stratum

12 It is a *key recommendation* to estimate the area of land in each stratum. Land area can be derived from
 13 national data sources that are widely accepted among policymakers and endorsed by the government.
 14 Potential data sources include remote sensed and aerial imagery, ministry of agriculture or forests,
 15 national agricultural or forest research institutes, and international agencies (e.g., FAO). Relevant land
 16 area data compiled for the national GHG inventory could also be useful. These data sources will typically
 17 provide information on historical and current land area.

18 There are several resources that detail how to develop land area estimates for forest carbon monitoring:

- 19 • IPCC 2003 Good Practice Guidelines for Land Use, Land-Use Change and Forestry¹⁵
- 20 • IPCC 2006 GL for AFOLU, Volume 4¹⁶
- 21 • Global Observation of Forest Cover and Land Dynamics (GOFCC GOLD) Sourcebook¹⁷
- 22 • Winrock Standard Operating Procedures for Terrestrial Carbon Measurement 2016¹⁸
- 23 • Global Forest Observation Initiative methods and guidance documentation¹⁹

24 These resources can be used to estimate a time series of land area for the baseline assessment. The
 25 time series is the number or hectares of land in each land stratum each year of the assessment period.
 26 Any of the approaches discussed in Section 7.1 can be used to project the hectares of land over time
 27 based on current and historical data.

28 7.2.4 Estimate carbon stock change

29 It is a *key recommendation* to estimate the carbon stock change (i.e., emission factor) for each carbon
 30 pool in each land stratum. At a minimum, the carbon stock change for the living aboveground and

¹⁵ Available at: <http://www.ipcc-nggip.iges.or.jp/public/gpplulucf/gpplulucf.html>

¹⁶ Available at: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>

¹⁷ Available at: <http://www.gofccgold.wur.nl/redd/>

¹⁸ Available at: <http://www.leafasia.org/tools/winrock-standard-operating-procedures-terrestrial-carbon-measurementfield-sop-manual>

¹⁹ Available at: <http://www.gfoi.org/methods-guidance/>

1 belowground biomass (living biomass) pool should be estimated. For afforestation/reforestation and
 2 avoided deforestation activities, carbon stock change for dead organic matter and soil carbon pools can
 3 also be estimated where these pools are included in the GHG assessment boundary.

4 When deciding which pools to estimate the carbon stock change for, users may encounter trade-offs
 5 between the principle of accuracy and the cost of collecting data. Conservativeness can serve as a
 6 moderator to accuracy in order to balance costs while maintaining the credibility the GHG estimate. Users
 7 can rely on existing data and methods for estimating carbon stock change including the following:

- 8 • National forest inventories
- 9 • Subnational or regional forest inventory datasets
- 10 • Independent relevant or regional scientific studies or datasets
- 11 • Values published in scientific literature
- 12 • Values provided in the IPCC 2006 GL

13 The guidance below is for estimating carbon stock change based on the living biomass carbon pool only.

14 Land-use change

15 For afforestation/reforestation or avoided deforestation where land-use changes (e.g., non-forest land
 16 converted to forest land and vice versa), the carbon stock change is the average change in forest carbon
 17 stocks per unit area as a result of land being afforested/reforested or deforested. In general, this can be
 18 estimated as the difference between the forest carbon stocks per unit area before and after the land
 19 conversion, as shown in Equation 7.1 (based on Equation 2.16 in the IPCC 2006 GL). Equation 7.1
 20 includes the area term representing activity data. Executing the equation with the area term yields total
 21 emissions and removals in terms of tonnes of carbon per year for all land conversions. Executing the
 22 equation without the area term will yield a per area carbon stock change for each type of land conversion.

23 *Equation 7.1: Carbon stock change from land conversion*

$$24 \quad \Delta C_{Conversion} = \sum_i \{ (B_{After,i} - B_{Before,i}) * A_{To_NF,i} \} * CF$$

25 Where,

26 $\Delta C_{Conversion}$ = Carbon stock change on land type i , tonnes C yr⁻¹

27 $B_{After,i}$ = biomass stocks* on land type i after the conversion, tonnes dry matter ha⁻¹

28 $B_{Before,i}$ = biomass stocks* on land type i before the conversion, tonnes dry matter ha⁻¹

29 $A_{To_NF,i}$ = area of land use i converted to non-forest land (NF) in a certain year, ha yr⁻¹

30 CF = carbon fraction of dry matter, tonne C (tonnes dry matter)⁻¹

31 i = type of land converted to non-forest land

32 * Note: Biomass stocks x CF = Carbon stocks; The carbon fraction converts units of dry matter (a
 33 common measure in forestry) to units of carbon with a basic conversion factor that varies by climate
 34 region. The IPCC 2006 GL provides default carbon fraction values in Table 4.3.

1 As noted above, Tier 1 estimated biomass values for natural and plantation forests for all ecological
 2 zones are provided in Table 4.12 of the IPCC 2006 GL, Volume 4, Chapter 4. These values can be used
 3 to develop Tier 1 carbon stock change factors for afforestation/reforestation and avoided deforestation,
 4 with the equation above. Values for biomass stocks in the non-forest land pre- or post-conversion
 5 categories can be found in IPCC 2006 GL Table 5.9 (croplands) or Table 6.4 (grassland).

6 For a rough estimate of a deforestation carbon stock change, use zero for the value of $B_{After,i}$. This will
 7 overestimate emissions from deforestation because the biomass gains that occur in the post-conversion
 8 land category are not counted (i.e., the loss in biomass as a result of conversion is overestimated).
 9 However, this is likely to be a proportionally small overestimation because post conversion biomass
 10 stocks are relatively small in magnitude compared to the pre-conversion forests carbon stocks.

11 For a rough estimate of an afforestation/reforestation carbon stock change, use zero for the value of
 12 $B_{Before,i}$. This will overestimate removals from afforestation/reforestation because it does not count the
 13 biomass stocks that existed before conversion (i.e., the gain in biomass as a result of conversion is
 14 overestimated). This is also likely to be a proportionally small overestimation because pre-conversion
 15 biomass stocks are relatively small in magnitude compared to the post-conversion forest carbon stocks.

16 Forest land remaining forest land

17 For forest land remaining forest land, the carbon stock change is the average annual change in forest
 18 carbon stocks per unit area. This can be estimated in one of two ways according to the IPCC 2006 GL:

- 19 • **Stock-difference method:** The average annual change in forest carbon stocks is calculated as
 20 the difference in average forest carbon stocks between two points in time, divided by the time
 21 period, as shown in Equations 7.2a and 7.2b (adapted the first part of Equation 2.8 in the IPCC
 22 2006 GL). The stock-difference method is most suitable to circumstances where there is good
 23 availability of information and/or resources, for example national forest inventories/datasets that
 24 allow estimates of carbon stocks by forest types, specific to local/regional conditions over time.
- 25 • **Gain-loss method:** The average annual change in forest carbon stocks is calculated as a
 26 process of gains and losses, where gains result from annual forest growth and losses from
 27 processes like wood harvesting, fuel wood extraction and disturbance, as shown in Equation 7.3.
 28 The gain-loss method is most suitable for circumstances when countries do not have time series
 29 information on activity data and emission factors to assess by stock-difference method.

30 Both the stock-difference and gain-loss methods are executed with the area term (activity data) in the
 31 equations, which yields total change in carbon stocks for all land strata in forest land remaining forest
 32 land. Therefore the carbon stock change is embedded in the quantification of total emissions and
 33 removals.

34 Stock-difference method

35 *Equation 7.2a: Part 1 of stock-difference method for estimating carbon stock change*

$$36 \quad \Delta C = \frac{(C_{t,2} - C_{t,1})}{(t_2 - t_1)}$$

37 Where:

1 ΔC = annual forest carbon stock change, tonnes C yr⁻¹

2 $C_{t,1}$ = forest carbon stock at time t_1 , tonnes C

3 $C_{t,2}$ = forest carbon stock at time t_2 , tonnes C

4 The terms $C_{t,1}$ and $C_{t,2}$ can be estimated with Equation 7.2b (adapted from the second part of Equation
5 2.8 in the IPCC 2006 GL). Like Equation 7.1, Equation 7.2b includes the area term representing activity
6 data. Executing equation 7.2b without the area term will yield a per area carbon stock value for a given
7 land stratum defined by ecological zone and climate domain.

8 *Equation 7.2b: Part 2 of stock-difference method for estimating carbon stock change*

9
$$C = \sum_{ij} \{ A_{i,j} \times V_{i,j} \times BCEF_{S_{i,j}} \times (1 + R_{i,j}) \times CF_{i,j} \}$$

10 Where:

11 C = total carbon stock in living biomass in all forest land remaining forest land at a given
12 point in time

13 $A_{i,j}$ = area of forest land remaining forest land (ha), in ecological zone i , and climate domain j

14 $V_{i,j}$ = merchantable growing stock volume (m³ ha⁻¹) for forests in ecological zone i and
15 climate domain j

16 $BCEF_{S_{i,j}}$ = biomass conversion and expansion factor for expansion of merchantable growing stock
17 volume to aboveground biomass, tonnes aboveground biomass growth (m³ growing
18 stock volume)⁻¹, for forests in ecological zone i and climate domain j

19 $R_{i,j}$ = ratio of belowground to aboveground biomass, tonnes dry matter below-ground
20 biomass (tonnes dry matter aboveground biomass)⁻¹, for forests in ecological zone i
21 and climate domain j

22 $CF_{i,j}$ = carbon fraction of dry matter, tonne C (tonne dry matter)⁻¹.

23 Gain-loss method

24 *Equation 7.3: Gain-loss method for estimating the carbon stock change*

25
$$\Delta C_B = \sum_{i,j} [G_{W_{i,j}} * (1 + R_{i,j}) * A_{i,j} * CF_{i,j}] + L_{wood-removals} + L_{fuelwood} + L_{disturbance}$$

26 Where:

27 ΔC_B = annual net change in C stocks in living biomass in all forest land remaining
28 forest land, tonnes C yr⁻¹

29 i = ecological zone ($i = 1$ to n)

30 j = climate domain ($j = 1$ to m)

31 $G_{W_{i,j}}$ = average annual aboveground biomass growth rate for a specific forest type,
32 tonnes dry matter ha⁻¹ yr⁻¹

- 1 $R_{i,j}$ = ratio of belowground biomass to aboveground biomass of the specific forest
 2 type; for Tier 1, $R_{i,j}$ can be set to zero
- 3 $A_{i,j}$ = area of forest, hectares (ha)
- 4 $CF_{i,j}$ = carbon fraction of dry matter, tonne C (tonne dry matter)⁻¹.
- 5 $L_{wood-removals}$ = annual aboveground biomass C loss due to wood removals, tonnes C yr⁻¹
- 6 $L_{fuelwood}$ = annual aboveground biomass C loss due to fuelwood removals, tonnes C yr⁻¹
- 7 $L_{disturbance}$ = annual aboveground biomass carbon losses due to disturbances, tonnes C yr⁻¹

8 Guidance and equations for estimating $L_{wood-removals}$, $L_{fuelwood}$, and $L_{disturbance}$ are provided in the IPCC
 9 2006 GL, Volume 4, Chapter 4.

10 With the gain-loss method, there are two options for estimating $G_{W_{i,j}}$ (average annual aboveground
 11 biomass growth rate).

- 12 • **IPCC default values:** Default values for net biomass growth are available in Table 4.12 of the
 13 IPCC 2006 GL, Volume 4, Chapter 4.
- 14 • **Mean annual growth:** Mean annual growth is also called mean annual increment (MAI). MAI
 15 describes the typical growth rates of trees in forests of a given type and age class. It is a fairly
 16 common measure collected by forestry agencies or forest managers. Consult the IPCC 2006 GL
 17 from further information on how to use MAI to estimate $G_{W_{i,j}}$.

18 Further resources

19 Comprehensive guidance on estimating forest carbon stock changes in all carbon pools can be found in
 20 numerous resources.

- 21 • IPCC 2003 Good Practice Guidelines for Land Use, Land-Use Change and Forestry
- 22 • IPCC 2006 GL for AFOLU, Volume 4
- 23 • Global Observation of Forest Cover and Land Dynamics (GOFC GOLD) Sourcebook
- 24 • Winrock Standard Operating Procedures for Terrestrial Carbon Measurement 2016
- 25 • Global Forest Observation Initiative (GFOI) Methods and Guidance Documentation

26 The GOFC GOLD Sourcebook and GFOI Methods and Guidance Documentation are particularly relevant
 27 resources for estimating carbon stock change for multiple carbon pools for enhancing carbon stocks
 28 through afforestation/reforestation, enhancing carbon stocks through management, deforestation, and
 29 degradation.

30 7.2.5 Calculate GHG emissions and removals

31 It is a *key recommendation* to calculate the cumulative GHG emissions and removals for the baseline
 32 scenario over the assessment period. Estimate annual carbon stock change for each land stratum each
 33 year in the baseline scenario using area data and carbon stock change equations provided above for
 34 land-use change (afforestation/reforestation and avoided deforestation) and forest land remaining forest

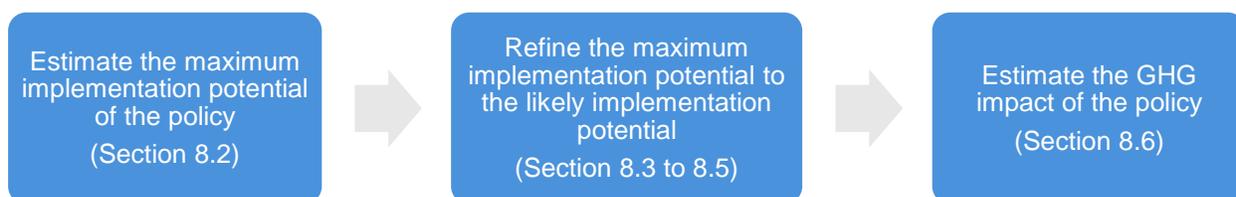
- 1 land. Sum annual carbon stock change by stratum across all land strata to yield net annual carbon stock
- 2 change on lands in the GHG assessment boundary.
- 3 Finally, sum the annual carbon stock changes for all years in the assessment period to yield cumulative
- 4 carbon stock change in the baseline scenario. Convert the cumulative carbon stock change to GHG
- 5 emissions expressed as tonnes of CO₂e by multiplying the cumulative carbon stock change by 44/12 and
- 6 by -1. This yields total cumulative CO₂e emissions (positive) or removals (negative) for the baseline.
- 7

8. ESTIMATING GHG IMPACTS EX-ANTE

This chapter describes how to estimate the expected future GHG impacts of the policy (ex-ante assessment). Users estimate the maximum implementation potential of the policy based on the causal chain that was developed in Chapter 6. Then users evaluate how barriers to implementation and other factors may limit its overall effectiveness, and determine the likely implementation potential of the policy. The likely implementation potential represents the effects that are expected to occur as a result of the policy (mostly likely policy scenario). Implicitly, these effects are relative to the baseline scenario.

There are two ways that users can estimate the GHG impacts of the policy scenario based on the implementation potential of the policy. Using the scenario approach, the GHG impacts are estimated by subtracting the baseline emissions (as determined in Chapter 7) from policy scenario emissions (as determined in this chapter). Alternatively, users can estimate the relative change in GHG emissions based on the likely implementation potential of the policy, using the deemed estimates approach.

Figure 8.1: Overview of steps in the chapter



Checklist of key recommendations

- Determine the maximum implementation potential of the policy
- Analyse policy design characteristics and national circumstances that may reduce the effectiveness of the policy, and account for their effect on the maximum implementation potential
- Analyse the financial feasibility of the policy for each stakeholder group, and account for the effect on the implementation potential of the policy
- Analyse other barriers that could reduce the effectiveness of the policy and account for their effect on the implementation potential
- Estimate the GHG impacts of the policy

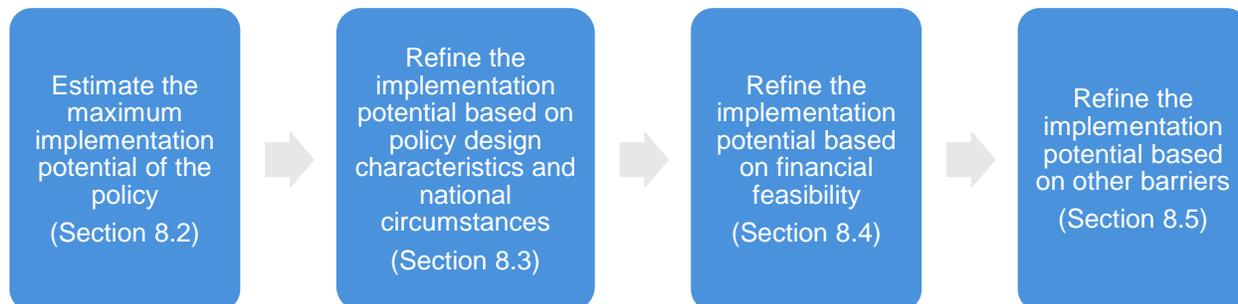
8.1 Introduction to estimating the implementation potential

The policy scenario represents the events or conditions most likely to occur in the presence of the policy being assessed. The guidance focuses first on estimating the *maximum implementation potential* of the policy. The maximum implementation potential of the policy assumes that all inputs, activities and intermediate effects in the causal chain are highly likely to occur as planned and at the implementation level intended by the policy. It represents the intended policy outcome or policy effectiveness. The maximum implementation potential is then refined to the likely implementation potential (e.g., most plausible policy scenario) by taking into account factors that could reduce the effectiveness of the policy.

Guidance is provided in the subsequent sections on how to estimate the implementation potential of the policy based on policy design characteristics and national circumstances (Section 8.3), financial feasibility

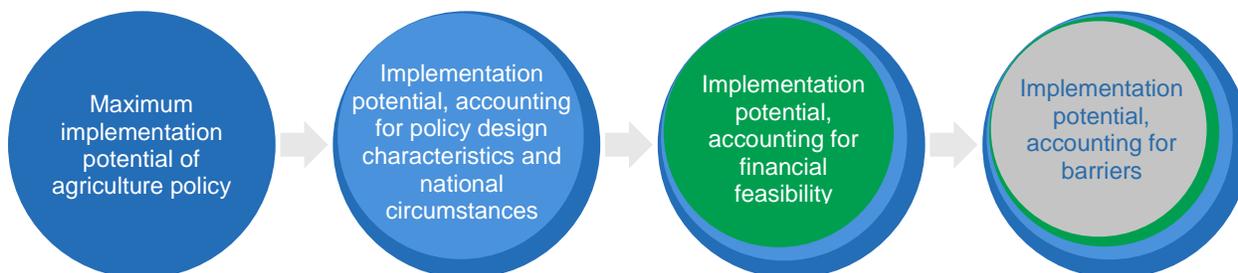
1 (Section 8.4), and other barriers (Section 8.5). Figure 8.2 outlines the steps to this process. Most of the
 2 analysis in Sections 8.2 – 8.5 will be qualitative and require expert judgment, expert elicitation and/or
 3 stakeholder input. Guidance on expert judgment is provided in Section 4.1.3.

4 *Figure 8.2: Overview of steps for estimating the likely implementation potential of the policy*



5
 6 Figure 8.3 illustrates how the maximum implementation potential of the policy is refined after each step to
 7 achieve a more realistic estimate of the implementation potential. It is possible that the policy’s likely
 8 implementation potential could exceed the estimated maximum implementation potential. This could
 9 occur where policies have a reinforcing effect (as discussed in Section 5.2.1).

10 *Figure 8.3: Refining the maximum implementation potential to the implementation potential*



11
 12 These steps focus on estimating the implementation potential of the policy in terms of activity data rather
 13 than GHG emissions. Examples of such activity data are discussed in Section 8.2. The GHG impacts for
 14 each GHG source or carbon pool in the GHG assessment boundary will be determined using the final
 15 refined estimates of the activity data after completion of the four steps, following the guidance in Section
 16 8.6.

17 Where quantitative information about how a factor is likely to impact the implementation potential of the
 18 policy is available, it can be used to estimate the effect of the policy. For example, an analysis may
 19 indicate that a barrier reduces the effectiveness of the policy intervention by 5%. The reduction of the
 20 effectiveness can apply at two different levels:

- 21 • **General level:** The barrier affects the entire policy (e.g., barriers that hinder the deployment
 22 across all components of the policy). In this case, the 5% reduction applies to the overall policy
 23 effect.
- 24 • **Component level:** The barrier only affects one specific aspect of the policy (e.g., a barrier may
 25 hinder the policy implementation for only a segment of the total population, one of the land-use
 26 categories considered, some regions of the country or the adoption rate of one agricultural
 27 practice). In this case, the 5% reduction applies only to the specific aspect of the policy affected
 28 by the barrier.

1 To the extent possible, identify a single policy scenario that is considered to be the most likely. In certain
 2 cases, multiple policy scenario options may seem equally plausible. Users can develop multiple policy
 3 scenarios, each based on different sets of assumptions, rather than just one set. This approach produces
 4 a range of possible emission reductions scenarios. Users can then conduct a sensitivity analysis to see
 5 how the results vary depending on the selection of policy scenario options. More guidance about
 6 conducting a sensitivity analysis is provided in Chapter 12 of the *Policy and Action Standard*.

7 An example is used to demonstrate how to estimate the implementation potential of a policy. A
 8 description of the example is provided in Box 8.1. The implementation potential of the example policy is
 9 assessed on the basis of the estimated number of hectares of land on which the policy will be
 10 implemented.

11 *Box 8.1: Example of forest policy for national or subnational level GHG mitigation*

The government is considering the option of promoting sustainable forest management and afforestation/reforestation through the introduction of a payment for ecosystem services (PES) programme combined with a new tax legislated for users of ecosystem services. Government officials are in the initial phase of the policy development process and need to consider all aspects relating to legislating, designing and implementing the policy intervention. It is expected that the national legislative body will enact a new tax for all users of ecosystem services (primarily for water and hydroelectric utilities, but other sectors may be included such as tourism companies). The national taxing agency will collect the tax, which will fund a new PES programme (estimated to be about 1-2% annual revenue) to provide programme incentives, as well as administrative and operational expenses.

The goals for the PES programme are to 1) expand SFM activities and 2) promote A/R through tree planting or natural regeneration.

Further details on the policy can be found in Section 5.1.

12 **8.2 Determine the maximum implementation potential**

13 It is a *key recommendation* to determine the maximum implementation potential of the policy. For each
 14 GHG source or carbon pool in the GHG assessment boundary, choose a type of activity data to assess
 15 the implementation potential of the policy. The type of activity data chosen should be a parameter that is
 16 expected to change as a result of the policy (e.g., hectares of forest land prevented from being converted
 17 to cropland), and be used to estimate GHG impacts. Therefore the activity data serves as a proxy for the
 18 policy outcome. The maximum implementation potential is expressed in terms of activity data. Table 8.1
 19 provides examples of the types of activity data to consider.

20 *Table 8.1: Examples of types of activity data for analyzing implementation potential*

GHG source or carbon pool	Policy	Activity Data
Biomass and soil carbon	<ul style="list-style-type: none"> • Incentives for sustainable forest management • Payments for afforestation/reforestation • Technical assistance to improve 	<ul style="list-style-type: none"> • Hectares of forest land prevented from being converted to non-forest land • Hectares of forest land remaining forest land where management is improved

	<p>management</p> <ul style="list-style-type: none"> • Introducing and improving systems to effectively enforce existing or new environmental regulation 	<ul style="list-style-type: none"> • Hectares of forest land remaining forest land where sustainable forest management is implemented • Hectares of cropland converted to forest land • Hectares of grassland converted to forest land
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1 The maximum implementation potential can be estimated based on a number of elements. The options
 2 include using a mitigation goal, expected adoption of practices or technologies, financial considerations,
 3 land area and other resource potential, and expert judgment. Each element is further explained below.
 4 The maximum implementation potential can be estimated using a single element or a combination of
 5 elements. A combination will likely yield a better estimate.

6 8.2.1 Mitigation goal

7 When there is an intended level of mitigation and/or an explicit goal for the policy, the goal along with
 8 other details of the policy can be used to estimate the maximum implementation potential. A mitigation
 9 goal may include, among other things, the target amount of emission reductions to be reduced or
 10 removed as a result of the policy, the targeted amount of land area or adoption rate, or the total expected
 11 emission reductions and removals from a specific GHG source or carbon pool. The mitigation goal may
 12 not be in the same units as the activity data, and additional information from surveys and national
 13 statistics may be needed to estimate how the goal will translate into actions or land areas. For example,
 14 an explicit goal for a forest policy could be to increase the minimum diameter cutting threshold on all
 15 publicly managed timber forests by 2020.

16 Using a stated goal as the main indication of intended policy outcomes or policy effectiveness can be
 17 highly uncertain. At a minimum, the mitigation goal needs to be specific enough to reflect an intended
 18 level of mitigation.

19 8.2.2 Adoption of practices or technologies

20 The expected level of adoption of the practice or technology that is targeted by the policy can be used to
 21 estimate the maximum implementation potential. The main assumption would be that targeted
 22 stakeholders will fully engage voluntarily, or fully comply where the policy is mandatory.

23 Information about stakeholders can be identified from the causal chain, policy description, and other
 24 sources. It can be used to infer the amount of land area or number of livestock affected by the policy,
 25 such as:

- 26 • The stakeholders targeted by the policy
- 27 • The average sized parcel of land owned or utilised by a stakeholder group
- 28 • The typical amount of forest products extracted or crops produced per person
- 29 • The number of cattle or other animals managed by stakeholders in a specific region

1 8.2.3 Financial considerations

2 Comparing the cost of implementing mitigation practices or using technology (e.g., \$/head to provide a
3 feed supplement to livestock) to the total financing available for the policy can be used to estimate the
4 maximum implementation potential. Information on the unit cost of implementing new technologies or
5 practices might be available through studies that have been commissioned and funded by the
6 government, an international organisation or academia. Where unit cost information is not available, other
7 sources can be used as a first approximation, including the following:

- 8 • Consultations with stakeholders on costs in different parts of the country and for different
9 activities (such information could also be derived from scientific journals)
- 10 • Figures obtained from other marginal abatement cost curve models or from articles or studies
11 published in scientific journals

12 Where unit cost figures are derived from global data, journals or studies relating to other countries, users
13 should ensure that unit cost information is suitable or representative of national circumstances.

14 Users also need an indication of the financial resources that will be allocated to a specific policy from the
15 national budget and other funding sources (e.g., private sector, national or international donors, or
16 international or regional funds) to estimate implementation potential from financial data. This information
17 may be available from the description of inputs developed in Section 6.1.1, Step 2.

18 The unit cost combined with total investment level can be used to estimate maximum potential
19 implementation levels. For example if a policy includes plans to invest USD 1 million in reforestation and it
20 costs USD 100 per hectare to implement, the maximum implementation level of the policy can be
21 estimated as 10,000 hectares of reforestation. Ideally this value would be reconciled with an estimate of
22 maximum available area of land for reforestation using land area data to ensure that it is realistic to
23 assume at least 10,000 hectares could be reforested.

24 Note that this analysis focuses on policy-level financing (e.g., national and sectoral-level). Guidance is
25 provided in Section 8.3 for how to assess the financial feasibility of a policy from the perspective of
26 landowners.

27 8.2.4 Land area and other resource potential

28 Analysing the availability of land is another way to estimate maximum implementation potential, meaning
29 identifying the total area of land upon which there is technical potential for a specific mitigation practice or
30 land-use change to occur. The assumption would be that all available land is affected by the change in
31 management or land use as a result of the policy. For example, if a policy aims to convert highly
32 degraded pasture to productive silvopastoral systems, and there are 50,000 hectares of highly degraded
33 pasture within the policy jurisdiction, assume the policy will result in 50,000 hectares of pasture used for
34 silvopasture.

35 To use this approach for estimating maximum implementation potential, information on current land
36 management and land uses is needed. Such data can be found in or derived from the following sources:

- 37 • National land cadastre
- 38 • National agricultural census data
- 39 • Land-use titles

- 1 • Local or regional land registration offices
- 2 • Farmer or logger associations
- 3 • Logging permits
- 4 • Timber-harvesting statistics

5 Analysing the technical potential of other resources besides land area can be used to estimate adoption
6 rates for new practices or technologies. For policies that reduce emissions from enteric fermentation, the
7 total number of livestock in the country or the total number of ranchers could be used to analyse the
8 maximum implementation potential. For example, if a policy seeks to increase use of feed supplements in
9 dairy cattle, it can be assumed that all dairy cattle within the policy jurisdiction will receive the feed
10 supplements as a result of the policy.

11 8.2.5 Expert judgment

12 Expert judgment can be paired with any of the approaches above to derive an informed estimate of the
13 maximum implementation potential. Sector specialists (e.g., farmers, ranchers, foresters, scientists who
14 study the technologies or practices promoted by a policy, statisticians, and government staff familiar with
15 the policy) can help to fill gaps in available data or provide a range for the maximum implementation
16 potential. Experts can also help users identify suitable values of the policy outcome or policy
17 effectiveness from estimated ranges. When consulting experts, information can be obtained through an
18 expert elicitation process (described in Section 4.1.3).

19 8.2.6 Example of determining maximum implementation potential

20 The PES policy has the goal to engage stakeholders in voluntary contracts with the Ministry of
21 Environment to provide ecosystem services on a total of 60% of private forest lands and 25% of low
22 productivity cropland over 10 years. The policy specifically intends to implement sustainable forest
23 management on private forest land and afforestation/reforestation activities on cropland. The maximum
24 implementation potential is determined for the policy activities on each land category.

25 Based on data from the latest national forest census, the total area of privately owned forest land in the
26 country is 250,000 hectares; 60% of this area is 150,000 hectares. From national agriculture statistics it is
27 known that the total area of low productivity cropland is 240,000 hectares; 25% of that is 60,000 hectares.
28 Therefore, over 10 years, the goal of the policy is for 150,000 more hectares of forest land remaining
29 forest land be brought into sustainable forest management and 60,000 more hectares of cropland be
30 converted to forest land as a result of the policy. The values can be annualised evenly over 10 years
31 (e.g., 15,000 hectare per year for 10 years), annualised following a non-linear trend based on estimated
32 timing of implementation, or considered cumulatively (i.e., 150,000 hectares total over 10 years). The land
33 areas (150,000 and 60,000 hectares, respectively) are considered as the maximum possible land areas
34 for policy intervention.

35 Additional information in the policy design indicates that to meet the goal of converting cropland to forest
36 land, the policy aims to promote three types of practices: general tree planting, tree planting with
37 endangered species, and natural regeneration, with land owner payments for each practice of USD 1,000
38 per hectare, USD 1,500 per hectare, and USD 500 per hectare, respectively. Discussion with programme
39 managers in the Ministry of the Environment indicate that they believe most of the budget should go to
40 funding natural regeneration because of its relatively low cost and comparable benefits to the other

1 practices and only a small share should fund tree planting with endangered species, with the remaining
 2 funding going to general tree planting. Based on these priorities, the total amount of land where each
 3 practice will be adopted as a result of the policy was estimated. Table 8.2 below provides the maximum
 4 potential estimated land areas affected by the policy, by practice, cumulatively for the 20-year
 5 assessment period.

6 *Table 8.2: Example of maximum implementation potential*

Policy activity	Maximum implementation potential (in ha)
SFM	150,000
Tree planting general	15,000
Natural regeneration	40,000
Tree planting with endangered species	5,000

7 8.3 Account for policy design characteristics and national circumstances

8 It is a *key recommendation* to analyse policy design characteristics and national circumstances that may
 9 reduce the effectiveness of the policy, and account for their effect on the maximum implementation
 10 potential.

11 Section 8.3.1 provides a method for analysing policy design characteristics and national circumstance
 12 (Step 1) and estimating their effect on maximum implementation potential (Step 2). Section 8.3.2 provides
 13 some further guidance to help with this analysis. Section 8.3.3 provides a worked example to illustrate the
 14 steps.

15 8.3.1 Method for accounting for policy design characteristics and national 16 circumstances

17 Step 1: Analyse policy design characteristics and national circumstances

18 Compile information on the policy design characteristics and national circumstances using the questions
 19 provided in Table 8.3. The questions relate to the effect of policy design characteristics and national
 20 circumstances on policy effectiveness. The questions can be revised or further questions can be added,
 21 as needed, to ensure that the analysis is relevant to the policy and national circumstances.

22 Information can be gathered through expert elicitations with administration and government experts that
 23 are directly or indirectly involved in the policy under consideration, desk reviews and stakeholder
 24 consultations. Refer to the ICAT *Stakeholder Participation Guidance* (Chapter 8) for further information on
 25 designing and conducting consultations with stakeholders.

26 Answer each question and score each response based on its potential to have a positive or negative
 27 effect on the effectiveness of the policy, on a scale of 1 to 4, as follows:

- 28 1 = Likely to have a positive (reinforcing) effect
- 29 2 = Likely to have no effect (no discernible positive or negative effect)
- 30 3 = Likely to have a negative effect

1 4 = Unknown

2 *Table 8.3: Questions for identifying policy design characteristics and national circumstances*

1. Institutional arrangements and national circumstances	
a.	Can the policy be implemented with existing governance structures, institutional arrangements and legal mechanisms?
b.	Is there corruption in the areas or regions under consideration, and if so, how extensive?
c.	Is there clear title and rights to stakeholders receiving the benefits offered by the policy?
d.	How well will the levels of governance that influence land use be able to coordinate to achieve the intended outcome?
e.	How well can coordination (e.g., resources, enforcement or data sharing) be carried out at subnational levels (e.g., between local municipalities), if necessary, according to the policy?
2. Participation requirements	
a.	Is participation or compliance with the policy voluntary or mandatory?
3. Compliance monitoring and enforcement	
a.	Is there a monitoring programme planned or in place to inspect policy implementation?
b.	Is there an enforcement measure that is part of the policy? If so, to what degree are similar standards, rules and regulations enforced and how?
4. Complementarity and synergies	
a.	To what extent will supporting or complimentary policies and actions in effect during the policy implementation period improve policy effectiveness?
b.	To what extent is the policy part of an interdisciplinary approach linking food security, ecosystem services and/or sustainable development?
c.	Are there supportive measures in place to build the capacity and technical skills in affected stakeholders who will be implementing the policy?
5. Policy implementation risks	
a.	To what extent are the intended policy outcomes vulnerable to risks (including natural events and disasters) that could jeopardise or reverse the policy outcomes?
b.	Have research and pilot studies been conducted in the areas where the policy will be implemented and do they demonstrate that the expected outcomes of the policy are feasible?

3 Step 2: Evaluate the overall distribution of scores and estimate the effect on maximum
4 implementation potential

5 Once policy design characteristics and national circumstances have been analysed and scored, evaluate
6 the overall distribution of scores:

- 1 • A distribution with many scores of 1 or 2 indicates less need to refine the estimated maximum
2 implementation potential of the policy.
- 3 • A distribution with many scores of 3 or 4 could suggest a downward adjustment of the maximum
4 implementation potential or gathering more information and reassessing the impact, especially for
5 scores of 4.

6 Carefully review each score of 3. Consider and, if possible, estimate to what extent the factor will
7 decrease policy effectiveness. Describe and justify the reduction. In addition, look for crucial problems
8 that have the potential to render the policy ineffective. If even one crucial problem is identified, it is
9 recommended to reconsider the policy design. It is recommended to identify, where possible, potential
10 corrective action to minimise the negative impacts. For example after following the guidance in this
11 section the user may reduce the geographic scope of impact, reduce the expected adoption rates or
12 delay the timing of the implementation of a policy.

13 For scores of 4, attempt to gather enough information to assess the effect of the factor. If that is not
14 possible, it is conservative to assume it will have a negative effect.

15 A positive impact may reinforce the implementation of the policy through, for example, synergetic effects
16 between policies. Where a situation may increase policy effectiveness, it is conservative to not estimate
17 any potential positive impact or make any positive adjustments to the expected policy outcomes.

18 8.3.2 Considerations for accounting for policy design characteristics and national 19 circumstances

20 This section describes a number of considerations to bear in mind when following the steps in Section
21 8.3.1.

22 Institutional arrangements and national circumstances

23 Institutional arrangements are formal or informal legal and procedural agreements between agencies
24 executing a policy. They can include arrangements between government agencies or with government
25 and non-government or private-sector agencies. National circumstances are the conditions present in the
26 country. They include, among others, the government structure, population profile, cultural context,
27 geographic profile, climate profile and the structure of the economy.

28 Lack of a governance structure, coordination between national and subnational levels or legal basis for
29 providing incentives to stakeholders are critical considerations that can inhibit the successful
30 implementation of the policy if not addressed appropriately. In countries without established institutional
31 arrangements or an effective legal framework to secure the cooperation between different government
32 levels and the involvement of key stakeholders (including private, public or non-governmental), policies
33 will likely be limited in their effectiveness.

34 Many ministries or other government agencies often have difficulties in hiring and retaining new staff
35 primarily due to budgetary and administrative constraints. Where staff and infrastructure (e.g., offices,
36 equipment, vehicles or fuel) necessary for the policy implementation are not in place prior to policy
37 implementation, policy implementation may not move forward as expected, reducing the effectiveness of
38 the policy.

1 Corruption in national or subnational government structures can also play a detrimental role in the
2 implementation of the policy. Corrupt practices may involve politicians, local leaders, governmental and/or
3 non-governmental actors and result in implementation problems relating to land concessions, the
4 allocation of contracts (e.g., favoring friends or relatives), allowing illegal practices (e.g., logging without
5 permits), and misuse of funds intended for the policy.

6 Participation requirements

7 Participating in the policy, by people or organisations, can be voluntary or mandatory. Voluntary
8 participation relies on the willingness of stakeholders to respond to a policy, offers flexibility in terms of
9 who participates and how, and can involve less oversight and enforcement. In the absence of strong
10 incentives, voluntary participation is unlikely to result in high participation and is more likely to result in a
11 policy whose impacts are indistinguishable from the baseline scenario. Other factors that can help or
12 hamper participation include effective communications and training for target stakeholder groups.

13 Mandatory participation can be accompanied with specific obligations and can be enforced through strict
14 procedures, including penalties for cases of non-compliance. Mandatory participation works better in
15 cases where the progress of the policy implementation can be effectively monitored and enforced.
16 However, bribery and corruption could reduce the potential impact of the policy.

17 Compliance monitoring and enforcement

18 Monitoring and enforcement are mechanisms to compel stakeholders to comply with a policy. Monitoring
19 is the process of inspecting that the policy is being implemented and enforcement is an action taken
20 against those who are not in conformance with the policy. The policy may include measures to monitor
21 and/or enforce policy implementation.

22 When stakeholders understand that policy implementation will be monitored, it is more likely that
23 implementation will occur. If monitoring procedures are already in place or are planned (e.g., due to the
24 existence of other similar policies or projects in a region), this should be taken into account, as it can help
25 ensure that the policy is implemented effectively. In the absence of monitoring procedures, the policy may
26 not be implemented as effectively as expected.

27 Local enforcement agencies and other stakeholders should be consulted to determine the likelihood that
28 standards, rules or laws will be enforced. The likelihood of enforcement (e.g., 90% chance of
29 enforcement) should then be used to refine the implementation potential of the policy (e.g., reduce the
30 impact by 10%). If penalties for non-conformance with the policy are minor, enforcement may not be as
31 effective at ensuring compliance.

32 Complementarity and synergies

33 GHG mitigation policies that contribute to local sustainable development and promote better local
34 conditions are far more acceptable to local communities and usually have a far better chance of uptake
35 and success (e.g., policies that have health benefits due to reduction of local air pollution, reduce loss of
36 biodiversity, address desertification issues, protect water resources or improve food security for poor
37 communities).

38 The implementation of GHG mitigation policies can be positively or negatively affected by other
39 complementary policies. For example, a policy to reduce water pollution from agricultural runoff may drive

1 changes in land management that reduce fertiliser use and increase use of cover crops, which are
 2 practices that can reduce N₂O emissions from soils and increase soil carbon sequestration.
 3 Interventions that provide education and technical assistance do not reduce GHG emissions directly.
 4 However, they may be pivotal in developing the capacity of land managers to implement new
 5 technologies and practices that reduce GHG emissions. Therefore, the presence of such interventions
 6 can be synergistic with GHG mitigation policies.

7 **Policy implementation risks**

8 Agriculture and forest productivity are greatly impacted by weather conditions, climate and water. Food,
 9 forests and wood production are often impacted by natural events and disasters. For example, forest
 10 fires, floods, droughts, extreme weather events (e.g., hurricanes and tornadoes), diseases and pests can
 11 have negative consequences.

12 The assessment should consider the effect of natural events and disasters. If areas that are known to be
 13 prone to extreme conditions are included in the geographic scope of the policy, the expected
 14 implementation potential of the policy should be reduced because the policy will likely be ineffective in
 15 those areas. However, even if there is no previous history of disaster risk, users may still consider
 16 reducing the implementation potential of the policy to account for unanticipated disasters.

17 The evaluation should also consider the risk that the policy will not be as successful as anticipated at
 18 reducing GHG emissions as a result of limited data and research. For example, where research and pilot
 19 studies have not been conducted in the areas where the policy will be implemented there is risk that
 20 implementation and/or impacts of the policy will be hampered by lack of experience and proof of concept,
 21 and this could reduce policy effectiveness.

22 **8.3.3 Example of accounting for policy design characteristics and national**
 23 **circumstances**

24 The screening questions from Table 8.3 were reviewed and policy design characteristics and national
 25 circumstances were analysed (Step 1). The participation requirements category is evaluated from the
 26 perspective of voluntary participants in SFM and A/R, as well as from users of ecosystem services. An
 27 additional question was added to reflect this. Extensive consultation with experts resulted in responses
 28 and scores shown in Table 8.4.

29 *Table 8.4: Example of accounting for policy design characteristics and national circumstances*

1. Institutional arrangements and national circumstances		Score
a.	<p><i>Can the policy be implemented with existing governance structures, institutional arrangements or legal mechanisms?</i></p> <p>Sufficient governance structures are in place to oversee the policy implementation.</p>	2
b.	<p><i>Is there corruption in the areas or regions under consideration, and if yes, how extensive?</i></p> <p>Corruption is confined to small communities where local leaders are known to receive bribes for favorable treatment of industry. Most of these communities are located in not easily accessible areas. After consulting with experts, it has been decided to assume that participation in the most remote communities will not result in the expected policy outcomes. These communities comprise an estimated 2% of the SFM area and 1.5% of the A/R area considered.</p>	3
c.	<p><i>Is there clear title and rights to stakeholders receiving the benefits offered by the policy?</i></p>	2

	There is no legal basis for the participation of private sector in the PES programme. To address this, the policy defines a legal framework for the participation of private land owners.	
d.	<p><i>How well will the levels of governance that influence land use be able to coordinate to achieve the intended outcome?</i></p> <p>With the exception of two regions, the government and local authorities have a good working cooperation.</p>	2
e.	<p><i>How well can coordination (e.g., resources, enforcement or data sharing) be carried out at subnational levels (e.g., between local municipalities), if necessary, according to the policy?</i></p> <p>There are no subnational technical assistance or incentive programmes that conflict with the national policy.</p>	2
2. Participation requirements		
a.	<p><i>Is participation or compliance with the SFM and A/R activities voluntary or mandatory?</i></p> <p>Because of voluntary participation, experts believe that 85% of the landowners originally considered will participate. These landowners account for 77% of the SFM area and 96.5% of the A/R area considered, without taking into consideration the area reduction due to aspect 1d above.</p>	3
b.	<p><i>Is participation or compliance in the ecosystem service programme voluntary or mandatory?</i></p> <p>One out of the two hydroelectric utilities will not participate in the policy implementation because operations will be suspended due to the 5-year drought that has reduced the river flows that power the hydropower station. It was expected that the utility would contribute to about 15% of the total revenue that was to be raised.</p>	3
3. Compliance monitoring and enforcement		
a.	<p><i>Is there a monitoring programme planned or in place to inspect policy implementation?</i></p> <p>There is sufficient local enforcement capacity in the regions considered.</p>	2
b.	<p><i>Is there an enforcement measure that is part of the policy? If so, to what degree are similar standards, rules, and regulations enforced and how?</i></p> <p>The Ministry of the Environment will conduct annual audits on a random basis to monitor implementation of, and compliance with, best practice standards for SFM, tree planting and natural regeneration.</p>	2
4. Complementarity and synergies		
a.	<p><i>To what extent will supporting or complimentary policies and actions in effect during the policy implementation period improve policy effectiveness?</i></p> <p>There are complementary activities to regulate water and reduce the loss of biodiversity in the areas considered.</p>	1
b.	<p><i>To what extent is the policy part of an interdisciplinary approach linking food security, ecosystem services and/or sustainable development?</i></p> <p>There is a direct link to ecosystem services (PES scheme) and sustainable development as it will provide resources to local communities and will contribute to stopping the degradation of the local environment.</p>	1
c.	<p><i>Are there supportive measures in place to build the capacity and technical skills in affected stakeholders who will be implementing the policy?</i></p> <p>The policy incorporates educational programmes to raise awareness and enhance technical skills of local foresters.</p>	1
5. Policy implementation risks		

a.	<i>To what extent are the intended policy outcomes vulnerable to risks (including natural events and disasters) that could jeopardise or reverse the policy outcomes?</i> About 35% of the areas considered have experienced extreme weather events in the last 5 years.	3
b.	<i>Have research and pilot studies been conducted in the areas where the policy will be implemented and do they demonstrate that the expected outcomes of the policy are feasible?</i> Scientific research in the National Study on Decarbonisation Strategies provides evidence that sustainable forest management and tree planting increase carbon sequestration.	1

1 The distribution of scores was evaluated (Step 2). Out of the 14 factors above, 10 received a score of 1 or
 2 2, indicating that most factors considered are expected to have either a positive or no impact on the
 3 implementation potential of the policy. Four factors are likely to have a negative impact and received a
 4 score of 3. The 3's were related to corruption (1b), participation (2a and 2b), and policy implementation
 5 risks (5a). No factors had a score of 4.

6 The extent to which policy effectiveness may be reduced as a result of each factor was evaluated (Step
 7 2). None of the factors receiving a 3 appear to be crucial problems that could completely hamper policy
 8 effectiveness. The impact on policy effectiveness was adjusted quantitatively²⁰.

9 The exclusion of communities with corruption problems (1b), the expectation of lower than planned
 10 voluntary participation of landowners (2a), and the potential risk of disasters (5a) will all result in an
 11 overall reduction in the amount of land area where the policy is effectively implemented. Table 8.5 below
 12 summarises the estimated extent to which these aspects will reduce policy outcomes.

13 *Table 8.5: Example description and justification for reducing expected policy effectiveness*

Description and justification for reducing expected policy effectiveness	Percent reduction in policy effectiveness	
	SFM	A/R
Participation in remote communities comprising 2% and 1.5% of the land areas for SFM and A/R targeted by the policy, respectively, will not yield expected policy outcomes because of corruption.	2%	1.5%
Experts estimate that only 85% of landowners offered the opportunity will participate because it is voluntary (77% of SFM; and 96.5% of A/R).	23%	0.50%
35% of the area target by the policy has experienced extreme weather events in the last 5 years. Using information on the impacts of these past events, experts estimate that about 5% of land enrolled in the programme will experience catastrophic weather during the assessment period that could prevent achievement of the expected policy outcomes in those areas.	5%	5%
Total potential adjustment (percent reduction in policy effectiveness)	30%	7%

²⁰ In cases where quantifiable information is not available, estimates of the impact on policy effectiveness may be made using expert judgment based on the best available information. While it may be subjective, this is more conservative than not making an adjustment where the aspect considered is likely to have a negative impact.

1 The withdrawal of one hydroelectric utility (factor 2b) will reduce the expected tax revenue by 15% over
 2 10 years. This reduction, however, is not expected to create a measureable impact as the overall SFM
 3 and A/R areas enrolled are also likely to be lower than expected (based on score for 2a). In any case, it
 4 would be desirable that other sources of revenue are identified to ensure that there will be no shortage of
 5 funding for the PES programme in the long-term.

6 Complementarity and synergy factors 4a, 4b and 4c could create interest and possibly increase support
 7 from stakeholders and participation from landowners who see the benefits of the policy. However, the
 8 potential positive impact is not quantified.

9 At the end of the analysis, the maximum area affected by the policy has been adjusted to reflect the
 10 quantifiable impacts of lower than originally designed participation and expected policy outcomes. The
 11 results are shown in Table 8.6 below.

12 *Table 8.6: Example of refined implementation potential*

Policy activity	Maximum implementation potential (in ha)	Refined implementation potential based on policy design and national circumstances (in ha)
SFM	150,000	105,000
Tree planting general	15,000	13,950
Natural regeneration	40,000	37,200
Tree planting with endangered species	5,000	4,650
Total	210,000	160,800

13 8.4 Account for financial feasibility

14 It is a *key recommendation* to analyse the financial feasibility of the policy for each stakeholder group and
 15 account for the effect on the implementation potential of the policy.

16 Financial feasibility analysis determines whether enough money is being invested in the policy to ensure
 17 that stakeholders will participate or otherwise respond to the policy. Where the policy's implementation
 18 costs outweigh its benefits for a given stakeholder critical to the implementation of the policy, its
 19 effectiveness can be affected.

20 There is no one single way to perform a financial feasibility analysis. It may take the form of a complex
 21 and rigorous assessment (e.g., a detailed financial return on investment model) or a simple analysis (e.g.,
 22 a checklist of financial costs and benefits). Determine the specific type of analysis based on the data
 23 available.

24 Sources of information for conducting financial feasibility are, in order of preference:

- 25 • Existing calculations of the costs and benefits of policies for an individual stakeholder that were
 26 done during the policy design phase (as long as these are deemed reliable)

- 1 • Implementation cost analyses
- 2 • Existing national cost studies
- 3 • Global cost studies
- 4 • Expert judgment based on assessments or desk review

5 In the absence of other available resources, guidance is provided in the sections below for performing a
6 basic cost analysis. Section 8.4.1 provides a method for analysing financial feasibility. Section 8.4.2
7 provides some further guidance to help with this analysis. Section 8.4.3 provides a worked example to
8 illustrate the steps.

9 Before starting the cost analysis, some questions to consider are:

- 10 • Do some stakeholders bear significant new net costs under the proposed policy? If so, which
11 ones and what are the costs?
- 12 • Do some stakeholders realise significant new net financial gain under the proposed policy? If so,
13 which ones and what are the gains?
- 14 • What goods and services are produced commercially from lands that are the target of the policy,
15 both before and after policy implementation? Is production likely to increase or decrease as a
16 result of the policy?
- 17 • Is the policy potentially in conflict with economic development?
- 18 • Will the policy strengthen important supply chains?

19 8.4.1 Method for accounting for financial feasibility

20 Step 1: Identify stakeholder groups to analyse

21 In Section 6.1.1, users identified the stakeholders of the policy. Those stakeholders are the focus of this
22 analysis, in particular stakeholders that implement changes in practices, technologies or land use in
23 response to the policy. Each stakeholder group should be included in the financial feasibility analysis and
24 the net costs and benefits for each group considered separately. Where there is not sufficient data and
25 information to analyse all stakeholder groups separately, at minimum include the following groups in the
26 analysis:

- 27 • Stakeholders with official land tenure rights or de facto control of lands addressed by the policy
- 28 • Stakeholders that use the lands addressed by the policy but have limited actual control over the
29 lands

30 It can be difficult to distinguish between stakeholders with official tenure to land and stakeholders that use
31 the lands affected by the policy without tenure. In such cases, focus on the main stakeholder group that
32 expected to implement the mitigation measures.

33 Step 2: Calculate net cash flows for each stakeholder group

34 In a basic implementation cost analysis, net cash flows are estimated for a typical stakeholder in each
35 stakeholder group under baseline and policy scenarios. It is best if the financial feasibility analysis is done
36 in the local currency. If foreign investment is required or if loans are denominated in a foreign currency, it

1 is still best to do the analysis in the local currency and then convert the results to the foreign currency.
 2 Often some factors will be in foreign currency. In this case, the exchange rate should be entered in only
 3 one location in the analysis calculations, allowing updating of the entire analysis upon changing the
 4 exchange rate at that one location. Then if the exchange rate changes, the quantification can be easily
 5 updated. If the analysis is done in a foreign currency, there is a risk of currency fluctuations altering the
 6 conclusions of the analysis.

7 Where inflation is likely (e.g., over longer periods of time) apply a discount rate and calculate a net
 8 present value for the cash flows to take into account the future value of money. Non-discounted values
 9 can be used if inflation is not likely during the analysis period (e.g., five years or less). Table 8.7 provides
 10 more for information on metrics for financial analysis.

11 Different stakeholders should have different discount rates. For example, the discount rate for a
 12 government is generally much lower than a discount rate for a corporation, and the discount rate for a
 13 corporation that has access to capital is often much lower than the discount rate of a smallholder farmer.
 14 Appendix B provides additional information on discount rates. To enable comparison between
 15 stakeholder groups, the costs should be normalised, for example per hectare, per operation or per head
 16 of livestock or per person.

17 *Table 8.7: Definitions of common terms used in financial analysis*

Term	Definition
Cash flows	The net amount of cash and cash-equivalents moving into and out of a business. Positive cash flow indicates that a company's liquid assets are increasing, enabling it to settle debts, reinvest in its business, return money to shareholders, pay expenses and provide a buffer against future financial challenges. Negative cash flow indicates that a company's liquid assets are decreasing. Some stakeholders will not implement an action that has a negative net cash flow at any time.
Discount rate	The interest rate you need to earn on a given amount of money today to end up with a given amount of money in the future. The discount rate accounts for the time value of money, which is the idea that a dollar today is worth more than a dollar tomorrow given that the dollar today has the capacity to earn interest.
Present value	The current worth of a future sum of money or stream of cash flows given a specified discount rate. Future cash flows are discounted at the discount rate, and the higher the discount rate, the lower the present value of the future cash flows.
Rate of return	The gain or loss on an investment over a specified time period, expressed as a percentage of the investment's cost. Gains on investments are defined as income received plus any capital gains realised on the sale of the investment. The general equation of the rate of return is: $\frac{(\text{Gain of Investment} - \text{Cost of Investment})}{\text{Cost of Investment}}$

18 *Source:* Adapted from Investopedia.

19 To estimate net cash flows:

- 20 1. Estimate baseline scenario costs and revenues using present day data for a typical stakeholder
 21 that will take part in the policy, repeating this separately for each stakeholder group. Taking into
 22 account how the land area under consideration would be used without the policy (e.g., what is

1 produced on the land and how much, considering for example, animal farming, croplands, set
2 asides or logging)

3 Average cost and revenue figures can be used for groups of land categories. For example, use
4 average expense and income from all cropland areas (irrespective of the type of the crop); group
5 together fallow land and set asides and derive average values for those lands; or use national
6 average timber harvest statistics and prices.

7 Include costs of inputs and costs of production, in addition to revenues from sale of goods. Key
8 input costs include raw materials, equipment, labour, permits to operate, and other costs entailed
9 in producing and selling the goods. For example, in agriculture costs include fertiliser and seed
10 for crops, cost of fencing for cattle, feed, feed additives and medications. Input costs may include
11 taxes on operations or land that must be paid from revenues from the sale of goods.²¹

12 2. Estimate the baseline scenario net cash flow (i.e., revenues minus costs) over the assessment
13 period, separately for each stakeholder group.

14 3. Estimate the policy scenario costs and revenues over the assessment period, separately for each
15 stakeholder group. This includes determining:

- 16 • The amount and type of government or private funding committed to implementing the policy
- 17 • The cost to the stakeholder to implement the policy
- 18 • The revenues that the stakeholder will gain from the policy

19 4. Estimate the net cash flow for a typical stakeholder in the policy scenario, separately for each
20 stakeholder group

21 Step 3: Assess financial feasibility

22 Compare the net cash flow for the baseline scenario with that for the policy scenario to assess financial
23 feasibility, as follows:

24 1. Determine whether the total net cash flow for the policy scenario exceeds the net cash flow for
25 the baseline scenario. This must be the case for the policy to be financially feasible.

26 2. Determine whether the total net cash flow for the policy scenario is positive. This must be the
27 case for the policy to be financially feasible.

28 3. When the net cash flow for the policy scenario is positive, compare the discounted cash flow (net
29 present value) and rate of return (for the general formula see Table 8.7) in the baseline and policy
30 cases. For the policy to be financially feasible, the rate of return on the policy case must be higher
31 than the baseline rate of return by more than three percentage points.

32 Repeat this analysis for each stakeholder group identified and all activities covered by the policy.

²¹ The European Commission Guide to Cost-Benefit Analysis of Investment Projects can be a useful resource for how to identify costs and revenues, calculate discounted cash flows, and implement other aspects of financial and economic feasibility analysis. Available at:

http://ec.europa.eu/regional_policy/sources/docgener/guides/cost/guide2008_en.pdf

1 Step 4: Estimate the extent to which financial aspects will limit policy outcomes

2 Based on the results of the financial feasibility assessment, decide how the implementation potential of
3 the policy will be affected, as follows:

- 4 • Where the policy does not appear to provide sufficient incentive for stakeholders to participate or
5 otherwise respond to the policy, either reconsider the design of the policy (or the relevant
6 component of the policy) or refine the implementation potential of the policy.
- 7 • Where the policy appears to provide sufficient incentive for stakeholders to participation or
8 otherwise respond to the policy, continue to the next step without revising the implementation
9 potential of the policy.

10 8.4.2 Considerations for accounting for financial feasibility

11 Below are additional considerations when deciding how the implementation potential of the policy will be
12 affected.

- 13 • In addition to discounted costs and revenues, the financial analysis should consider the relative
14 timing of costs and revenues, and the capital needed to achieve these cash flows. If costs occur
15 before revenues, stakeholders must have access to funds to pay the costs or they may not
16 behave as expected.

17 Shifts in timing of returns can be large for afforestation and reforestation. There are considerable
18 costs in establishing stands of trees, but there may be negligible revenues for years while the
19 trees grow to have commercial value. As a result, many forestry projects are only financially
20 feasible with low discount rates. For entities with high discount rates, such as most smallholder
21 farmers, even modest seasonal delays in revenue relative to expenditures can create a significant
22 barrier to implementation. Delaying the harvest season can be a barrier to food insecure
23 households that do not have other crops to eat during the delay.

- 24 • In general, unless the policy increases net revenue to stakeholders, or reduces their risks, the
25 policy is unlikely to be adopted voluntarily.

26 Policies that provide a net financial benefit may have little incentive for adoption if the net gain is
27 small relative to overall cash flows.

28 Investors, farmers, landowners and other stakeholders are often risk averse. Some policies offer
29 stakeholders a positive financial return, yet still fail to be adopted, because stakeholder's view
30 returns as too uncertain or risky. For example, they may not be confident payments in the future
31 will be made, contracts will be honoured, or the policy will have ongoing political and budgetary
32 support. As a result, assessing simple return on investment alone may not give a reliable
33 indication of the likelihood of policy adoption. Financial risk can be quantitatively incorporated into
34 the analysis by increasing stakeholder's discount rate, or qualitatively considered by consulting
35 stakeholders on their likely response to specific real-world policy incentives.

- 36 • Some changes may have non-obvious costs. For example, a change may involve significant
37 management labour costs to revise organisational processes or training new workers that are
38 needed to provide different skills into the organisation.

- It may be important to identify other financial considerations and sectoral policies and trends that may affect the outcome of the financial feasibility of the policy, and to consider whether these sectoral policies or trends reinforce or counteract the intended implementation (e.g., through price signals and consumer behavior).

When a government is considering what policies to adopt, it may also want to consider the financial effects on society as a whole. However, such an evaluation is beyond the scope of this guidance.²²

8.4.3 Example of accounting for financial feasibility

To estimate net cash flows, data on a per-hectare basis are used for annual costs and benefits for land areas affected by the policy, from the perspective of stakeholders managing the land. For this example, a cost analysis is conducted for tree planting activities on cropland. This example considers the first 10 years of implementation after the conversion of agricultural land into forest land, representing enough time to complete a harvest cycle and realise the value of timber from the planted trees.

The costs and revenues for the baseline scenario are estimated in Table 8.8. The baseline scenario assumes that there will be a continuation of current agricultural production for the next 10 years (constant baseline). The tables present annual data for Year 1, Years 2-9 and Year 10 of the policy. Negative numbers represent costs (expenses) and positive numbers represent revenues (income).

Table 8.8: Example calculation of baseline costs and revenues for continuation of agricultural production

Baseline	Annual costs and revenues for Year (USD/ha):			Total
	1	2-9*	10	
Costs				
Farming labour	-100	-100	-100	
Crop inputs (seed, fertiliser, equipment, fuel)	-100	-100	-100	
Land cost, taxes and concession fees	0	0	0	
Total cost	-200	-200	-200	
Revenues				
Crop revenues	250	250	250	
Net farming revenue, undiscounted	50	50	50	500
Net farming revenue, present value	50	[43 – 16]	14	289

* Years 2-9 are not shown for simplicity. Square brackets indicate the range of values during that time period. For example, [43 -16] means values range from USD 43/ha in Year 2 to USD 16/ha in Year 9

Table 8.8 provides average present day estimates for costs and revenues per hectare under the baseline scenario. The costs identified were farming labour, crop inputs (seed, fertiliser, equipment, fuel), and land cost, taxes and concession fees. The revenues identified include all income from selling the crops. The cost and revenue were kept constant for all 10 years. Based on these assumptions, a typical farmer has

²² A variety of sources are available that provide guidance on estimating net economic effects on society, including EC 2008.

1 net annual revenues (or cash flow) of USD 50 per hectare. Applying a discount rate of 15% reduces the
 2 annual revenue from USD 50/ha in Year 1 to USD 14/ha by Year 10.

3 Next the costs and revenues for the policy scenario are estimated (Table 8.9). Under the policy scenario,
 4 the same cropland area is converted to forest land through general tree planting.

5 *Table 8.9: Example calculation of policy scenario costs and revenues for general tree planting*

Policy Scenario: Tree planting general	Annual costs and revenues for Year (USD/ha):			Total
	1	2-9*	10	
Costs				
Planting cost	-1,000	0	0	
Land costs, taxes and concession fees	0	0	0	
Stand management and harvest cost	0	-10	-12,500	
Total cost	-1,000	-10	-12,500	
Revenues				
Timber	0	0	15,000	
Government payments for planting	1,000	0	0	
Government livelihood support	0	0	0	
Total revenue	1,000	0	15,000	
Net tree planting revenue, \$/ha, undiscounted	0	-10	2,500	2,420
Net tree planting revenue, \$/ha, present value	0	[-9 – -3]	711	665

6 * Years 2-9 are not shown for simplicity. Square brackets indicate the range of values during that time period.

7 Table 8.9 provides average present day estimates for costs and revenues per hectare under the policy
 8 scenario. The costs identified are planting cost for trees, land costs, taxes and concession fees, and
 9 stand management and harvest cost. It is anticipated that the farmer would have planting costs for Year 1
 10 (USD 1,000/ha), stand management costs for Years 2-9 (USD 10/ha), and harvest costs for Year 10
 11 (USD 12,000/ha, assuming a harvest of 50 m³/ha, a harvest cost of USD 100/m³, a processing cost of
 12 USD 50/m³, and transport and tax cost of USD 100/m³)

13 The revenues identified include government support for the planting of all trees in Year 1 (USD 1,000/ha),
 14 and income from selling the harvested timber in Year 10 (assuming a harvest of 50 m³/ha, and a price of
 15 USD 300/m³).

16 Comparison of discounted net revenues between the baseline (USD 289/ha) and policy (USD 665/ha)
 17 scenarios indicates that general tree planting activities may be profitable for farmers (Table 8.8 and Table
 18 8.9). The net cash flow in the policy scenario is positive and exceeds the net cash flow for the baseline
 19 scenario. In both cases, the net revenue after 10 years of tree planting would be significantly higher than
 20 the net farming revenue.

21 However, yearly cash flow trends in the policy scenario show a net loss of income for 9 out of the 10
 22 years of policy implementation. Because of this, some farmers may decide not to participate. Other
 23 farmers may be able to wait until Year 10 for the revenue from selling the harvested timber and would be

1 more likely to participate. Without more information or refining of the policy design, participation is likely to
 2 be highly situational and difficult to predict.

3 Given this uncertainty, the policy design is reconsidered and an alternative scenario explored. The
 4 alternative scenario would be for the government to provide a low-interest rate (e.g., 4%) annual loan
 5 payment to compensate for the lost revenue (USD 50/ha/year) (see Table 8.10). The loan provides the
 6 farmer with annual income (although less than the baseline case) and the total loan value can be repaid
 7 from timber sale revenues in Year 10. If the policy is modified this way, broad participation in the
 8 programme is more likely. Table 8.10 demonstrates the costs and revenues of the redesigned policy for
 9 general tree planting with a low-interest rate loan.

10 *Table 8.10: Calculation of policy scenario costs and revenues for general tree planting with a low-interest*
 11 *rate loan*

Policy Scenario: Tree planting general	Annual costs and revenues for Year (USD/ha):			Total
	1	2-9*	10	
Costs				
Planting cost	-1,000	0	0	
Land costs, taxes, concession fees	0	0	0	
Stand management & harvest cost	0	-10	-12,500	
Total cost	-1,000	-10	-12,500	
Revenues (with government support)				
Timber	0	0	15,000	
Government payments for planting	1,000	0	0	
Government livelihood support	50	50	-1,300	
Total revenue	1,050	50	13,700	
Net tree planting revenue, undiscounted	50	40	1,200	1,570
Net tree planting revenue, present value	50	[35 – 13]	341	571

12 * Years 2-9 are not shown for simplicity. Square brackets indicate the range of values during that time period.

13 Net cash flow estimates were made for natural regeneration and tree planting with endangered species
 14 for the A/R policy scenario (not shown), using the same constant baseline scenario as in Table 8.8
 15 (continuation of current agricultural production for the next 10 years). Net cash flow estimate were also
 16 made for implementing SFM on privately owned forest land, where the constant baseline is the
 17 continuation of current forest management practices (not shown).

18 After considering all proposed activities, and adjusting some policy design aspects as described above,
 19 the policy was determined to be financially feasible for general tree planting and tree planting with
 20 endangered species. For SFM and natural regeneration, the policy scenario does not generate more
 21 revenue for landowners. Therefore the policy design was modified further to increase payments for SFM
 22 and natural regeneration maintaining the overall budget level. To achieve this, the area of land targeted
 23 for SFM and natural regeneration will be reduced by 10%. This would result in the total land areas shown
 24 in Table 8.11.

1 **Table 8.11: Refined implementation potential after financial feasibility analysis**

Policy activity	Maximum implementation potential (in ha)	Refined implementation potential based on policy design and national circumstances (in ha)	Refined implementation potential based on financial feasibility (in ha)
SFM	150,000	105,000	94,500
Tree planting general	15,000	13,950	14,250
Natural regeneration	40,000	37,200	33,480
Tree planting with endangered species	5,000	4,650	4,750
Total	210,000	160,800	146,580

2 **8.5 Account for other barriers**

3 It is a *key recommendation* to analyse other barriers that could reduce the effectiveness of the policy and
 4 account for their effect on the implementation potential. This analysis is similar to that in Section 8.3 but
 5 focuses on institutional, cultural and physical barriers that may limit effectiveness of the policy.

6 Section 8.5.1 provides a method for analysing these barriers and estimating their effect on
 7 implementation potential of the policy. Section 8.5.2 provides some further guidance to help with this
 8 analysis. Section 8.5.3 provides a worked example to illustrate the steps.

9 **8.5.1 Method for accounting for other barriers**

10 **Step 1: Analyse institutional, cultural and physical barriers**

11 Compile information on the barriers identified in Table 8.12 and consider how these barriers may affect
 12 the implementation potential using the questions provided. The questions can be adapted or further
 13 barriers and questions can be added as needed, to ensure that the analysis is relevant to national
 14 circumstances.

15 Information can be gathered through expert elicitations with administration and government experts that
 16 are directly or indirectly involved in the policy under consideration, as well as through desk reviews and
 17 additional stakeholder consultations. Refer to the ICAT *Stakeholder Participation Guidance* (Chapter 8)
 18 for further information on designing and conducting consultations.

19 Answer each question and score each response based on its potential to limit the effectiveness of the
 20 policy, on a scale of 1 to 4, as follows:

- 21 1 = Likely to have no effect
- 22 2 = Likely to limit effectiveness
- 23 3 = Likely to prevent implementation
- 24 4 = Unknown

25

1 *Table 8.12: Other barriers to policy implementation*

1. Institutional barriers	
a.	Are there any conflicting goals or jurisdictions between ministries or other agencies with respect to the implementation of the policy?
b.	Is there the potential for institutional racism, gender bias or age discrimination that could limit the policy effectiveness, for example by limiting participation of certain stakeholders based on their race, religion, gender or age?
2. Cultural barriers	
a.	Are different languages used in the region where the policy will be implemented?
b.	Is the policy congruent with cultural norms and values?
c.	Are there gender issues in access to resources or communication?
d.	Are there generational differences in work ethics and work approaches that can result in conflicts or disputes among stakeholders that limit ability to effectively implement the policy?
e.	Are there any areas or landmarks with religious significance of the region under consideration?
f.	Is there a group that has very strong opposition to the policy?
3. Physical barriers	
a.	Are land areas proposed for intervention easily accessible?
b.	Is the necessary physical infrastructure in place for the proposed policy?
c.	Are there any war conflicts in the country that would limit access to certain land areas?

2 Step 2: Evaluate the overall distribution of scores and estimate the effect on
 3 implementation potential

4 Once each barrier has been analysed and scored, evaluate the overall distribution of scores:

- 5 • A distribution with many scores of 1 indicates less of a need to refine the implementation potential
 6 of the policy.
- 7 • A distribution with many scores of 2, 3 or 4 could suggest a downward adjustment of the
 8 implementation potential or gathering more information and reassessing the impact, especially for
 9 scores of 4.

10 Carefully review each score of 2 and 3. For a score of 2 consider and, if possible, estimate to what extent
 11 the barrier will decrease policy effectiveness. Describe and justify the reduction. For a score of 3, the
 12 barrier is considered crucial and has the potential to render the policy ineffective. If even one crucial
 13 barrier is identified, it is recommended to reconsider the policy design and discontinue the impacts
 14 assessment. For scores of 4, attempt to gather enough information to assess the effect of the barrier. If
 15 that is not possible, it is conservative to assume it limits effectiveness.

1 Consider and determine to what extent the effects of the barriers overlap. An overlapping effect occurs
2 where one barrier limits implementation in one area and another barrier also limits implementation in the
3 same area. These overlapping effects should be appropriately accounted for when calculating the
4 potential effect of all barriers. The combined effect of the barriers together may be greater than or less
5 than the sum of the individual barriers. If information is available, uncertainty ranges should also be
6 incorporated in the final results.

7 During the data-gathering phase, it is recommended that information also be collected on any other
8 relevant policies in the country that might help overcome specific barriers. Where such policies exist, the
9 scoring of the barrier effect should be changed accordingly (most likely to a score of 1).

10 8.5.2 Considerations for accounting for other barriers

11 Institutional barriers

12 Conflicting goals between different ministries and other government agencies could result in overlapping
13 regulation and ambiguous roles and responsibilities of the stakeholders involved. For example, proposed
14 areas for the policy may overlap with other existing types of area protection (e.g., based on national
15 policies or international conventions), which could lead to confusing regulations for specific sites.

16 Institutional barriers relating to discrimination often include racism, gender bias, age discrimination,
17 favoritism and other selection approaches that are not based on the actual performance of individual
18 workers. Where discrimination is present, certain stakeholders may not have equal access to the
19 opportunities afforded by a policy (e.g., incentive payments, technical assistance or education) and this
20 can limit overall effectiveness. Often such barriers are linked to corrupt practices (addressed in Section
21 8.3). Safeguards to prevent discrimination can be built into policies. For example, it can be required that
22 enrollment in programmes such as education opportunities must be diverse in terms of race and gender.
23 If safeguards against discrimination do not exist, either as part of the policy being analysed or in
24 institutions involved in implementing the policy, it is possible that discrimination will be a barrier to policy
25 implementation.

26 Cultural barriers

27 The use of language and terminology that is not widely understood by the target stakeholders could be a
28 crucial cultural barrier as it could result in communications problems causing misunderstandings, mistrust
29 and non-participation/compliance among the local population. Where language barriers exist and there is
30 no mechanism in place to overcome them, the effectiveness of the policy is likely to be reduced.

31 In many countries, the successful implementation of mitigation policies may require consideration of
32 gender or social class sensitivities to reduce resistance of local communities to the proposed intervention.
33 Cultural preferences may have more potential for change than physical limits, but change may take time
34 and almost certainly will benefit from considering existing mechanisms of social influence. There may also
35 be generational differences in work ethics and work approaches that have the potential to result in
36 conflicts between older and younger workers. If the policy is sensitive to such factors, including potential
37 language barriers, age distribution and cultural norms of stakeholders, they may not present a barrier to
38 implementation.

39 In some countries, gender considerations can have a very important effect on the success or failure of
40 implementation of the policy. It is important to consider who makes decisions about land use actions, and

1 who has access to information and money. For a policy to be implemented effectively the person who is
 2 responsible for managing land will also need to have the ability to access information and financing to
 3 implement management changes. If they do not, this will likely limit policy effectiveness.

4 Certain land areas or landmarks have important religious significance for local communities. Policies that
 5 may affect ancestral homes or sacred grounds would be more likely to face resistance from indigenous
 6 peoples and local communities.

7 Strong opposition to a policy, for example from a particular stakeholder group or political party, could
 8 hamper efforts to secure financing, gain trust, and otherwise implement policy interventions, especially if
 9 that group is influential.

10 Failure to identify and address cultural barriers will more than likely have detrimental impacts on the policy
 11 implementation. Effective stakeholder participation from early in policy design is important to identify and
 12 address cultural barriers. Refer to the ICAT *Stakeholder Participation Guidance* for further information
 13 about all elements of effective stakeholder participation for policy design, implementation and evaluation.

14 **Physical barriers**

15 In mountainous countries or countries with inaccessible regions, policies relating to agriculture and forests
 16 should take into account whether certain land areas are remote or are difficult to access. Minimal existing
 17 road networks or insufficient transportation infrastructure would be expected to limit the implementation
 18 potential.

19 Conflicts in a country (such as civil war or territorial disputes with a neighboring country) could limit
 20 access to areas that could be considered for policy intervention. Depending on the severity of the conflict,
 21 and to safeguard the welfare of the people involved, certain parts of the country may be excluded until the
 22 conflict is resolved. This would reduce the impact of the policy at least through the time period during
 23 which conflicts remain active, and possibly longer.

24 **8.5.3 Example of accounting for other barriers**

25 The screening questions from Table 8.12 were reviewed (Step 1). Not all of the screening questions were
 26 identified to be relevant and a few of the questions were modified to suit national circumstances. The
 27 barriers under the cultural barriers category related to cultural norms and values (2b), gender issues (2c),
 28 generational differences (2d), and areas of religious significance (2e) were considered collectively. The
 29 barriers under the physical barrier category related accessibility of land area (3a) and availability of
 30 infrastructure (3b) were also considered jointly. With these modifications a total of seven barriers were
 31 considered. In consultation with experts, responses were tabulated and scored in Table 8.13 below.

32 *Table 8.13: Example of accounting for other barriers*

1. Institutional barriers		Score
a.	<p><i>Are there any conflicting goals or jurisdictions between ministries or other agencies?</i></p> <p>The Ministry of Natural Resources has recently initiated a project, as a result of national legislation, in a land area covering about 25,000 hectares to address loss of biodiversity concerns. The same area is also considered for this project.</p>	4
b.	<p><i>Is there the potential for institutional racism, gender bias or age discrimination that could limit the policy effectiveness, for example by limiting participation of certain stakeholders based on their</i></p>	1

	<i>race, religion, gender or age?</i> The policy is in accordance with recent national legislation that has been put in place to eliminate discrimination in the work place.	
2. Cultural barriers		
a.	<i>Are different languages used in the region where the policy will be implemented?</i> French and English are the two most spoken languages. However, several local isolated communities use their own dialects. Most local offices have sufficient capacity to communicate in these dialects.	1
b.	<i>Is the policy congruent with cultural norms and values?</i> Several local communities rely on hierarchical authority to make decisions on the use of their forest land. This is made possible in part by the age distribution of the communities. In most rural areas, the population is rather aged (average age of farmers: 45 years). Most young people move to urban areas in search of work due to lack of job opportunities in the countryside. As a result, there is very little conflict about how to manage natural resources, with decisions made by elders largely carried out by the community leaders without question. Therefore there are no cultural barriers related to generational differences.	1
c.	<i>Are there gender issues in access to resources or communication?</i> See b above.	N/A
d.	<i>Are there generational differences in work ethics and work approaches that can result in conflicts or disputes among stakeholders that limit ability to effectively implement the policy?</i> See b above.	N/A
e.	<i>Are there any areas or landmarks with religious significance of the region under consideration?</i> See b above.	N/A
f.	<i>Is there a group that has very strong opposition to the policy?</i> No indications of groups that oppose the policy; however, information is very limited.	4
3. Physical barriers		
a.	<i>Are land areas proposed for intervention easily accessible?</i> About 96% of the land area targeted by the policy is accessible. However, due to recent floods and soil erosion in the northern part of the country (accounting for about 35% of the land are under consideration), some roads will need to be inspected and repaired. According to expert judgment, it is too expensive, and there is currently no budget, to build roads. Therefore, about 6,400 hectares of land originally targeted by the policy will not be accessible. Based on current land use in the impacted areas, it is estimated that half would have been used for natural regeneration and the other half for SFM under the PES programme.	2
b.	<i>Is the necessary physical infrastructure in place for the proposed policy?</i> See a above.	N/A
c.	<i>Are there any war conflicts in the country that would limit access to certain land areas?</i> There are no conflicts in the country.	1

- 1 The distribution of scores was evaluated (Step 2). Four barriers received a score of 1. One barrier
- 2 received a score of 2. Two barriers received a score of 4. None of the barriers received a score of 3.
- 3 The extent to which policy effectiveness may be reduced as a result of each barrier was evaluated. Five
- 4 of the barriers are not expected to limit policy effectiveness. None of the barriers received a 3 (e.g.,

1 appear to be crucial problems that could completely hamper policy effectiveness). Physical barrier 3a will
 2 reduce the area of land available for SFM and natural regeneration by 3,200 hectares each. Any potential
 3 conflicts with the biodiversity project are unknown at this point because there are no details yet available
 4 on how the project will be implemented and what sort of criteria it will have for management and land use.
 5 Based on the above assessment, the land area of the policy will be adjusted as shown in Table 8.14
 6 below.

7 *Table 8.14: Example of refined implementation potential*

Policy activity	Maximum implementation potential (in ha)	Refined implementation potential based on policy design and national circumstances (in ha)	Refined implementation potential based on financial feasibility (in ha)	Refined implementation potential based on barriers (in ha)
SFM	150,000	105,000	94,500	91,300
Tree planting general	15,000	13,950	14,250	13,950
Natural regeneration	40,000	37,200	33,480	30,280
Tree planting with endangered species	5,000	4,650	4,750	4,750
Total	210,000	160,800	146,580	140,280

8 The table illustrates how land area was refined after each step. The refined values in the last column are
 9 considered the likely implementation potential of the policy, which are the values that should be used to
 10 estimate the GHG impacts of the policy.

11 8.6 Estimate GHG impacts

12 It is a *key recommendation* to estimate the GHG impacts of the policy. There are two ways to estimate
 13 GHG impacts: the scenario approach or deemed estimates approach. Where baseline emissions were
 14 estimated, users can calculate the change in emissions between the baseline and policy scenarios
 15 (scenario approach). Where baseline emissions were not estimated, the GHG impacts can be estimated
 16 by calculating the net GHG emission reductions and removals directly from the likely implementation
 17 potential of the policy (deemed estimates approach). Guidance for estimating the GHG impacts for each
 18 approach is given below.

19 8.6.1 Scenario approach

20 Use the likely implementation potential of the policy (derived following the guidance in Sections 8.2 – 8.5)
 21 to determine the most-likely policy scenario. Derive new parameter values and, if relevant, new emission
 22 factors that reflect conditions under the policy scenario.

1 Use the adjusted values and emission factors to estimate GHG emissions of the policy scenario. Subtract
 2 the policy scenario emissions and removals from the baseline emissions and removals to estimate net
 3 change in GHG emissions and removals resulting from the policy.

4 8.6.2 Deemed estimates approach

5 The likely implementation potential of the policy represents the effects that are expected to occur as a
 6 result of the policy. Implicitly, these effects are relative to the baseline scenario. Use the guidance below
 7 to calculate the impact of the policy on each GHG source and carbon pool in the GHG assessment
 8 boundary. Sum the GHG impacts for all GHG sources and carbon pools to yield total policy impact on
 9 GHGs.

10 Estimate carbon stock change

11 Using the estimates of how much the policy will increase or decrease the area of land (hectares) in land
 12 categories affected by the policy (determined following the guidance in Section 8.2 – 8.5), subdivide the
 13 land categories into strata according to guidance in Section 7.2.2. These are the policy scenario strata.

14 Determine the policy impact on each GHG source and carbon pool included in the GHG assessment
 15 boundary for each policy scenario stratum. Guidance for estimating the GHG impacts of the living
 16 biomass carbon pool are provided in the relevant section below. Repeat the steps for each policy
 17 scenario stratum.

18 Forest land remaining forest land

- 19 • Step 1: Estimate the hectares of land in the policy scenario stratum for each year of the
 20 assessment period. Unless the policy design indicates otherwise, assume the area of land
 21 changes following a linear trend. For example, in the forest policy example, the implementation
 22 potential for SFM is estimated as 97,400 hectares over 15 years. A linear trend assumes 6,300
 23 hectares of forest are affected by the policy each year for 15 years (i.e., management changes to
 24 sustainable forestry on 6,300 hectares per year for 15 years). The assessment period is 20 years
 25 long; therefore, for the last 5 years of the time series, no further hectares of forest are affected by
 26 the policy. Table 8.15 provides an example land area time series.

27 *Table 8.15: Example land area time series*

Year	1	2	3	4-13*	14	15	16	17	18	19	20
Area (hectares)	6,300	12,600	18,900	[25,200-81,900]	88,200	94,500	94,500	94,500	94,500	94,500	94,500

28 * Years 4-13 are not shown for simplicity. Square brackets indicate the range of values during that time period.

- 29 • Step 2: Calculate the annual carbon stock change for living biomass for the policy scenario
 30 stratum based on the land area time series estimated in Step 1 and the guidance in Section 7.2.4
 31 for forest land remaining forest land. Call this term $\Delta C_{Biomass_with\ policy}$ (units are tonnes C/year).
- 32 • Step 3: Determine the baseline scenario stratum, which is the most likely stratum if the policy
 33 were not enacted (without policy). The ecological zone in the baseline stratum should be the
 34 same as in the policy scenario stratum. The management category should be different from the
 35 policy scenario stratum. The baseline land area time series is identical to the policy scenario land

1 area time series developed in Step 1 because it represents the same land as the policy scenario
 2 under an alternative scenario. Calculate the annual carbon stock change in living biomass for the
 3 baseline stratum based on the land area time series estimated in Step 1 and following the
 4 guidance in Section 7.2.4 for forest land remaining forest land. Call this term

5 $\Delta C_{Biomass_without\ policy}$ (units are tonnes C/year).

- 6 • Step 4: Calculate the cumulative carbon stock change over all years of the assessment period,
 7 separately for the baseline and policy strata.
- 8 • Step 5: Subtract the baseline cumulative carbon stock change from the policy cumulative carbon
 9 stock change to yield the policy impact on the living biomass carbon pool for the land strata.

10 **Non-forest land converted to forest land**

- 11 • Step 1: Estimate the cumulative hectares of land in the policy scenario stratum for the
 12 assessment period. For example, in the forest policy example, it is estimated that 14,250
 13 hectares of cropland will be converted to forest land through general tree planting as a result of
 14 the policy. Therefore the cumulative hectares of land in the policy scenario stratum for non-forest
 15 land converted to forest land is 14,250 hectares.
- 16 • Step 2: Calculate the change in forest carbon stocks from land conversion using Equation 7.1 in
 17 Section 7.2.4. Set the area term in Equation 7.1 equal to the hectares of land from Step 1. This
 18 yields the policy impact on the living biomass carbon pool for the land stratum.

19 **Avoided forest land conversion to non-forest land**

- 20 • Step 1: Estimate the cumulative hectares of land in the policy scenario stratum for the
 21 assessment period. For avoided deforestation, this will be the estimated amount of forest land not
 22 converted to non-forest land as a result of the policy.
- 23 • Step 2: Calculate the change in forest carbon stocks from land conversion using Equation 7.1 in
 24 Section 7.2.4. Set the area term in Equation 7.1 equal to the hectares of land from Step 1.

25 The result of Equation 7.1 will be the estimated carbon stock loss that would have occurred if
 26 those hectares were deforested. Multiply the result of Equation 7.1 by -1 to convert the outcome
 27 to carbon stock gain because the policy avoided this amount of forest carbon stock loss. This
 28 yields the policy impact on the living biomass carbon pool for the land stratum.

29 **8.6.3 Calculate GHG impacts**

30 Calculate the total policy impact on the living biomass carbon pool by summing the results for all policy
 31 scenario strata. Convert the net carbon stock change to GHG emission reductions or removals,
 32 expressed as tonnes of CO₂e, by multiplying by 44/12 and -1. This generates the cumulative policy
 33 impact in terms of tonnes CO₂e emissions (positive) or removals (negative). Divide the cumulative policy
 34 impact by the number of years in the assessment period for the annual GHG impacts of the policy.

35 Where other GHG sources and carbon pools are included in the GHG assessment boundary, calculate
 36 their impact in terms of CO₂e emissions and add to the policy impact on the living biomass carbon pool.

37

9. ESTIMATING GHG IMPACTS EX-POST

Ex-post impact assessment is a backward-looking assessment of the GHG impacts achieved by a policy to date. The GHG impacts can be assessed during the policy implementation period or in the years after implementation. Ex-post assessment involves evaluating the performance of the policy, and estimating the impact of the policy by comparing observed policy scenario values (based on monitored data) to ex-post baseline values (described in Chapter 7). In contrast to ex-ante assessment, which is based on forecasted values, ex-post assessment involves monitored or observed data collected during the policy implementation period. The impact of the policy (ex-post) is estimated by subtracting baseline estimates from policy scenario estimates. Users that are estimating GHG impacts ex-ante only can skip this chapter.

Figure 9.1: Overview of steps in the chapter



Checklist of key recommendations

- Estimate or update baseline emissions using observed values for parameters that are not affected by the policy and estimated values for parameters that are affected by the policy
- Ascertain whether the inputs, activities and intermediate effects that were expected to occur according to the causal chain, actually occurred (if relevant)
- Estimate the GHG impacts of the policy over the assessment period for each GHG source and carbon pool included in the GHG assessment boundary

9.1 Estimate or update baseline emissions

It is a *key recommendation* to estimate or update baseline emissions using observed values for parameters that are not affected by the policy and estimated values for parameters that are affected by the policy. The baseline emissions can be estimated following the guidance in Chapter 7. Further guidance on monitoring parameters is provided in Chapter 10. The baseline and policy scenarios have the same GHG assessment boundary.

Where the baseline scenario was determined and baseline emissions estimated in a previous ex-ante impact assessment, this should be updated by replacing estimated values with observed data for non-policy drivers.

9.2 Estimate GHG impacts

Evaluate performance of the policy (if relevant)

The performance of the policy should be evaluated to ensure that the GHG impacts calculated ex-post can be attributed to policy. To do this, it is a *key recommendation* to ascertain whether the inputs, activities and intermediate effects that were expected to occur according to the causal chain, actually

1 occurred. For ex-post impact assessments where no previous ex-ante assessment has been conducted
 2 this step can be skipped.

3 Chapter 10 provides examples of the inputs and activities that should be monitored to evaluate the
 4 performance of the policy. If the user cannot ascertain that the inputs or activities occurred, it is not
 5 possible to attribute GHG impacts to policy implementation.

6 Users should also examine whether the intermediate effects in the causal chain occurred. It may not be
 7 feasible to monitor all intermediate effects. At minimum, each of the intermediate effects linked to GHG
 8 sources and carbon pools included in the GHG assessment boundary should be monitored with at least
 9 one parameter. Table 6.2 and Table 6.3 in Chapter 6 provide examples of intermediate effects that should
 10 be monitored. If the user cannot confirm that these intermediate effects occurred, it is not possible to
 11 attribute GHG impacts to policy implementation.

12 Note that inputs, activities and/or intermediate effects may be lower or higher in magnitude than expected
 13 but this does not mean that GHG impacts cannot be attributed to the policy.

14 Estimate the GHG impact of the policy

15 It is a *key recommendation* to estimate the GHG impacts of the policy over the assessment period for
 16 each GHG source and carbon pool included in the GHG assessment boundary. The same methods used
 17 to estimate baseline emissions can be used to estimate policy scenario emissions.

18 Calculate policy scenario emissions using the estimation methods provided in Chapter 7. Use observed,
 19 measured or recently collected activity data, and measured or re-estimated emission factors. Further
 20 guidance on monitoring parameters is provided in Chapter 10. Calculate the GHG impacts of the policy by
 21 subtracting baseline emissions (estimated in Section 9.2) from the ex-post policy scenario emissions for
 22 each GHG source and carbon pool included in the GHG assessment boundary.

23

PART IV: MONITORING AND REPORTING

10. MONITORING PERFORMANCE OVER TIME

Monitoring allows the user to collect the information needed for the quantification of the GHG impacts during or after policy implementation. It also allows the user to understand whether the policy is on track and being implemented as planned. This chapter provides guidance on how to develop a monitoring plan and identifies data and parameters to monitor over time.

Figure 10.1: Overview of steps in the chapter



Checklist of key recommendations

- Create a plan for monitoring key performance indicators and parameters
- Identify the key performance indicators that will be used to track performance of the policy over time and define the parameters necessary to estimate GHG emissions ex-post
- Monitor each of the indicators and parameters over time, in accordance with the monitoring plan

10.1 Create a monitoring plan

Monitoring during the policy implementation period serves two objectives:

- **To evaluate performance of the policy:** Monitor trends in performance parameters to understand whether the policy is on track and being implemented as planned
- **To estimate GHG impacts:** Collect the data needed for ex-post assessment of GHG impacts

A *key performance indicator* is a metric that indicates the performance of a policy (such as tracking changes in targeted outcomes). A *parameter* is a variable such as activity data or an emission factor that is needed to estimate emissions.

To monitor progress and estimate GHG effects ex-post, users need to collect data on parameters during and/or after the policy implementation period. It is a *key recommendation* to create a plan for monitoring key performance indicators and parameters. A monitoring plan is the system for obtaining, recording, compiling and analysing data and information important for tracking performance and estimating GHG impacts. Where possible, a monitoring plan should be developed before policy implementation. Doing so can ensure that the data needed to assess the effectiveness of the policy are collected. Further guidance on the parameters to monitor is provided in Section 10.2.

The elements below should be described in the monitoring plan.

1 Monitoring period

2 The policy implementation period is the time period during which the policy is in effect. The assessment
3 period is the time period over which the GHG impacts resulting from the policy are assessed. The
4 monitoring period is the time period over which the policy is monitored. At minimum the monitoring period
5 should include the policy implementation period. Users can have multiple monitoring periods for separate
6 assessment periods. A monitoring period can also include monitoring of relevant activities prior to
7 implementation of the policy and after the policy implementation period.

8 Users should strive to align the monitoring period with those of other assessments being conducted using
9 other ICAT guidance documents. For example, if assessing sustainable development impacts using the
10 ICAT *Sustainable Development Guidance* in addition to assessing GHG impacts, the monitoring periods
11 should be the same.

12 Institutional arrangements for coordinated monitoring

13 Information on key performance indicators and parameters can be dispersed among a number of different
14 institutions. Given the wide variety of data needed for impact assessment and a range of different
15 stakeholders involved, strong institutional arrangements serve an important function. They play a central
16 role in coordinating monitoring. A technical coordinator, coordinating team or body is often assigned to
17 lead MRV processes in which responsibilities have been delegated to different institutions. Since data can
18 be widely dispersed between institutions, the coordinating body oversees the procedures for data
19 collection, management and reporting.

20 Countries may already have institutions in place as part of the national MRV system. Where this is the
21 case, users can consider expanding the national MRV system to also monitor the impact of the policy.
22 Where strong institutional arrangements do not yet exist, users can determine the governmental body
23 with the adequate capacity and authority to be responsible for the MRV system and to establish the
24 necessary legal arrangements. Institutional mandates help to strengthen the procedures and the system,
25 and may also help secure funding from the government to ensure the continuity of the process.

26 Refer to the UNFCCC *Toolkit on Establishing Institutional Arrangements for National Communications*
27 *and Biennial Update Reports*, as well as other sources, for support on establishing or improving the
28 institutional arrangements for a robust MRV system.²³

29 Considerations for a robust monitoring plan

30 To ensure that the monitoring plan is robust, consider including the following elements in the plan.

- 31 • **Roles and responsibilities:** Identify the entity or person that is responsible for monitoring key
32 performance indicators and parameters, and clarify the roles and responsibilities of the personnel
33 conducting the monitoring.
- 34 • **Competencies:** Include information about any required competencies and any training needed to
35 ensure that personnel have necessary skills.

²³ Available at: http://unfccc.int/files/national_reports/non-annex_i_natcom/training_material/methodological_documents/application/pdf/unfccc_mda-toolkit_131108_ly.pdf

- 1 • **Methods:** Explain the methods for generating, storing, collating and reporting data on monitored
2 parameters.
- 3 • **Frequency:** Key performance indicators and parameters can be monitored at various
4 frequencies, such as monthly, quarterly or annually. Determine the appropriate frequency of
5 monitoring based on the needs of decision makers and stakeholders, cost and data availability. In
6 general, the more frequent that data is collected, the more robust the assessment will be.
7 Frequency of monitoring can be consistent with measurement conducted under the national MRV
8 system.
- 9 • **Collecting and managing data:** Identify the databases, tools or software systems that are used
10 for collecting and managing data and information.
- 11 • **Quality assurance and quality control (QA/QC):** Define the methods for QA/QC to ensure the
12 quality of data enhance the confidence of the assessment results. Quality assurance is a planned
13 review process conducted by personnel who are not directly involved in the data collection and
14 processing. Quality control is a procedure or routine set of steps that are performed by the
15 personnel compiling the data to ensure the quality of the data.
- 16 • **Record keeping and internal documentation:** Define procedures for clearly documenting the
17 procedures and approaches for data collection as well as the data and information collected. This
18 information is beneficial for improving the availability of information for subsequent monitoring
19 events, documenting improvements over time and creating a robust historical record for archiving.

20 10.2 Monitor indicators and parameters over time

21 This section describes the key performance indicators and parameters to monitor. Key performance
22 indicators are used to monitor policy performance. Parameters are used to estimate the GHG impacts in
23 an ex-post assessment. Data are collected for indicators and parameters during or after the monitoring
24 period.

25 It is a *key recommendation* to identify the key performance indicators that will be used to track
26 performance of the policy over time and define the parameters necessary to estimate GHG emission ex-
27 post. It is a *key recommendation* to monitor each of the indicators and parameters over time, according to
28 the monitoring plan. The frequency of monitoring is dependent on stakeholder resources, data availability,
29 feasibility, and the uncertainty requirement of reporting or estimation needs. The monitoring plan should
30 include an iterative process for balancing these dependencies.

31 Key performance indicators

32 The following table defines and provides examples of the types of key performance indicators: inputs,
33 activities, intermediate effects, GHG impacts and sustainable development impacts.

34 *Table 10.1: Key performance indicators to monitor*

Key performance indicators	Definition	Example key performance indicator
Inputs	Resources that go into implementing a policy	Taxation of ecosystem service users

Activities	Administrative activities involved in implementing the policy	Number of contracts executed with land owners
Intermediate effects	Changes in behavior, technology, processes or practices	Survival and growth of trees
GHG impacts	Changes in greenhouse gas emissions by sources or removals by sinks that result from the intermediate effects of the policy	Increased sequestration from biomass accumulation
Sustainable development impacts	Changes in relevant environmental, social or economic conditions that result from the policy	Number of endangered species planted

1 Parameters

2 Table 10.2 defines and describes the three types of parameters: assumptions, activity data and carbon
3 stock change factor.

4 *Table 10.2: Parameters to monitor*

Parameters	Definition	Data Example
Assumptions	Data that influence estimation of parameters	GDP
Activity data	A quantitative measure of a level of activity that results in GHG emissions. Activity data is multiplied by an emissions factor to derive the GHG emissions associated with a process or an operation.	Non-forest land converted to forest land
Carbon stock change factors	The average emission rate of a given GHG for a given source, relative to units of activity and the data needed to choose or derive emission factors.	CO ₂ removals per hectare

5 Table 10.3 further elaborates specific parameters for afforestation/reforestation, sustainable forest
6 management and avoided deforestation. In some cases parameters may also be used as key
7 performance indicators, as noted in the table. Parameters are organised by those needed for estimating
8 GHG impacts of land-use change or of land management change. Those that are relevant to land
9 management change on forest land remaining forest land (FLrFL) are organised by the stock-difference
10 method or the gain-loss method. Parameters that are needed regardless of land use or land management
11 change are listed under “All.” Parameters needed to estimate GHG impacts that can also be used to
12 monitor policy performance are also designated as key performance indicators. The data needed to
13 monitor these parameters may be measured, modeled or estimated. A suggested monitoring frequency is
14 also provided. For parameters that are suggested to be monitored periodically, users can monitor
15 annually, every 5 years or every 10 years, depending on data availability and desired level of certainty.

16 *Table 10.3: Monitoring parameters*

Parameter and	Potential sources of data	Parameter type	Suggested
---------------	---------------------------	----------------	-----------

unit			monitoring frequency
All			
Land use classification (by ecological domain and climate zone) (unitless)	Remotely sensed and aerial imagery Land cover maps National forest inventory GHG inventory reports IPCC 2006 GL* Table 4.1	Assumption	Once Can be updated in conjunction with collecting data on the area of land in each strata
Carbon fraction of dry matter $CF_{i,j}$ (tonnes C per tonnes dry matter)	IPCC 2006 GL* Table 4.3 Country-specific research	Carbon stock change calculation	Once per type
Land-Use Change			
Area of forest land converted to non-forest land (ha)	Remotely sensed and aerial imagery Land cover maps National forest inventory GHG inventory reports	Activity data Key performance indicator	At least twice, at beginning and end of policy implementation period Or, periodically during the policy implementation period
Area of land converted to forest land (ha)	Remotely sensed and aerial imagery Land cover maps National forest inventory GHG inventory reports	Activity data Key performance indicator	At least twice, at beginning and end of policy implementation period Or, periodically during the policy implementation period
Biomass carbon stocks on land type i , after the conversion $B_{After,i}$ (tonnes dry matter per ha)	Measured samples for tree attributes, such as diameters and heights, and applying species-specific allometric equations or biomass tables, from: national forest inventory or country-specific research studies GHG Inventory Reports IPCC 2006 GL* Table 4.7, 4.8, and 4.12 for aboveground biomass carbon stocks in forests IPCC 2006 GL* Table 5.9 for default biomass carbon stocks on cropland (tonnes C ha ⁻¹) IPCC 2006 GL* Table 6.4 for default biomass stocks on grassland	Carbon stock change calculation Key performance indicator	Once
Biomass carbon stocks on land type i , before the conversion	Measured samples for tree attributes, such as diameters and heights, and applying species-specific allometric	Carbon stock change calculation	Once

$B_{Before,i}$ (tonnes dry matter per ha)	equations or biomass tables, from: national forest inventory or country-specific research studies GHG inventory reports IPCC 2006 GL* Table 4.7, 4.8, and 4.12 for aboveground biomass carbon stocks in forests IPCC 2006 GL* Table 5.9 for default biomass carbon stocks on cropland (tonnes C ha ⁻¹) IPCC 2006 GL* Table 6.4 on default biomass stocks on grassland		
FLrFL: All			
Area of forest land remaining forest land (ha)	Remotely sensed and aerial imagery Land cover maps National forest inventory GHG inventory reports	Activity data Key performance indicator	At least twice, at beginning and end of policy implementation period Or, periodically during the policy implementation period
Ratio of belowground to aboveground biomass $R_{i,j}$ (tonnes dry matter belowground biomass per tonnes dry matter aboveground biomass)	IPCC 2006 GL* Table 4.4	Carbon stock change calculation	Once per type
FLrFL: Stock-Difference Method			
Forest carbon stock at time t_1 $C_{t,1}$ (tonnes C)	Measured samples for tree attributes, such as diameters and heights, and applying species-specific allometric equations or biomass tables, from: national forest inventory or country-specific research studies Estimated with IPCC 2006 GL* Equation 2.8	Carbon stock change calculation Key performance indicator	Once at the beginning of a time interval The time interval may correspond to the policy implementation period or a shorter interval within the policy implementation period
Forest carbon stock at time t_2 $C_{t,2}$ (tonnes C)	Measured samples for tree attributes, such as diameters and heights, and applying species-specific allometric equations or biomass tables, from: national forest inventory or country-specific research studies Estimated with IPCC 2006 GL* Equation 2.8	Carbon stock change calculation Key performance indicator	Once at the end of a time interval The time interval may correspond to the policy implementation period or a shorter interval within the policy implementation period
Merchantable growing	National forest inventory	Carbon stock change	Twice, in conjunction

stock volume $V_{i,j}$ (m ³ per hectare)	GHG inventory reports Harvest or timber sale records	calculation (parameter in IPCC 2006 GL* Equation 2.8) Key performance indicator	with estimating $C_{t,1}$ and $C_{t,2}$ One or more time intervals may be monitored within the policy implementation period
Biomass conversion and expansion factor $BCEF_{S_{i,j}}$ (tonnes aboveground biomass grown per m ³ of growing stock volume)	IPCC 2006 GL* Table 4.5	Carbon stock change calculation (parameter in IPCC 2006 GL* Equation 2.8)	Once per type
FLrFL: Gain-loss method			
Aboveground biomass growth rate $G_{W_{i,j}}$ (tonnes dry matter per ha)	Measured samples for tree attributes, such as diameters and heights, and applying species-specific allometric equations or biomass tables, from: national forest inventory or country-specific research studies GHG inventory reports IPCC 2006 GL* Table 4.12 Derived from mean annual increment (default values available in IPCC 2006 GL* Table 4.11A and 4.11B) and IPCC 2006 GL* Equation 2.10	Carbon stock change calculation Key performance indicator	Periodically
Annual aboveground biomass C loss due to wood removals $L_{wood-removals}$ (tonnes C per year)	Estimated with IPCC 2006 GL* Equation 2.12 National forest inventory Harvest or timber sale records	Carbon stock change calculation Key performance indicator	Periodically
Annual aboveground biomass C loss due to fuelwood removals $L_{fuelwood}$ (tonnes C per year)	Estimated with IPCC 2006 GL* Equation 2.13 National forest inventory	Carbon stock change calculation Key performance indicator	Periodically
Annual aboveground biomass carbon losses due to disturbances $L_{disturbance}$ (tonnes C per year)	Estimated with IPCC 2006 GL* Equation 2.14 National forest inventory	Carbon stock change calculation Key performance indicator	Periodically

1 *IPCC 2006 GL, Volume 4, AFOLU

2

1 11. REPORTING

2 *Reporting the results, methodology and assumptions used is important to ensure the GHG impacts*
 3 *assessment is transparent and gives decision-makers and stakeholders the information they need to*
 4 *properly interpret the results. This chapter presents a list of information that is recommended for inclusion*
 5 *in an assessment report.*

6 Checklist of key recommendations

- Report information about the assessment process and the GHG impacts resulting from the policy (including the information listed in Section 11.1)

7 11.1 Recommended information to report

8 It is a *key recommendation* to report information about the assessment process and the GHG impacts
 9 resulting from the policy (including the information listed below). For guidance on providing information to
 10 stakeholders, refer to the *ICAT Stakeholder Participation Guidance* (Chapter 7).

11 General information

- 12 • The name of the policy assessed
- 13 • The person(s)/organisation(s) that did the assessment
- 14 • The date of the assessment
- 15 • Whether the assessment is an update of a previous assessment, and if so, links to any previous
 16 assessments

17 Chapter 2: Objectives of estimating GHG impacts

- 18 • The objective(s) and intended audience(s) of the assessment

19 Chapter 4: Steps and assessment principles

- 20 • Opportunities for stakeholders to participate in the assessment

21 Chapter 5: Describing the policy

- 22 • A description of the policy including the recommended information in Table 5.1 and the additional
 23 information in Table 5.2
- 24 • Whether the assessment applies to an individual policy or a package of related policies, and if a
 25 package is assessed, which policies are included in the package
- 26 • Whether the assessment is ex-ante, ex-post or a combination of ex-ante and ex-post

27 Chapter 6: Identifying impacts: How forest policies reduce or remove emissions

- 28 • A causal chain, including a table describing all intermediate effects
- 29 • A list of all GHG sources and carbon pools that are included in the GHG assessment boundary
- 30 • A list of potential GHG sources and carbon pools that are excluded from the GHG assessment
 31 boundary, with justification for their exclusion

- 1 • The assessment period

2 Chapter 7: Estimating the baseline scenario and emissions

- 3 • The method chosen, scenario approach or deemed estimates approach, for estimating the
4 policy's expected GHG impacts
- 5 • A description of the baseline scenario and justification for why it is considered the most likely
6 scenario
- 7 • A list of the intended policy outcomes and associated target drivers
- 8 • Total annual and cumulative baseline emissions and removals over the GHG assessment period
- 9 • The methodology and assumptions used to estimate baseline emissions, including the emissions
10 estimation methods (including any models) used
- 11 • Justification for the choice of whether to develop new baseline assumptions and data or to use
12 published baseline assumptions and data
- 13 • A list of policies, actions and projects included in the baseline scenario
- 14 • A list of implemented or adopted policies, actions, or projects that are expected to affect the GHG
15 sources or carbon pools included in the GHG assessment boundary but are excluded from the
16 baseline scenario, with justification for their exclusion
- 17 • Whether the baseline scenario includes any planned policies and if so, which planned policies are
18 included
- 19 • A list of non-policy drivers included in the baseline scenario
- 20 • A list of non-policy drivers that are considered for inclusion but are excluded from the baseline
21 scenario, with justification for their exclusion
- 22 • The baseline values for key parameters (such as activity data, emission factors and GWP values)
23 in the baseline emissions estimation method(s)
- 24 • The methodology and assumptions used to estimate baseline values for key parameters,
25 including whether each parameter is assumed to be static or dynamic, and assumptions
26 regarding other policies/actions and non-policy drivers that are included in the baseline and affect
27 each parameter
- 28 • All sources of data used to estimate key parameters, including activity data, emission factors,
29 GWP values and assumptions
- 30 • The method or approach used to assess uncertainty
- 31 • An estimate or description of the uncertainty and/or sensitivity of the results in order to help users
32 of the information properly interpret the results

33 Chapter 8: Estimating GHG impacts ex-ante

- 34 • An estimate of the maximum implementation potential of the policy and a description of how it
35 was estimated

- 1 • A description and justification for how policy design and national circumstances affect the
2 maximum implementation potential of the policy and a refined estimate of the implementation
3 potential after accounting for policy design and national circumstances
- 4 • A description and justification for how financial feasibility affects the implementation potential of
5 the policy and a refined estimate of the implementation potential after accounting for the financial
6 feasibility of the policy
- 7 • A description and justification for how other barriers affect the implementation potential of the
8 policy and a refined estimate of the implementation potential accounting for other barriers
- 9 • Total annual and cumulative policy scenario emissions and removals over the GHG assessment
10 period, if feasible based on the method used
- 11 • An ex-ante estimate of the total net GHG impacts of the policy over the assessment period, and
12 an estimate disaggregated by each GHG source and carbon pool included in the GHG
13 assessment boundary
- 14 • Any methodologies and assumptions used to estimate policy scenario emissions, including the
15 emissions estimation methods (including any models) used
- 16 • The policy scenario values for key parameters (such as activity data, emission factors and GWP
17 values) in the emissions estimation method(s)
- 18 • The methodology and assumptions used to estimate policy scenario values for key parameters,
19 including whether each parameter is assumed to be static or dynamic
- 20 • All sources of data used to estimate key parameters, including activity data, emission factors,
21 GWP values and assumptions
- 22 • The method or approach used to assess uncertainty
- 23 • An estimate or description of the uncertainty and/or sensitivity of the results in order to help users
24 of the information properly interpret the results

25 Chapter 9: Estimating GHG impacts ex-post

- 26 • The performance of the policy, including whether the inputs, activities and intermediate effects
27 that were expected to occur according to the causal chain, actually occurred
- 28 • Total annual and cumulative policy scenario emissions and removals over the GHG assessment
29 period
- 30 • The methodology and assumptions used to estimate policy scenario emissions, including the
31 emissions estimation methods (including any models) used
- 32 • All sources of data to estimate key parameters, including activity data, emission factors, GWP
33 values and assumptions
- 34 • An estimate of the total cumulative GHG impacts of the policy over the assessment period, and
35 disaggregated by each GHG source and carbon pool included in the GHG assessment boundary
- 36 • The method or approach used to assess uncertainty

- 1 • An estimate or description of the uncertainty and/or sensitivity of the results in order to help users
2 of the information properly interpret the results

3 Chapter 10: Monitoring performance over time

- 4 • A list of the key performance indicators used to track performance over time and the rationale for
5 their selection

- 6 • Sources of key performance indicator data and monitoring frequency

7 Additional information to report (if relevant)

- 8 • The type of technical review undertaken (first-, second-, or third-party), the qualifications of the
9 reviewers and the review conclusions. More guidance on reporting information related to
10 technical review is provided in Chapter 9 of the ICAT *Technical Review Guidance*.

11

1 APPENDIX A: STAKEHOLDER PARTICIPATION DURING THE 2 ASSESSMENT PROCESS

3 This appendix provides an overview of the ways that stakeholder participation can enhance the process
4 for assessment of GHG impacts of forest policies. Table A.1 provides a summary of the steps in the
5 assessment process where stakeholder participation is recommended and why it is important, explaining
6 where relevant guidance can be found in the ICAT *Stakeholder Participation Guidance*.

7 *Table A.1 List of steps where stakeholder participation is recommended in the impact assessment*

Chapter/step in this guidance document	Why stakeholder participation is important at this step	Relevant chapters in <i>Stakeholder Participation Guidance</i>
Chapter 2 – Objectives of estimating GHG impacts	<ul style="list-style-type: none"> Ensure that the objectives of the assessment respond to the needs and interests of the stakeholders 	Chapter 5 – Identifying and understanding stakeholders
Chapter 4 – Steps and assessment principles <ul style="list-style-type: none"> Section 4.1.4 Planning the assessment 	<ul style="list-style-type: none"> Build understanding, participation and support for the policy among stakeholders Ensure conformity with national and international laws and norms, as well as donor requirements related to stakeholder participation Identify and plan how to engage stakeholder groups who may be affected or may influence the policy Coordinate participation at multiple steps for this assessment with participation in other stages of the policy design and implementation cycle and other assessments 	Chapter 4 – Planning effective stakeholder participation Chapter 5 – Identifying and understanding stakeholders Chapter 6 – Establishing multi-stakeholder bodies Chapter 9 – Establishing grievance redress mechanisms
Chapter 6 – Identifying impacts: How forest policies reduce or remove GHG emissions	<ul style="list-style-type: none"> Identify the full range of stakeholder groups affected by or with influence on the policy Enhance completeness by identifying expected intermediate effects and impacts for all stakeholder groups Identify and address possible unintended or negative impacts early on Improve and validate causal chain with stakeholder insights on cause-effect relationships between the policy, behaviour change and expected impacts 	Chapter 8 – Designing and conducting consultations
Chapter 7 – Estimating the baseline scenario and emissions	<ul style="list-style-type: none"> Inform assumptions on existing and planned policies 	Chapter 8 – Designing and conducting consultations
Chapter 8 – Estimating GHG impacts ex-ante	<ul style="list-style-type: none"> Inform estimates of the policy's implementation potential 	Chapter 8 – Designing and conducting consultations

	<ul style="list-style-type: none"> • Gain insights into a policy's specific local context and impacts • Identify and address potential cultural and other barriers to policy implementation 	
Chapters 10 – Monitoring performance over time	<ul style="list-style-type: none"> • Ensure monitoring frequency addresses the needs of decision makers and other stakeholders 	Chapter 8 – Designing and conducting consultations
Chapter 11 – Reporting	<ul style="list-style-type: none"> • Raise awareness of the GHG benefits and build support for the policy • Inform decision makers and other stakeholders about impacts to facilitate adaptive management • Increase accountability and transparency and thereby credibility and acceptance of the assessment 	Chapter 7 – Providing information to stakeholders

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APPENDIX B: GUIDANCE ON DISCOUNT RATES

Different kinds of entities have different discount rates. To understand the likely implementation potential of a proposed policy, it is useful to analyse the policy from the perspective of the stakeholders that use and manage land. Where the policy requires investments that are not provided by the government, it is useful to analyse the policy from the perspective of the investors. Where a private land manager will use its own capital for the investment, analyse from the perspective of the land manager. Where land managers need to borrow capital from others, it is useful to analyse the policy from the perspective of potential investors.

The discount rate used to analyse private investments, from the perspective of private firms (e.g., timber companies), will be different from the discount rate used to analyse government spending. The best discount rate to use is the rate a bank would charge to provide a loan to the typical actor for the activity being analysed. For private, multiyear investments in developing countries, discount rates may be greater than 15% per year.

For government investments and costs, the best discount rate for the analysis is the rate that government pays to borrow money, with the term of the borrowing roughly matching the time span of the financial analysis. For example, if one is analysing an investment in equipment for improving logging practices where the equipment has a 5 year payback period, the rate the government pays for bonds that mature five years after issuance might be the appropriate discount rate for the analysis. That said, a 10 year rate is often more appropriate than a 5 year rate. While discount rates for stable governments may be 3%, rates for less stable governments may be 5-10% or even more.

Imputing a discount rate for smallholders who do not have access to credit can be difficult. Rates provided by informal lenders may be the best option for estimating rates for smallholders. These rates can be extremely high – 30% to 100% per year. Subsidised rates are not appropriate. For example, if an NGO provides subsidised loans for development or other social reasons, these loan rates may be quite different from the smallholders' discount rates.

To understand the likely behaviour of smallholders, the analysis should be done using observed interest rates or discount rates imputed from observing what activities the smallholder will or will not participate in. For example, if the smallholder does not buy available, reliable, high-yielding seed that would grow a crop that is harvested and sold one year after seed purchase, even when the net returns from farming would be 30% higher, the smallholder has an imputed discount rate of 30%. However, this discount rate may be high because of barriers such as seasonal food insecurity or lack of access to capital. If the policy can address these barriers, the appropriate discount rate for the analysis may be much lower.

Discount rates of investors include the risk that the investor will not be repaid, repayments will be delayed or repayments may be partial. Typically, an analysis of a policy will not include a financial risk analysis, but instead will look at rates required by banks for similar policies. Hurdle rates of return required by private entities investing in similar policies can be used as the discount rate for private investors. However, private investors may not be willing to reveal their internal rates for analysis, and it can be hard to tell if risk factors of the proposed policy would be like the risk factors of investments proposed as comparisons.

1 ABBREVIATIONS AND ACRONYMS

2	AFOLU	agriculture, forestry and other land use
3	A/R	afforestation/reforestation
4	C	carbon
5	CBA	cost benefit analysis
6	CDM	Clean Development Mechanism
7	CH₄	methane
8	CO₂	carbon dioxide
9	CO_{2e}	carbon dioxide equivalent
10	FAO	Food and Agriculture Organization of the United Nations
11	GDP	gross domestic product
12	GHG	greenhouse gas
13	GWP	global warming potential
14	ha	hectares
15	ICAT	Initiative for Climate Action Transparency
16	IPCC	Intergovernmental Panel on Climate Change
17	kg	kilogram
18	m³	cubic meters
19	MJ	megajoules
20	MRV	Measurement, Reporting and Verification
21	NAMA	Nationally Appropriate Mitigation Action
22	NDC	Nationally Determined Contribution
23	NGO	non-governmental organization
24	N₂O	nitrous oxide
25	PES	payments for ecosystem services
26	REDD	reduced emissions from deforestation and degradation
27	SDG	Sustainable Development Goals
28	SFM	sustainable forest management
29	SPLP	Sustainable Pastures and Livestock Production
30	UNFCCC	United Nations Framework Convention on Climate Change
31	USD	US dollar
32	VCS	Verified Carbon Standard
33	WRI	World Resources Institute

1 **GLOSSARY**

2	Assessment period	The time period over which GHG impacts resulting from a policy are assessed
3		
4	Assessment report	A report, completed by the user, that documents the assessment process and the GHG, sustainable development and/or transformational impacts of the policy
5		
6		
7	Baseline scenario	A reference case that represents the events or conditions most likely to occur in the absence of a policy (or package of policies) being assessed
8		
9	Causal chain	A conceptual diagram tracing the process by which the policy leads to impacts through a series of interlinked logical and sequential stages of cause-and-effect relationships
10		
11		
12	Emission factor	A factor that converts activity data into GHG emissions data
13	Ex-ante assessment	The process of estimating expected future GHG impacts of a policy (i.e., a forward-looking assessment)
14		
15	Ex-post assessment	The process of estimating historical GHG impacts of a policy (i.e., a backward-looking assessment)
16		
17	Expert judgment	A carefully considered, well-documented qualitative or quantitative judgment made in the absence of unequivocal observational evidence by a person or persons who have a demonstrable expertise in the given field (IPCC 2006). Users can apply their own expert judgment or can consult experts.
18		
19		
20		
21		
22	GHG assessment boundary	The scope of the assessment in terms of the range of GHG impacts that is included in the assessment
23		
24	GHG impacts	Changes in GHG emissions by GHG sources and carbon pools that result from a policy
25		
26	Impact assessment	The estimation of changes in GHG emissions or removals resulting from a policy, either ex-ante or ex-post
27		
28	Independent policies	Policies that do not interact with each other, such that the combined effect of implementing the policies together is equal to the sum of the individual effects of implementing them separately
29		
30		
31	Inputs	Resources that go into implementing the policy, such as financing
32	Interacting policies	Policies that produce total effects, when implemented together, that differ from the sum of the individual effects had they been implemented separately
33		
34		
35	Intermediate effects	Changes in behaviour, technology, processes or practices that result from the policy, which lead to GHG impacts
36		
37	Jurisdiction	The geographic area within which an entity's (such as a government's) authority is exercised
38		

1	Key performance indicator	A metric that indicates the performance of a policy
2	Monitoring period	The time over which the policy is monitored, which may include pre-
3		policy monitoring and post-policy monitoring in addition to the policy
4		implementation period
5	Negative impacts	Impacts that are perceived as unfavourable from the perspective of
6		decision makers and stakeholders
7	Overlapping policies	Policies that interact with each other and that, when implemented
8		together, have a combined effect less than the sum of their individual
9		effects when implemented separately. This includes both policies that
10		have the same or complementary goals, as well as counteracting or
11		countervailing policies that have different or opposing goals
12	Parameter	A variable such as activity data or emission factors that are needed to
13		estimate GHG impacts
14	Policy or action	An intervention taken or mandated by a government, institution, or other
15		entity, which may include laws, regulations, and standards; taxes,
16		charges, subsidies, and incentives; information instruments; voluntary
17		agreements; implementation of new technologies, processes, or
18		practices; and public or private sector financing and investment, among
19		others.
20	Policy implementation period	The time period during which the policy is in effect
21	Policy scenario	A scenario that represents the events or conditions most likely to occur
22		in the presence of the policy (or package of policies) being assessed.
23		The policy scenario is the same as the baseline scenario except that it
24		includes the policy (or package of policies) being assessed
25	Positive impacts	Impacts that are perceived as favorable from the perspectives of
26		decision makers and stakeholders
27	Rebound effect	Increased consumption that results from actions that increase efficiency
28		and reduce consumer costs
29	Stakeholders	People, organisations, communities or individuals who are affected by
30		and/or who have influence or power over the policy
31	Sustainable development	Changes in environmental, social or economic conditions that result
32	impacts	from a policy, such as changes in economic activity, employment,
33		public health, air quality and energy security
34	Uncertainty	1. Quantitative definition: Measurement that characterises the
35		dispersion of values that could reasonably be attributed to a parameter.
36		2. Qualitative definition: A general term that refers to the lack of
37		certainty in data and methodological choices, such as the application of
38		non-representative factors or methods, incomplete data, or lack of
39		transparency.

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