



UN-REDD
PROGRAMME
INDONESIA



REDD+ IN INDONESIA
INFORMATION,
MONITORING &
MEASUREMENT,
REPORTING AND
VERIFICATION (MRV)

April 2011



TABLE OF CONTENTS

EXECUTIVE SUMMARY	3
LIST OF FIGURES.....	4
1. INTRODUCTION.....	5
1.1 REDD+.....	6
1.2 INFORMATION, MONITORING & MEASUREMENT, REPORTING AND VERIFICATION (MRV) FOR REDD+	7
1.3 THE NATIONAL INVENTORY SYSTEM.....	10
1.4 OBJECTIVES & GUIDING PRINCIPLES	10
2. REDD+ PHASE 1: CAPACITY BUILDING & INSTITUTIONAL ARRANGEMENTS.....	12
2.1 REDD+ PARTNERSHIPS & INITIATIVES	12
2.2 INSTITUTIONAL ARRANGEMENTS	14
2.3 DEVELOPMENT OF REDD+ POLICIES & MEASURES.....	17
3. REDD+ PHASE 2: INFORMATION & MONITORING	18
3.1 REDD+ SAFEGUARDS INFORMATION SYSTEM	18
3.2 NATIONAL & SUB-NATIONAL MONITORING SYSTEM	18
3.3 SATELLITE LAND MONITORING SYSTEM	20
4. REDD+ PHASE 3: INFORMATION, MONITORING & MRV	22
4.1 NATIONAL FOREST INVENTORY	22
4.2 NATIONAL PEATLAND SURVEY.....	23
4.3 REDD+ GHG INVENTORY	24
5. REFERENCES.....	26
6. ANNEXES	27
ANNEX 1: MRV METHODOLOGIES.....	27

EXECUTIVE SUMMARY

Greenhouse gas (GHG) emissions from deforestation, forest degradation and peatland drainage are the major contributors to Indonesia's emissions profile, making it one of the world's highest emitting countries. The development and implementation of mechanisms to reduce emissions from deforestation and forest degradation; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+) is now a national priority for the Government of Indonesia as part of their climate change mitigation and adaptation strategies. National REDD+ efforts should strive towards internationally-recognised standards and verification under the United Nations Framework Convention on Climate Change (UNFCCC).

This document sets out an action plan for developing, implementing and operationalising an Indonesian system for Information, Monitoring and Measurement, Reporting and Verification (MRV) for REDD+, following the most recent internationally-agreed decisions under the UNFCCC and methodological guidelines of the Intergovernmental Panel on Climate Change (IPCC). Implementation of Indonesia's Information, Monitoring and MRV System will follow a phased approach, following the three phases of REDD+. The document sets out the requirements for Indonesia to complete each phase in turn.

Indonesia is currently in Phase 1, building national REDD+ capacity through international partnerships and initiatives. Phase 1 will also require Indonesia to determine its institutional arrangements for Information, Monitoring and MRV, establish a MRV Institution and develop REDD+ policies and measures.

In Phase 2 Indonesia will need to begin implementing national policies and demonstration activities – ensuring they are results-based through a monitoring system – and develop a system for providing information on the REDD+ safeguards, as set out by the UNFCCC.

In Phase 3 REDD+ will be fully integrated with other mitigation mechanisms under UNFCCC, meaning that the REDD+ activities will need to be fully measured, reported and verified. This will require an operational Satellite Land Monitoring System to provide activity data on forest area and forest area changes, and a National Forest Inventory for REDD+ to quantify emissions or removals per unit activity. These will be combined in a REDD+ GHG Inventory for submission to the UNFCCC.

This document sets out institutional arrangements and capacity building needs to develop and implement these elements. A five-year work plan to operationalise the Information, Monitoring and MRV System by 2015 is set also out. The Annexes detail specific methodologies to develop each of the components, a budget and a draft Presidential Decree to create the MRV Institution and enact the institutional arrangements and responsibilities set out in the document.

LIST OF FIGURES

Figure 1	Projected BAU emissions (million tonnes CO ₂) in Indonesia	5
Figure 2	The IPCC's methodological approach to calculate anthropogenic GHG emissions by sources and removals by sinks related to forest land	8
Figure 3	Multiphase implementation of REDD+ through MRV development	9
Figure 4	The components of the Information, Monitoring and MRV System for REDD+	9
Figure 5	Institutional arrangements for Information, Monitoring and MRV for REDD+ in Indonesia	15
Figure 6	Institutional arrangements for Information, Monitoring and MRV for REDD+ in Indonesia, including functions of each component, the required human resources (several to be completed), institutional linkages and how these correspond with Phases 2 and 3 of REDD+	15
Figure 7	Structure of the National MRV Institution in Indonesia, including the functions (dashed-lined boxes) and necessary human resources for each sub-component	
Figure 8	Options for nested approaches to REDD+ in Indonesia	19
Figure 9	Structure of the SLMS Shared Platform, including functions and necessary human resources for each sub-component	21
Figure 10	Institutional structure for the National Forest Inventory for REDD+	23
Figure 11	Structure of, and phased approach to, the National GHG Inventory	25
Figure 12	Potential land use classification/stratification system for Indonesia's national territory	30
Figure 13	Land stratification scheme based on forest type and forest management practices	31
Figure 14	Generalised carbon cycle of terrestrial AFOLU ecosystems	33

SECTION 1: CONTEXT

1. INTRODUCTION

Climate change threatens many of the Millennium Development Goal (MDG) commitments and achievements Indonesia has made in the past decade. With 17,000 islands, Indonesia is especially vulnerable to rising sea levels and floods, while erratic weather patterns could impact agricultural production that supports the livelihoods of much of the rural population. Most MDG goals, particularly poverty reduction, will therefore be severely compromised in the absence of adequate adaptation interventions.

Indonesia is also a major emitter of GHGs: annual greenhouse gas (GHG) emissions amounted to approximately 1.7 gigatonnes (Gt) in 2000 and 2.1 Gt in 2005. As a major GHG emitter vulnerable to the effects of rising global temperatures, the Government of Indonesia (GoI) has played a leading role in addressing global climate change. At the G20 Summit in Pittsburgh in September 2009, President Susilo Bambang Yudhoyono committed Indonesia to a 26% GHG emission reduction target by 2020, and a 41% target with international support. By shifting to a less carbon-intensive economic growth model and playing a leading role in addressing global climate change, the country aims to:

- Play a proper and appropriate role in combating climate change which threatens the country's future prosperity and well-being;
- Create a more sustainable and diversified economic growth model in the provinces and districts without sacrificing the country's national economic and development objectives, and providing new energy and purpose for its decentralisation programme;
- Be a leader in innovative climate financing, providing diverse models to capture global financing to support not only Indonesia's climate change programmes but also the country's more general development objectives.

As Indonesia continues to develop, its total GHG emissions are expected to rise to 2.95 Gt by 2020 under a business-as-usual (BAU) scenario (Boer et al., 2010) (Figure 1). Emissions from land use, land use change and biomass burning (emissions from deforestation and peat degradation) made up approximately 70% of Indonesia's 2000 GHG emissions: by far the largest contributors to Indonesia's current and expected future emissions under this BAU scenario. These practices not only contribute to global climate change but also threaten biodiversity conservation and the provision of livelihoods and myriad ecosystem services.

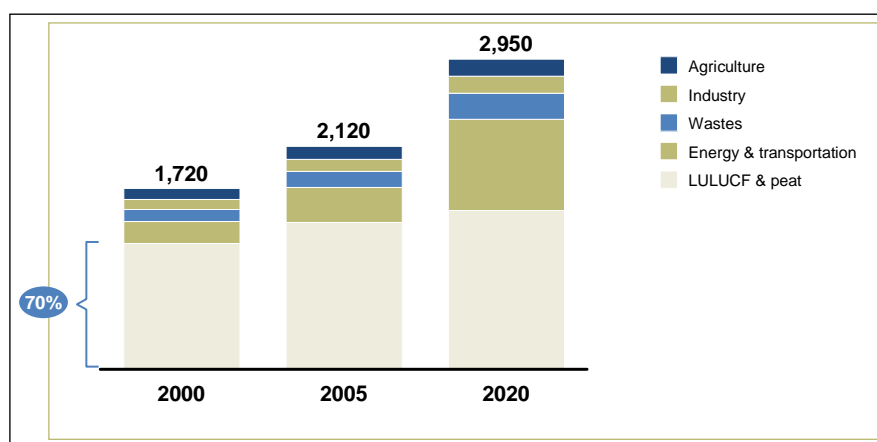


Figure 1. Projected BAU emissions (million tonnes CO₂ emissions) in Indonesia (Boer et al., 2010).

1.1 REDD+

The 15th Conference of the Parties (COP15) to the UNFCCC in 2009 adopted a decision on “Methodological guidance for activities relating to reducing emissions from deforestation and forest degradation; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries” (REDD+) which requires developing countries to establish a “robust and transparent national forest monitoring system”. The COP decision advises Parties to “use the most recent Intergovernmental Panel on Climate Change (IPCC) guidance and guidelines (IPCC, 2003; 2006), as adopted or encouraged by the COP, as appropriate, as a basis for estimating anthropogenic forest-related greenhouse gas emissions by sources and removals by sinks, forest carbon stocks and forest area changes”.

The decision adopted by Parties at COP16 in 2010 states the five forest related activities identified under REDD+ (FCCC/CP/2010/7/Add.1/C/Par.70):

- (i) Reducing emissions from deforestation;
- (ii) Reducing emissions from forest degradation;
- (iii) Conservation of forest carbon stocks;
- (iv) Sustainable management of forests;
- (v) Enhancement of forest carbon stocks.

This broad scope was agreed in order to reflect the wide range of countries’ national circumstances (e.g. high forest cover and high deforestation/high forest cover and low deforestation/expanding their forest area and their carbon stocks).

At COP16 in 2010 Parties also agreed to a series of rules to formally structure REDD+. Importantly, with paragraph 73 of the Decision, the COP “decides that the activities undertaken by Parties referred to in paragraph 70 (the five REDD+ activities) should be implemented in phases”. This is significant as it allows developing countries to undertake a learning-by-doing approach, and allows the participation of all potential REDD+ countries regardless of their current national circumstances. Paragraph 73 also provides an indication of three REDD+ phases:

1. Development of national strategies or action plans, policies and measures, and capacity-building;
2. Implementation of national policies and measures and national strategies or action plans that could involve further capacity-building, technology development and transfer and results-based demonstration activities;
3. Evolution of all the REDD+ activities into results-based actions that should be fully measured, reported and verified.

The Cancun Agreements also set out a number of elements that developing country Parties aiming to undertake REDD+ activities under the Convention are requested to develop:

- A national strategy or action plan;
- A national forest reference emission level and/or forest reference level;
- A robust and transparent national forest monitoring system for the monitoring and reporting of REDD+ activities;
- A system for providing information on REDD+ safeguards.

REDD+ has become a priority for Indonesia, given the pace and extent of deforestation and forest degradation across the country. More than 80% of Indonesia’s planned emission reductions could be achieved through the forestry sector and peatland management. This translates to an emission reduction of 0.672 Gt CO₂e to reach the 26% reduction target and 1.039 Gt CO₂e to reach the 41% reduction target. For this to be successful some significant steps have to be taken. REDD+ will therefore play an important role in supporting Indonesia’s voluntary commitment to reduce its emissions.

1.2 INFORMATION, MONITORING & MEASUREMENT, REPORTING AND VERIFICATION (MRV) FOR REDD+

This document provides guidance on the provision of Information, Monitoring and Measurement, Reporting and Verification (MRV) for REDD+ under the UNFCCC in Indonesia. The context and implications of each of these elements is now outlined.

Firstly, “Information” refers to the UNFCCC’s request for Parties aiming to undertake REDD+ activities to develop a system for providing information on how REDD+ safeguards are being addressed and respected throughout the implementation of REDD+ activities, while respecting sovereignty. The concept of safeguards was introduced during COP15 and was adopted during COP16 (FCCC/CP/2010/7/Add.1). The seven REDD+ safeguards listed in Annex 1 of the Cancun decision text are:

- (a) Actions to be consistent with the objectives of national forest programmes and international conventions and agreements;
- (b) Transparent and effective national forest governance structures;
- (c) Respect for the knowledge and rights of indigenous peoples and local communities;
- (d) The full and effective participation of relevant stakeholders;
- (e) Actions to be consistent with the conservation of natural forests and biological diversity;
- (f) Actions to address the risks of reversals;
- (g) Actions to reduce displacement of emissions.

In this respect, countries will need to develop a REDD+ Safeguards Information System that provides all the necessary information on how the REDD+ safeguards are addressed in the implementation of the national and sub-national/demonstration policies and activities related to the five REDD+ activities, beginning in Phase 2.

Secondly, “Monitoring” refers to the development of a system which:

1. In Phase 2 of REDD+, (i) validates that sub-national Demonstration Activities are results-based (i.e. result in measurable positive outcomes), which is a requirement of the Convention; and (ii) provides basic national-level coverage data, e.g. forest cover changes and the location of fires. A Satellite Land Monitoring System (SLMS) will generate the requisite data on the location, extent and related changes of the five REDD+ activities at the sub-national and the basic national coverage data;
2. In Phase 3 of REDD+, validates that the implementation of national policies and measures on all the national territory are results-based (i.e. determines how much of each REDD+ activity is taking place over the national territory and how these are changing).

Thirdly, an MRV System, referred to by the UNFCCC as a National Forest Monitoring System (Par. 71(c) Decision 1/CP.16; Par. 1(d) Decision 1/CP.15), fulfils the MRV commitment under the Convention (Art. 4) to assess anthropogenic GHG emissions by sources and removals by sinks related to forest land. This system must enable identification and tracking of actions and processes related to the five activities identified under REDD+, following the most recently adopted or encouraged IPCC methodological approaches (Decision 4/CP.15).

In the IPCC’s Good Practice Guidance the most common methodological approach is to combine information on the extent to which a human activity takes place (activity data, AD) with coefficients which quantify the emissions or removals per activity unit (emission factors, EF) – together comprising the “Measurement” contingent of MRV. To collect this data for REDD+ requires:

1. A Satellite Land Monitoring System (SLMS) to assess AD on forest area and forest area changes;
2. A National Forest Inventory (NFI) to assess EFs on carbon stocks and carbon stock changes.

This information is combined to compile a GHG Inventory for REDD+ (Figure 2), forming part of countries’ National Communications to the UNFCCC: the “Reporting” element of MRV. The core elements of

National Communications are information on GHG emissions and removals, and details of activities a country has undertaken to fulfil its commitments under the UNFCCC. “Verification” refers to the subsequent process of independent review (checking of the accuracy and reliability), undertaken by the UNFCCC Secretariat through its roster of experts, of reported information and the procedures used to generate information. A complete MRV System will allow countries to access international performance-based REDD+ finance. The MRV System will be the reference point for any potential Nationally Appropriate Mitigation Actions (NAMAs) in the Agriculture, Forestry and Land Use (AFOLU) sector (Annex II of Decision 1/CP.16), e.g. mitigation activities on agricultural land would be measured, reported and verified through the same MRV System as the five REDD+ activities.

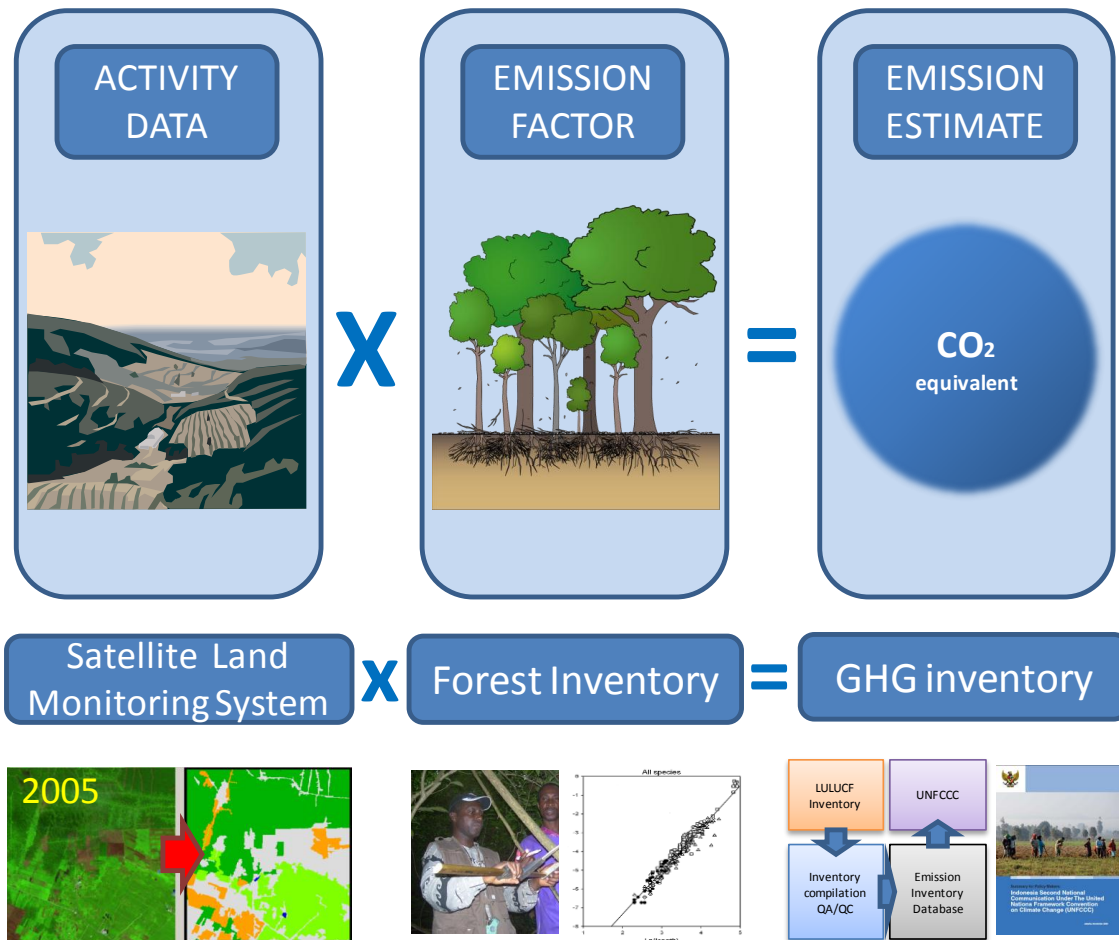


Figure 2. The IPCC’s methodological approach to calculate anthropogenic GHG emissions by sources and removals by sinks related to forest land.

Information, Monitoring and MRV Systems are developed following the three phases of the REDD+ mechanism, ensuring results-based demonstration activities in the Phase 2, and fully measured, reported and verified (i.e. performance-based) REDD+ mitigation activities in Phase 3 (Figure 3). Each phase aims to build capacity and prepare for the subsequent phase, meaning that there can be an element of overlap between phases, e.g. preparing and building capacity for the NFI and REDD+ GHG in Phase 2.

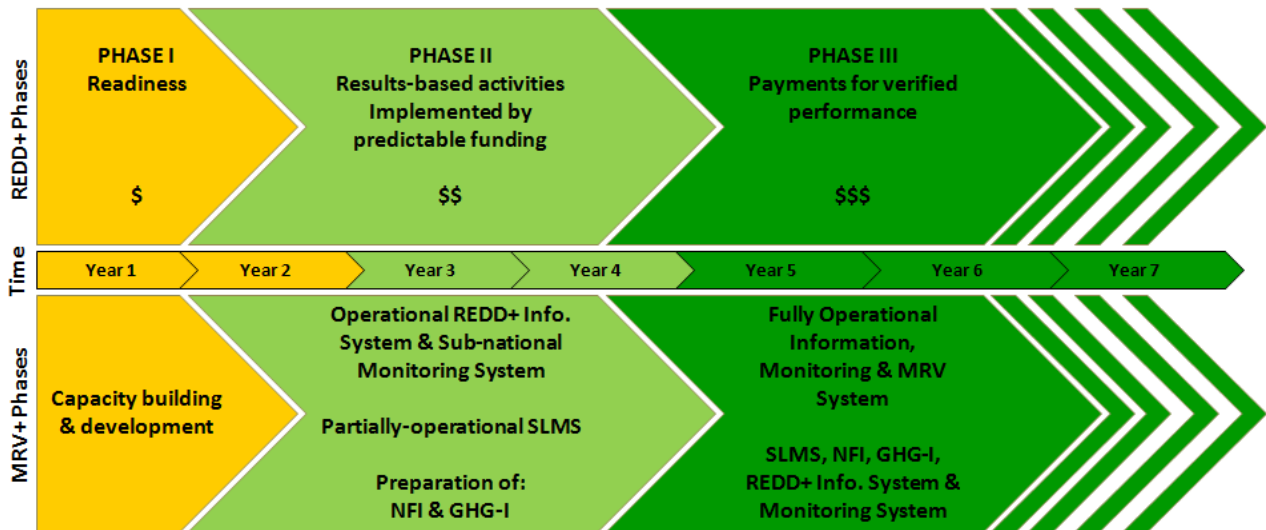


Figure 3. Multiphase implementation of REDD+ through MRV development.

The length of time it takes to progress through the 3 phases will vary from country to country, depending on existing capacities and capabilities, national circumstances and international support received. Figure 4 illustrates how the components of an Information, Monitoring and MRV System fit together and how they relate to Phases 2 and 3 of REDD+.

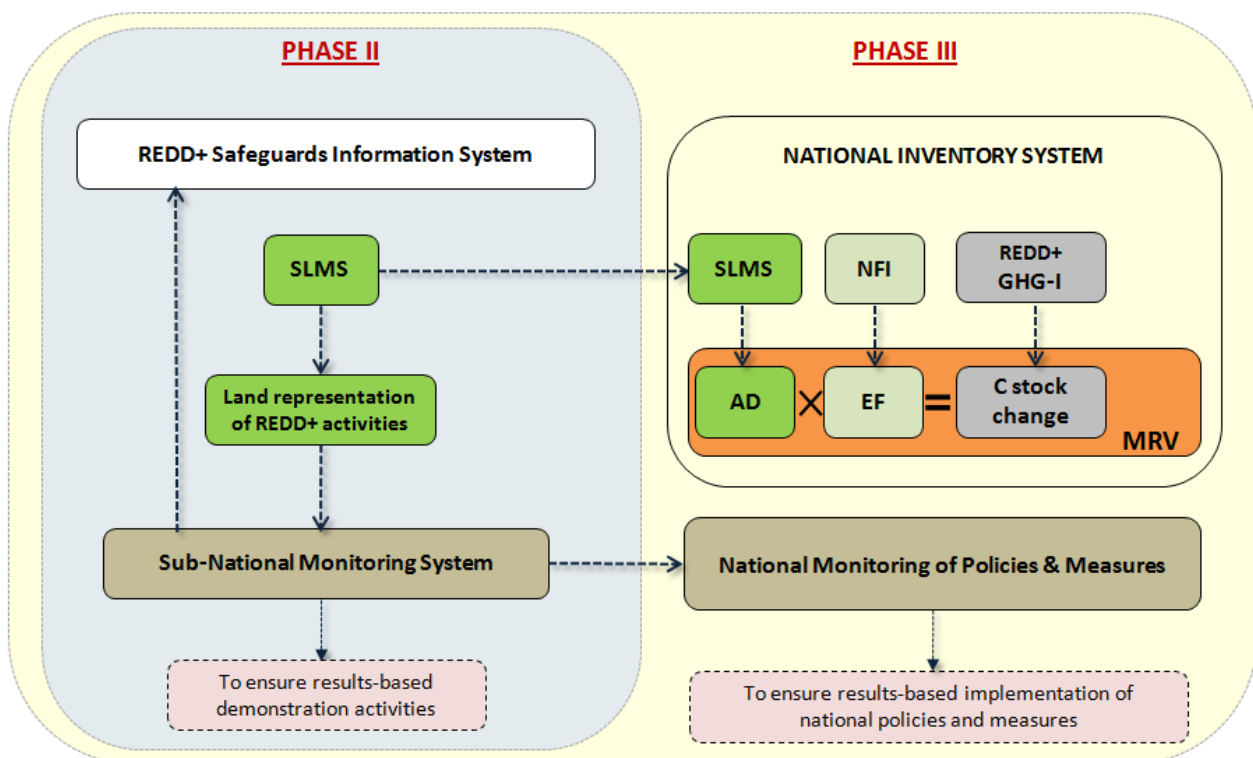


Figure 4. The components of the Information, Monitoring and MRV System for REDD+. Phase 2 will involve the operationalisation of the Information and Monitoring System, comprising the REDD+ Safeguards Information System and sub-national monitoring through SLMS land representation data. The transition to Phase 3 will be achieved through the operationalisation of the full Information, Monitoring and MRV System, involving the full operationalisation of the SLMS (to produce AD), a National Forest Inventory (NFI) and a REDD+ GHG Inventory, in addition to the operational elements of Phase 2.

1.3 THE NATIONAL INVENTORY SYSTEM

The periodic production of national GHG inventories requires countries to set a series of functions for their planning, preparation and management. To this end, the most appropriate reference is Article 5.1 of the Kyoto Protocol of the UNFCCC, which formalised these functions in a decision text as the “national system” for a GHG inventory. A national inventory system includes all institutional, legal and procedural arrangements made within a country for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information. The main objectives of national systems are to assist Parties to estimate their anthropogenic GHG emissions by sources and removals by sinks, to report these emissions and to ensure and improve the quality of their inventories. National inventory systems should be designed and operated to ensure the transparency, consistency, comparability, completeness and accuracy of inventories.

As a Non-Annex 1 Party under the Convention, Indonesia will most likely be requested to fulfil the same reporting requirements as Annex 1 Parties in Phase 3 when REDD+ is integrated with other mitigation actions under the Convention. This will involve the submission of National Communications every four years, and update reports every two years. In the context of REDD+, the national inventory system comprises the elements through which the REDD+ GHG inventory is compiled, i.e. the SLMS for AD and NFI for EFs.

1.4 OBJECTIVES & GUIDING PRINCIPLES

This document is one of Indonesia’s REDD+ action plans which, along with other critical elements of a national REDD+ programme, will allow the country to leverage maximum benefits from the future REDD+ mechanism under the UNFCCC by guiding the country through a phased approach to MRV, fully integrated with the phases of the REDD+ mechanism. The phased approach would also allow optimal allocation of human, material and financial resources. The action plan presented here includes all the operations and actions that the Government of Indonesia will have to undertake to achieve an operational REDD+ information and monitoring system that is a prerequisite to move in the next phase, as well as all of the activities required to develop a fully operational Information, Monitoring and MRV System.

The 2006 IPCC Guidelines (though not yet adopted by the UNFCCC) provide the methodological basis for the proposed Indonesian Information, Monitoring and MRV System, since they are the most up-to-date guidelines produced by the IPCC and are fully consistent with the 2003 IPCC Good Practice Guidance (GPG) for Land Use, Land Use Change and Forestry (LULUCF), currently adopted by the UNFCCC for reporting GHG Inventories. Due to the significance of peatland emissions, the Information, Monitoring and MRV System will place specific emphasis on this area.

Establishing clear long-term institutional arrangements, roles and responsibilities – i.e. a National Inventory System – is essential in order to design, establish, manage and report on an Information, Monitoring and MRV System under the UNFCCC. Clear institutional mandates must therefore be put in place for the coordination of administrative and technical duties, quality checking of reported figures and fulfilment of procedural requirements of MRV for REDD+. Moreover, effective coordination mechanisms will be required to ensure interaction between all stakeholders at the national and sub-national levels, which will involve capacity building for the implementation of MRV components as an essential first step in the implementation of REDD+. This will require supporting legislation in Indonesia. Institutional arrangements for MRV should be based on existing institutions and capabilities where possible, only building new ones where necessary. To this end, this document will support the development of Indonesia’s National System for its GHG Inventory, providing information on:

- The roles and responsibilities of various agencies and entities in relation to the inventory development process, as well as the institutional, legal and procedural arrangements made to prepare the inventory;
- A description of the process for collecting activity data, for selecting emission factors and methods, and for the development of emission estimates;

- A description of the process and the results of key source identification and, where relevant, archiving of test data.

The approach taken to the development and implementation of Information, Monitoring and MRV for REDD+ recommended by this document has been guided by a number of key policy and technical principles. The policy principles are the following:

1. **National ownership:** Indonesia will have the full control on all MRV-related processes. International organisations or foreign institutions will only provide support for technical capacity building and institutional capacity development.
2. **Support to UNFCCC process:** Indonesia will be expected to fully integrate REDD+ under the UNFCCC, and for their Information, Monitoring and MRV System to incorporate REDD+ into their national policies and legislation.
3. **Autonomy:** Indonesia will be able to develop the system according to national circumstances, capabilities and priorities. Institutional arrangements shall be based where possible on existing institutions, with the creation of new ones being the result of necessity.
4. **Responsibility:** Indonesia will be fully and solely responsible for the implementation of their Information, Monitoring and MRV System and subsequent reporting.

The technical principles will guide the national institutions in implementing the activities described in this concept note. The aim of these technical guiding principles is to establish a learning-by-doing process with set milestones and deliverables. The technical guiding principles are the following:

1. **Nationally tailored:** The Information, Monitoring and MRV System will be robust, flexible, transparent and country-driven, to allow adjustment to national circumstances. Sub-national demonstration activities, including monitoring, and the results thereof, will necessarily form part of and feed into the System.
2. **Operational:** The Information, Monitoring and MRV System will be funded by the State budget and by reported on annually.
3. **Centrally coordinated, standardized and scalable top-down system:** The MRV Institution should define standardised methodology protocols and agree data supply plans with the data suppliers.
4. **Leverages existing competencies, capacities and information.**
5. **IPCC compliance:** The Information, Monitoring and MRV System must be in line with the most recently adopted or recommended IPCC Guidance and Guidelines.
6. **Cost-efficiency:** Activities will seek out the most cost-effective solutions at all stages and structural levels.
7. **Multiple benefits:** The Information, Monitoring and MRV System must go beyond carbon and become a multifunctional instrument, aiming to serve as a guide for social, economic and environmental policies and provide information on forestry-related fields such as biodiversity. The system should be flexible enough to serve different purposes, for example, reporting on the needs of donors as well as UNFCCC.
8. **Phased approach:** Following the three phases of REDD+, development and implementation of the Information, Monitoring and MRV System will be undertaken in phases:
 - Phase 1: Development and testing of the monitoring and Safeguards Information System (1 year);
 - Phase 2: Operationalisation of the Safeguards Information System with a domestic sub-national monitoring system and basic national land cover data (2-4 years) that will support an interim results-based fund (such as the [Amazon Fund](#));
 - Phase 3: Full operationalisation of the Information, Monitoring and MRV System for mitigation actions under the UNFCCC (after 3-4 years from the beginning of the Phase II).

SECTION 2: IMPLEMENTATION

2. REDD+ PHASE 1: CAPACITY BUILDING & INSTITUTIONAL ARRANGEMENTS

Indonesia will follow the phased approach to Information, Monitoring and MRV as set out by the UNFCCC. Indonesia is currently in Phase 1 of REDD+, involving the development of national strategies and action plans, policies and measures, and capacity building for the establishment and testing of the Information, Monitoring and MRV System for REDD+. By the closing of this phase, it is expected that Indonesia will have obtained the necessary historical data for establishing their reference emission level (REL) and/or reference level (RL).

2.1 REDD+ PARTNERSHIPS & INITIATIVES

As part of Phase 1, the GoI has entered into bilateral partnerships with the Governments of Norway, the United States, Australia and others, and is participating in international programmes such as the FCPF and UN-REDD, which aim to build capacity and readiness for REDD+ (outlined below).

A concrete outcome to date is the establishment of a UN-REDD Programme Management Unit (PMU) within the MoFor, which aims to assist the GoI in establishing and organising a fair, equitable and transparent REDD+ architecture and build REDD+ capacity. Another key domestic readiness activity has been the creation of the REDD+ Task Force under the coordination of the President's Delivery Unit for Development Monitoring and Oversight (UKP4), which has begun planning capacity building and knowledge sharing activities such as workshops relating to REDD+ readiness. At the Provincial level, both the REDD+ Task Force and UN-REDD Indonesia have identified pilot provinces (Central Kalimantan and Central Sulawesi, respectively) for the implementation and testing of sub-national REDD+ activities, which are due to begin implementation in 2011.

The Norway-Indonesia Climate Change Partnership

In response to the President's emissions reductions commitment, on May 26th 2010 the Governments of Indonesia and Norway signed a Letter of Intent (LoI) outlining a USD 1 billion programme of "*Cooperation on reducing greenhouse gas emissions from deforestation and forest degradation*". This ambitious programme aims to be implemented in three phases: 1) **Preparation**, with five key results to be achieved mostly by the end of 2010; 2) **Transformation**, involving substantial capacity building and sub-national implementation in a pilot province (Central Kalimantan) over the period 2011-2013; and 3) **Contributions for verified emission reductions**, from 2014 onwards, for national level implementation of measures to reduce emissions. This is a global-profile programme aiming to reduce deforestation and land degradation, and the associated GHG emissions, over Indonesia.

Payments will be made to the GoI based on deliverables as outlined in the LoI. A Joint Consultation Group, comprised of representatives of the GoI and the Government of Norway (GoN), has been formed as a forum for dialogue and to oversee the implementation of the deliverables of the LoI.

The REDD+ Task Force

The signing of the LoI and the GoN's USD 1 billion commitment is a first important step towards the delivery of important benefits and lessons for Indonesia's climate change efforts. The way in which the preparation phase is managed will affect the long-term success in dealing with climate change. The combined magnitude of the endeavour, the urgency of the challenges, and the limited timeline for the preparation stage serve as the rationale for the provision of support through this project. The GoI created the REDD+ Task Force under the coordination of the President's Delivery Unit for Development Monitoring and Oversight (UKP4) to consolidate and coordinate all REDD+ initiatives and ensure that LoI implementation reflects the wider Indonesian climate change agenda and interests. The REDD+ Task Force is chaired by the Head of UKP4, Kuntoro Mangkusubroto, and comprised of individuals from the Ministry of Finance, the National Development and Planning Agency (BAPPENAS), the Ministry of Forestry, the Ministry of Environment, the National Land Agency, the National Council on Climate Change (DNPI), and UKP4.

In August 2010, the Governments of Indonesia and Norway agreed that the Norwegian Government will provide initial funding of USD 30 million to prepare for the implementation of the above Lol, to be lead by the Indonesia REDD+ Task Force. UNDP is acting as the financial manager for Phase 1 of the Lol, supporting the above request from the Gol and Norway through the framework of a standard UNDP Cost Sharing Agreement and project document, in close coordination with the UN-REDD Programme. Given the urgent and high profile nature of the programme, and time constraints for delivery of activities, a Fast Track modality is being applied, allowing greater decision-making autonomy and flexibility at the local level, thus expediting necessary recruitment, procurement and other operational processes.

The UN-REDD Programme

The UN-REDD Programme (www.un-redd.org) is a collaborative partnership between UNDP, UNEP and FAO. At the national level, the UN-REDD Programme supports developing countries in the implementation of REDD+ strategies, guided by the principles of country ownership and the United Nations human rights-based approach, and with a strong focus on engagement of all stakeholders, including indigenous peoples and civil society organizations. UN-REDD Indonesia has already supported the Gol in many of the key issues to be addressed through the Indonesia-Norway cooperative programme. The UN-REDD Programme provides a means of mobilising lessons and experience on REDD+ initiatives globally and brings together the complementary knowledge and expertise of the three UN agencies.

In order to strengthen preparation for the Lol with GoN, the Indonesian UN-REDD National Joint Programme has supported various initiatives and national consultations on REDD+ and related Lol activities, conducted by the Ministry of Forestry, BAPPENAS and UKP4.

Under the UN-REDD Programme, FAO will provide support to the Gol on issues specifically relating to the Information, Monitoring and MRV for REDD+. To this end, a Letter of Agreement (LoA) between the Ministry of Forestry and FAO (*“Consultation and capacity building for a Measuring, Reporting and Verification (MRV) system based on the national REDD+ architecture”*) was signed in January 2011.

World Bank Forest Carbon Partnership Facility

Indonesia is set to receive \$3.6 million through its participation in the World Bank’s Forest Carbon Partnership Facility (FCPF), a global REDD+ capacity building programme. Of the total, approximately \$0.5 million will be directly implemented by the WB, and \$3.0 million by the Gol. The government’s \$3 million is intended to help address REDD+ readiness gaps and will implemented by MoFor, the National Forestry Council (DKN) and the Ministry of Finance. Specific activities to be funded through the FCPF grant are:

- Management of readiness strategy (demonstration activities), including institutional strengthening and capacity building (linking to UN-REDD), environmental and social assessment and support for regulatory arrangements of incentives;
- Analysis and mapping of drivers of deforestation;
- REDD Investment Strategy (co-funded by the Forest Investment Program (FIP)).

United States programmes

The US is supporting Indonesia in relation to REDD+ through several initiatives.

1. The USAID IFACS Project aims to reduce the threats of deforestation and help the Gol conserve the country’s tropical forests, wildlife (including orangutans) and ecosystem services (including the generation of clean water, reduction of soil erosion, food security and carbon sequestration). This is a four-year project that is expected to result in the following benefits to Indonesia:
 - A 50% reduction in the rate of forest degradation and loss from conversion, illegal extraction and over-harvesting over six million hectares;
 - Improved management of 3.5 million hectares of tropical forest landscapes;
 - A 20% increase in financial resources for forest management, increased transparency, and access to information to strengthen capacity of government, civil society and the private

- sector for conservation and sustainable management of forest resources, biodiversity and ecosystem services at targeted landscapes;
 - Low carbon growth development strategies piloted at the local level in eight districts.
2. The US-Indonesia Comprehensive Partnership supports the development of a Climate Change Centre, in conjunction with DNPI, to help "translate science into policy".
 3. Through the US Department of Treasury and its "Debt-for-Nature" programme, called the Tropical Forest Conservation Act, there are ongoing negotiations for direct support to the Berau Forest Carbon Program as a GoI National REDD+ Demonstration Activity.
 4. The US Environmental Protection Agency (US-EPA) is assisting Indonesia through training on GHG Inventory Compilation (all sectors) using a UNFCCC-sanctioned tool developed by US-EPA, USFS and Colorado State University.

In addition, USAID supports the US Forest Service in forest and climate related capacity building activities in Indonesia. In this respect, the US Forest Service assists Indonesia with MRV, peatland research and reduced impact logging. This includes direct support to the REDD+ Task Force.

Other Partnerships & Initiatives

Indonesia is also involved in a number of other government partnerships related to REDD+, including:

- The UK-Indonesia Climate Change Partnership, focusing on policy and institutional reform for improving the country's response to the impacts of climate change;
- The Indonesia-Australia Forest Carbon Partnership, aiming to support Indonesia's REDD+ process through support to demonstration activities and the development of Indonesia's national carbon accounting system (INCAS);
- Germany's Forests and Climate Change Programme (FORCLIME), aiming to reduce greenhouse gas emissions from the forest sector while improving the livelihoods of Indonesia's poor rural communities, and the development of a system for providing information on REDD+ safeguards;
- Japan's International Cooperation Agency's (JICA) Forest Resources Management through Satellite Imagery Project, aiming to upgrade the capacity of Ministry of Forestry to conduct forest resources monitoring and assessment.

There are also a number of non-government initiatives in place in Indonesia relating to REDD+, the most prominent of which are:

- The World Agroforestry Centre's (ICRAF) ALREDDI (Accountability and Local Level Initiative to Reduce Emission from Deforestation and Degradation in Indonesia), aiming to build capacity on carbon accounting and monitoring systems;
- The Center for International Forestry Research (CIFOR), based in Bogor, researches and publishes regularly on REDD issues, globally and Indonesia-specific;
- The Nature Conservancy (TNC), a non-profit undertaking a REDD pilot project in the Province of Berau;
- The World Wildlife Fund's (WWF) Heart of Borneo initiative to conserve and reduce the pressure on Borneo's forests, including through REDD+.

2.2 INSTITUTIONAL ARRANGEMENTS

As part of Phase 1, Indonesia will need to define its structure for Information, Monitoring and MRV for REDD+ and initiate capacity building of all the institutions involved in the system, with a view to operationalising these institutional arrangements in Phase 2. This sub-section presents a recommended set of institutional arrangements for Information, Monitoring and MRV for REDD+ in Indonesia, based on existing capacities and capabilities, with a view to building on current strengths and collaborations, consolidating capacity shortcomings and building new institutions where necessary (Figures 5 and 6). The institutional arrangements for Information, Monitoring and MRV for REDD+, once approved by all stakeholders, should be legally enacted by Presidential Decree (see Annex 4 for a draft of this Decree).

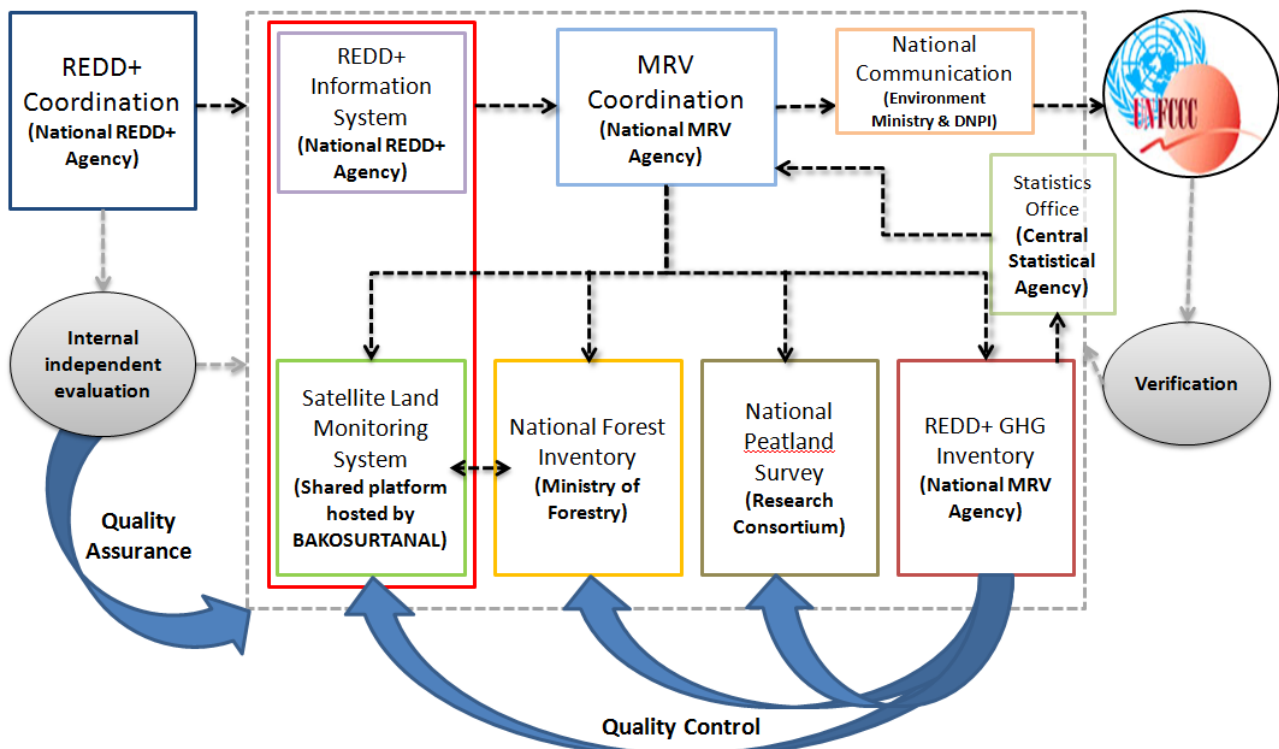


Figure 5. Institutional arrangements for Information, Monitoring and MRV for REDD+ in Indonesia. The components contained by the grey box (dashed line) together comprise the institutional arrangements for the complete Information, Monitoring and MRV System. The two components contained by the red box (REDD+ Safeguards Information System and SLMS) represent the elements required for Phase 2 of REDD+.

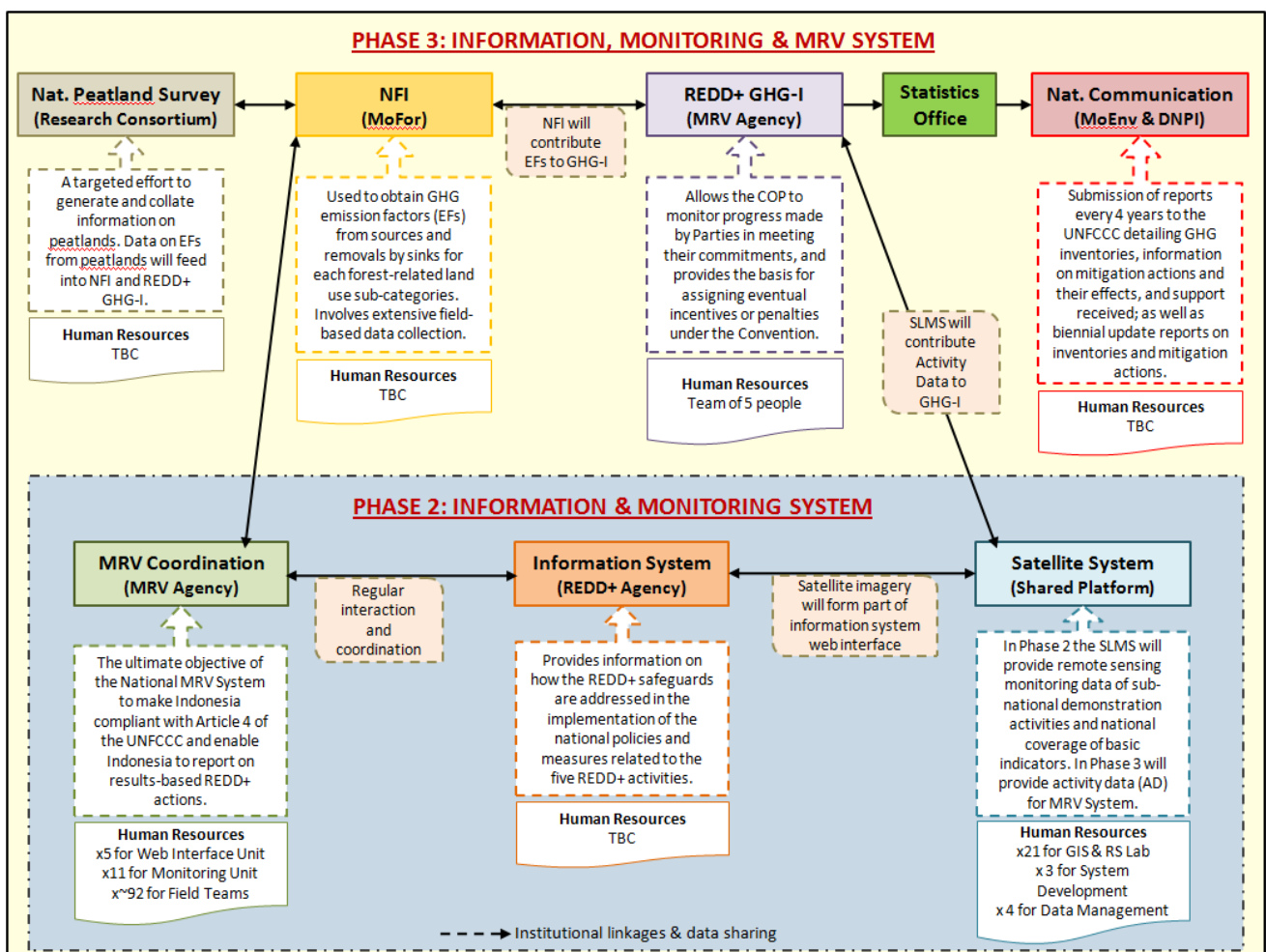


Figure 6 (previous page). Institutional arrangements for Information, Monitoring and MRV for REDD+ in Indonesia, including functions of each component, the required human resources (several to be completed), institutional linkages and how these correspond with Phases 2 and 3 of REDD+.

MRV Institution

A key activity in Indonesia's REDD+ Phase 1 will be the definition and establishment of a coordinating institution for MRV, for which the following arrangements are recommended. Overall coordination, oversight and steering of all MRV activities (including for all other activities in the AFOLU sector) will be undertaken by a new **MRV Institution**. This agency will be created with the mandate to manage, oversee and guide all activities relating to MRV of REDD+ in Indonesia (Figure 7). The MRV Institution will be the key structure for the internal monitoring of national REDD+ policies, measures and monitoring connected with the payment system.

The MRV Institution Director will act as the budget holder and external representative for the Agency. The governing body of the Institution will be a Steering Committee, comprised of the Heads of each of the sub-units of the Institution and the Heads of the SLMS Shared Platform and the NFI, will coordinate and plan the Institution's activities.

The operational elements of the Agency will be undertaken by three units:

The GHG Unit (five staff) will assess GHG removals in relation to REDD+ activities, for submission to the MoE for compilation of the National GHG Inventory Report. Staff of this Unit must be familiar with the UNFCCC process, decisions and reporting requirements, and the IPCC guidance and guidelines.

The Data Management Unit (5 staff) will implement and manage the land monitoring web interface component of the REDD+ Safeguards Information System, in collaboration with the National REDD+ Agency which will have overall responsibility for the REDD+ Safeguards Information System. Members of this Unit will need to be familiar with software development and web programming.

The Monitoring Unit (11 HQ staff; ~92 decentralised staff) is the largest of the Units and will be divided into two components. The central staff of the Monitoring Unit will be responsible for assessing REDD+ policy measures and performance at the provincial level and support to provincial Field Teams, with each of 10 technical officers responsible for between 1-7 provinces, depending on the size and circumstances of each province. Technical officers should have project management experience, technical knowledge of forest inventories and be effective communicators.

The second component of the Monitoring Unit, the Field Teams, will be responsible for stakeholder engagement, promotion of REDD+ policies, activities and initiatives, contracting Provincial Governments and verification of Provincial REDD+ activities and measures. Field Teams will be comprised of a Coordinator (who also acts as the forestry specialist), a botanist, a driver and a technician.

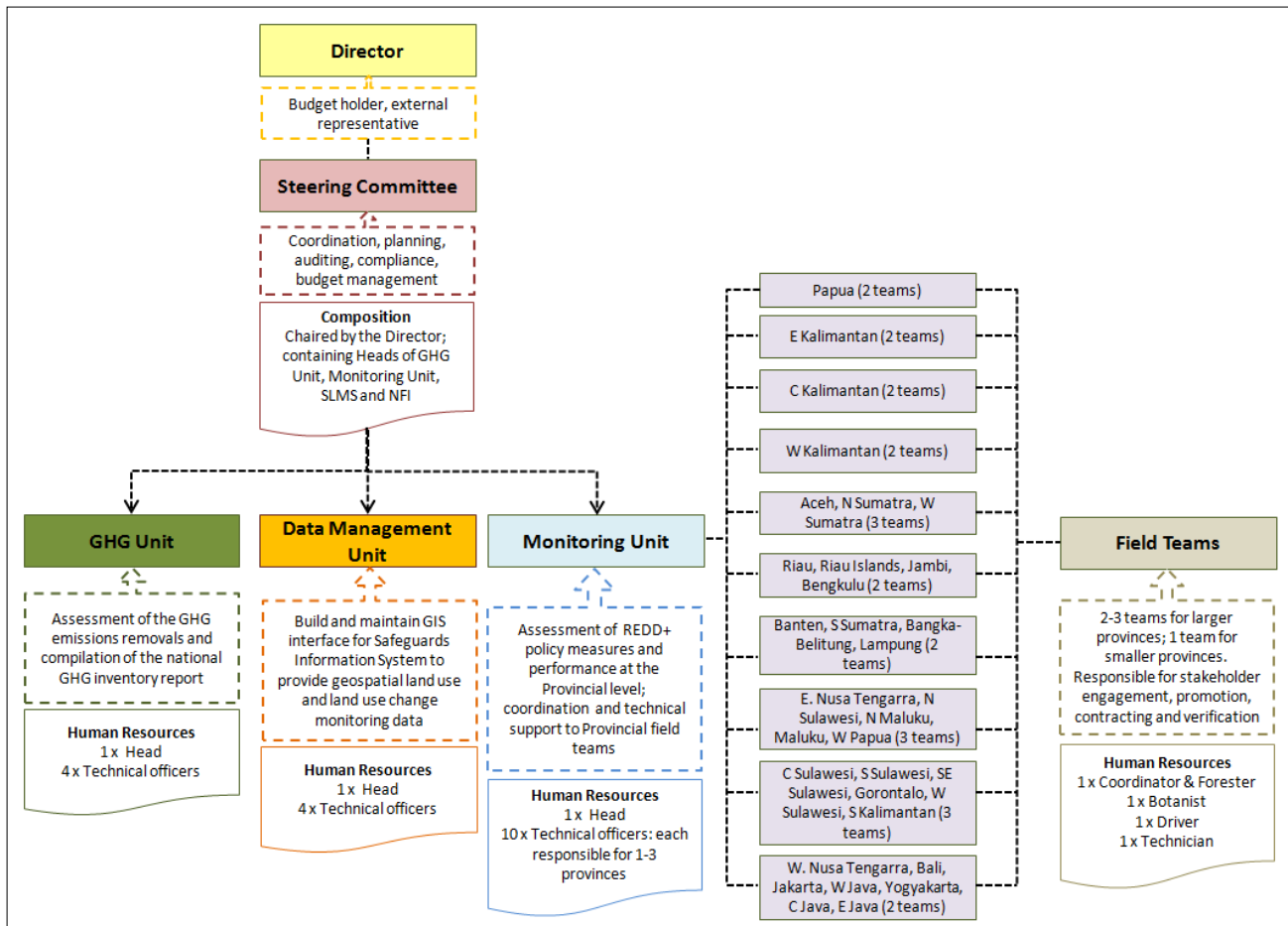


Figure 7. Structure of the MRV Institution in Indonesia, including the functions (dashed-lined boxes) and necessary human resources for each sub-unit.

2.3 DEVELOPMENT OF REDD+ POLICIES & MEASURES

The final component of REDD+ Phase 1 is the development of REDD+ policies and measures. This process will involve defining where and how the five REDD+ activities will be distributed across the national territory, and thereby delineate the mitigation potential in exact figures of REDD+ in the country. This is a critically important activity for monitoring and MRV because it is only by first defining the ways in which REDD+ will be enacted and implemented that specific methodologies can be developed to monitor these activities. Following this process, Phase 1 will therefore provide an indication of how the monitoring system should be developed by defining the specific monitoring requirements.

The Government of Indonesia is currently developing a two-year moratorium on issuing new permits for conversion of natural forest and peatland, which will be enacted by Presidential Decree, which represents a national-level REDD+ policy. Nevertheless, an urgent activity remains the definition and division of all five REDD+ activities at the Provincial level, which will yield important information for the national mitigation potential of REDD+ and monitoring requirements in subsequent REDD+ phases.

3. REDD+ PHASE 2: INFORMATION & MONITORING

This is a transition phase which focuses on the implementation of national policies, measures, national strategies and action plans; technology development and transfer; and results-based demonstration activities. Indonesia could enter the second phase of REDD+ at the beginning of 2012. National policies and measures will be implemented through activities implemented at the provincial level, with a few pilot provinces as frontrunners.

In this phase, while the elements of a full Information, Monitoring and MRV System for REDD+ are being developed, the elements that are necessary to ensure that (i) information is provided on the REDD+ safeguards; (ii) demonstration activities are results-based; and (iii) provides basic national-level forest monitoring information, will have to be fully operational. A Satellite Land Monitoring System (SLMS) will generate data and information on safeguards – to be made available through the web portal – as well as for the domestic monitoring system at provincial level and basic national coverage data.

3.1 REDD+ SAFEGUARDS INFORMATION SYSTEM

The main tool for sharing information freely on how the REDD+ safeguards are promoted and supported in the implementation of the national policies and activities related to the five REDD+ activities will be a web portal interface. This web portal will provide information on the current legislation pertaining to land uses and designations, indigenous rights and all measures and activities that the country is undertaking to promote them. The system will also provide information on Indonesian governance structures and functions, from central government to provincial government level, and non-government (communities, NGOs, private actors) activities.

The REDD+ Safeguards Information System will be an important tool for helping to secure the full and effective participation of local and international stakeholders in the REDD+ process through free access to information through the web portal. The information will be freely provided over the internet, and will act as the entry point for any stakeholder or otherwise interested party seeking information on REDD+ in Indonesia.

The REDD+ Safeguards Information system will be developed and hosted by the **National REDD+ Agency**. An independent, multi-stakeholder committee will provide guidance on the REDD+ Safeguards Information System's implementation. Under this guise, the role of the National REDD+ Agency will be to:

- Develop a web interface to make information on REDD+ safeguards freely available;
- Collect geospatial, social, ecological and governance data and information for web interface;
- Upload and update data and information on the web interface when it becomes available.

The National REDD+ Agency will be provided with shapefiles from MoFor, MoE, BAKOSURTANAL, LAPAN and research institutes (e.g. CIFOR, the Climate Centre and (national and international) universities). The Data Management Unit within the MRV Institution (see Figure 7) will provide land use and land use change monitoring data.

3.2 NATIONAL & SUB-NATIONAL MONITORING SYSTEM

In REDD+ Phase 2 Indonesia will need to have in place a monitoring methodology for assessing and ensuring that the implementation of REDD+ demonstration activities (e.g. in pilot provinces) is results-based through detailed information on the implementation of the REDD+ activities. At the national level, information on some broad land cover indicators, such as forest cover, forest cover change and the locations of fire, will also need to be made available.

The structure of the most appropriate sub-national monitoring methodology will depend on the way the GoI decides to link national mitigation performance with sub-national activities, i.e. the approach taken to 'nesting' REDD+. Nesting refers to the principle of undertaking sub-national REDD+ activities within a national-level framework. The two principle ways in which this can be done are the Provincial Approach or the Project Approach (Figure 8).

Under the Provincial Approach, the national government sets a national framework for policies and measures for each REDD+ activity, which are then adapted individually for each Province according to their circumstances (for instance, the Province of Papua may be selected to focus on conservation actions). Provincial units, under direction of the National MRV Institution, are deployed to promote these selected REDD+ activities in collaboration with provincial governments, and provide technical support to non-government-driven REDD+ projects (e.g. projects by NGOs). The emissions reductions and removals resulting from these projects and activities are then measured against the provincial policies and measures, which are in turn collated for all provinces and measured against the national target and reference emission level/reference level (REL/RL).

Under the Project Approach, the national government likewise sets a national framework on rules and regulations relating to REDD+ projects. Government and non-government actors (i.e. NGOs, private sector) then follow these regulations to develop REDD+ project proposals. Each proposal is reviewed by a Regulatory Board (similar in function to the CDM Executive Board), which approves, rejects and/or provides feedback and/or recommendations on the proposals it receives. If and when projects are approved, personnel from a centralised (Jakarta-based) national monitoring unit are responsible for visiting project developers and implementers to provide technical advisory and evaluation services. The emissions reductions and removals resulting from these projects are then measured against the national target and REL/RL. Under this approach monitoring of project demonstration activities in Phase 2 will need to scale-up to nationally operational MRV in Phase 3 (thus requiring a greater capacity leap than through the Provincial Approach).

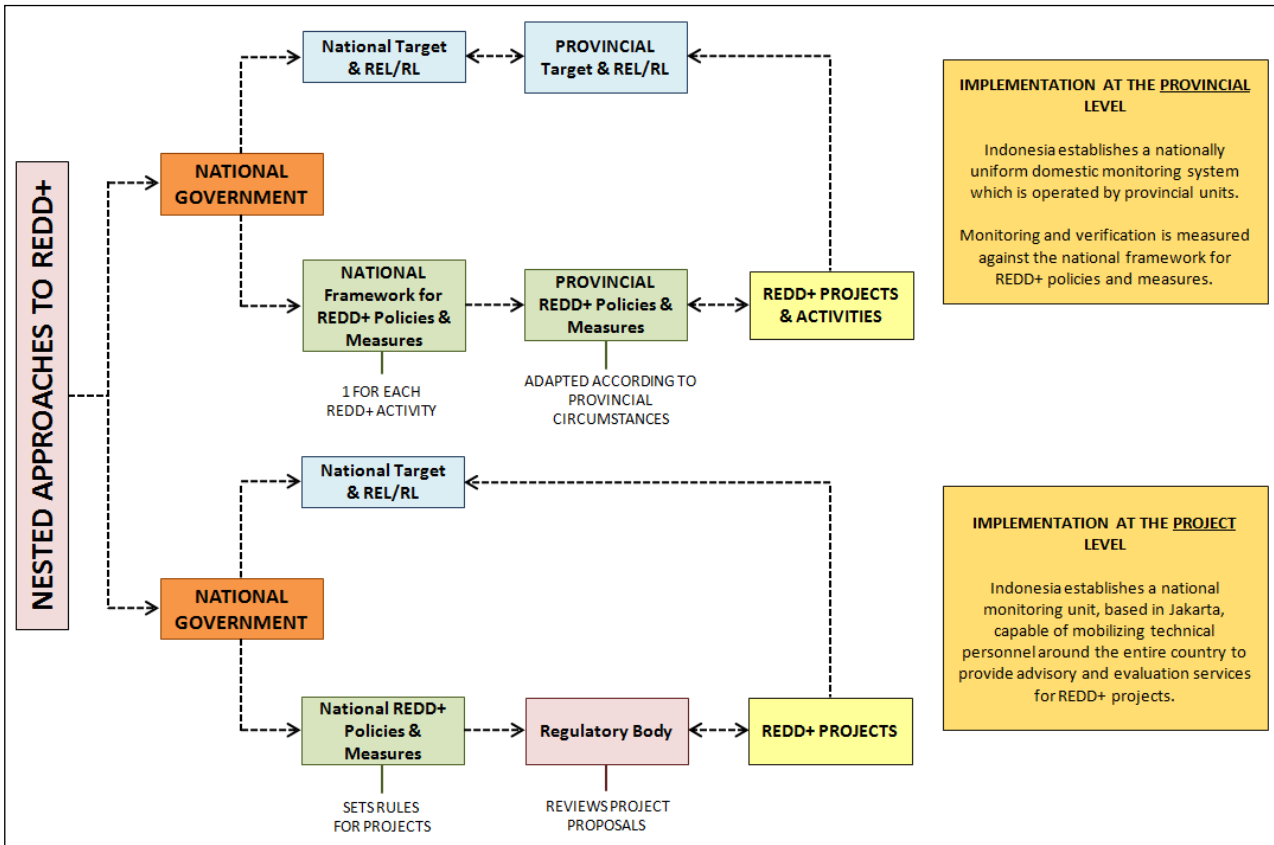


Figure 8. Options for nested approaches to REDD+ in Indonesia.

3.3 SATELLITE LAND MONITORING SYSTEM

Both the Provincial and Project approaches will require the operationalisation of a Satellite Land Monitoring System (SLMS) in Phase 2 to provide remote sensing monitoring data of sub-national demonstration activities and national coverage of basic land use indicators. The SLMS will provide data to enable the Monitoring Unit of the National MRV Institution (see Figure 7) to guide field activities with a sampling-driven approach. This system will become fully operational in Phase 3 of REDD+ when the SLMS will need to provide AD across the entire national territory (wall-to-wall).

In order to establish this system and make it operational an open source software platform will be developed, which will facilitate easy alterations in the future and allow full country ownership. The methodologies to analyse remote sensing data have to be capable of detecting annual changes in forest cover as well as assessing changes in land use. An example of such a platform is TerraAmazon developed by the Brazilian Space Agency (INPE), used in operational monitoring systems of the Amazon. The Amazonian operational monitoring system is capable of detecting annual changes in forest cover and can be used as a basis for the development of the Indonesian monitoring system. In addition, the European Commission's Joint Research Centre (JRC), together with FAO, have developed the Remote Sensing Forest Resource Assessment (FRA-RS) approach, which can serve as a basis to assess land use changes. Moreover, both the Government of Indonesia, through LAPAN, and FAO have close links with South Dakota State University's Geographic Information Science Center of Excellence (GIScCE), who have developed methodologies to assess changes in forest canopy cover loss. By combining the experience from these institutions, existing Indonesian remote sensing capacities and the knowledge of Indonesia's specific circumstances, an original and sophisticated Indonesian SLMS can be developed.

The following structure is recommended for management of the SLMS (Figure 9). A shared platform for the development and operation of the SLMS for REDD+ will be coordinated and hosted by **BAKOSURTANAL**, with full-time participants from **LAPAN, MoFor, MoA, MoE, the MRV Institution and the National REDD+ Agency**.

A Director within BAKOSURTANAL will be appointed to oversee the Platform and act as its external representative. A steering committee chaired by the Director will be comprised of officials from each of the agencies represented in the Platform, and will coordinate and plan activities, auditing and compliance, and manage the budget.

There will be three operational sections of the Platform. The GIS and Remote Sensing Laboratory will contain 20 technical officers from the different agencies and ministries, as well as one Head (manager), who will work collaboratively to provide comprehensive land representation of REDD+ activities through the collection and analysis of satellite data. The technical officers will require expertise and experience of spatial data processing and analysis.

The second operational team of the Platform will be the System and Software Development Unit (three staff), which will monitor the global development of GIS and remote sensing software and provide regular advisory to the GIS and Remote Sensing Lab on the latest technologies and techniques. These officers will require technical knowledge and experience of developing, writing and using spatial analysis software.

The third team is the Data Management Unit (three staff), which will coordinate and organise data management and storage. These staff will require knowledge and experience of database design, development and management.

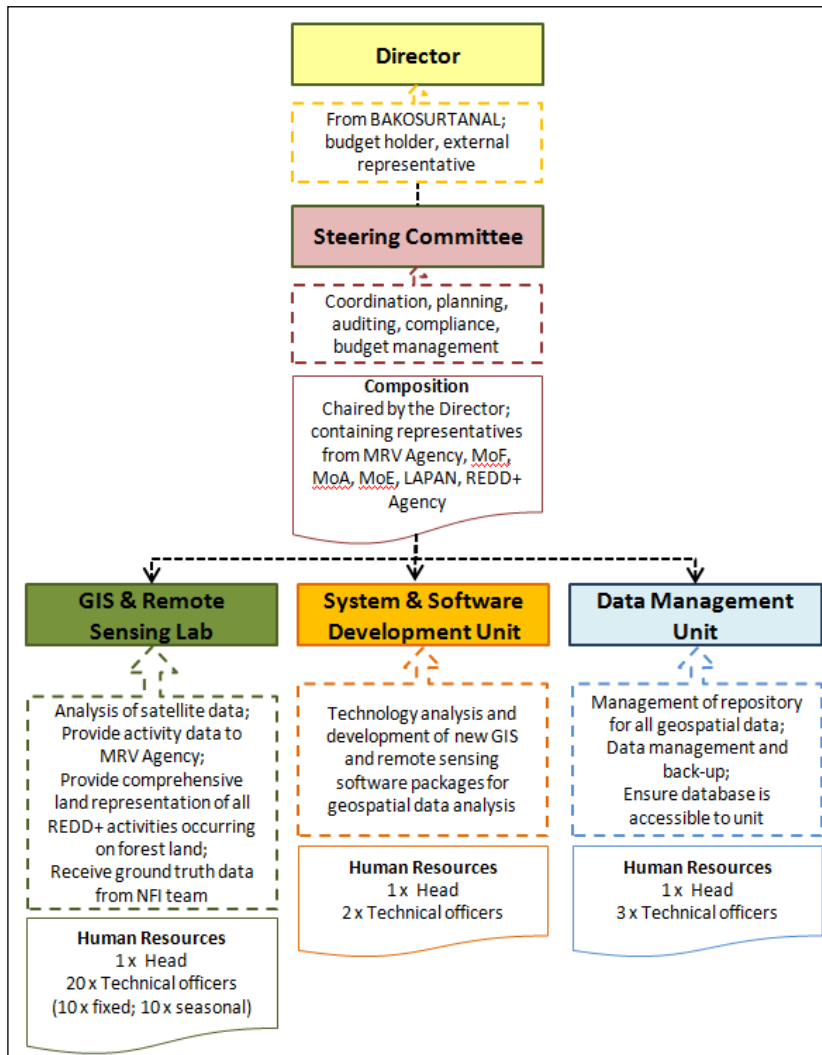


Figure 9. Structure of the SLMS Shared Platform, including functions and necessary human resources for each sub-component.

4. REDD+ PHASE 3: INFORMATION, MONITORING & MRV

In this Phase REDD+ will be fully integrated with other mitigation mechanisms under UNFCCC. All MRV (National Inventory System) elements will have to be operational, in addition to the Phase 2 elements, and the system and the resultant data subjected to verification from the roster of experts coordinated by the UNFCCC Secretariat.

Beyond the specific activities and objectives of Indonesia's MRV for REDD+, the system will have the capacity to be used as a tool to implement national policies and measures beyond REDD+ activities. For instance, the operational SLMS will allow the tracking of some activities across the country (not limited to REDD+). Another example is the NFI as a means to establish a participatory approach for forest-related measurements by including local communities and the private sector. The early establishment of a structured long-term vision for Indonesia's Information, Monitoring and MRV system could therefore generate co-benefits for national policies and local practice.

4.1 NATIONAL FOREST INVENTORY

The principal aim of the NFI for Information, Monitoring and MRV System is to obtain information on GHG emission factors (EF) by sources and removals by sinks (i.e. carbon stock changes) for each of the forest-related land use sub-categories¹ (Maniatis & Mollicone 2010). An NFI can include remote sensing and field surveys. EFs are specific to local conditions, e.g. site fertility and tree species, and are thus usually very diverse. However, EFs usually do not change over time, and therefore only need to be estimated once for a specific area. The implementation of an NFI is a complex process which requires deep knowledge of country-specific ecological and socio-economic conditions, in addition to extensive field-based data collection. See Annex 1 for methodological guidance for NFI development.

The **MoFor** will retain its current responsibility for producing the country's NFI, and will receive considerable technical support and capacity building assistance at the national and sub-national levels to adapt current practices to apply internationally-recognised standards and data collection and analysis methodologies. In this way it will deliver an accurate and cost-effective NFI in a timely manner.

The most immediate activity will be the implementation, and training in the use of, a specialised forest inventory database in MoFor HQ in Jakarta. Training will be funded by the Indonesian UN-REDD Programme, and carried out by a forest database specialist from FAO HQ.

A director within MoFor will oversee and manage the NFI (Figure 10). Field data collection will be carried out at the Provincial level through MoFor's 19 decentralised offices that will act as the data collection hubs. Staff of these offices will be coordinated by a Central Management Unit, comprised of a head and five technical officers. Technical officers will require project management experience, excellent communication and technical knowledge of forest inventories and plot sampling.

Teams at the decentralised offices will receive technical training on forest-based sampling and data collection for NFI for REDD+ and be supported by the Central GIS and Remote Sensing Lab (six staff), which will provide them with maps detailing the locations of sample plot sites. Staff of the GIS/RS Lab will require technical knowledge and experience of spatial data processing, analysis and map production.

Data collected will be sent to MoFor HQ for processing, analysis and entry into the specialised database by the Central Data Analysis and Archiving Unit (six staff). Technical officers of this Unit will require knowledge and experience of spatial data analysis and database management.

¹ IPCC identified six broad land-use categories as basis for estimating and reporting greenhouse gas emissions and removals from land use and land-use conversions. The land uses may be considered as top-level categories for representing all land-use areas, while sub-categories (e.g. forest type) will be necessary to describe national circumstances significant to emissions estimation.

Finally, a Central Auditing Unit (four staff) will undertake internal quality control of all data, to ensure consistency and transparency. Technical officers of this Unit will require knowledge and experience of data quality analysis and evaluation.

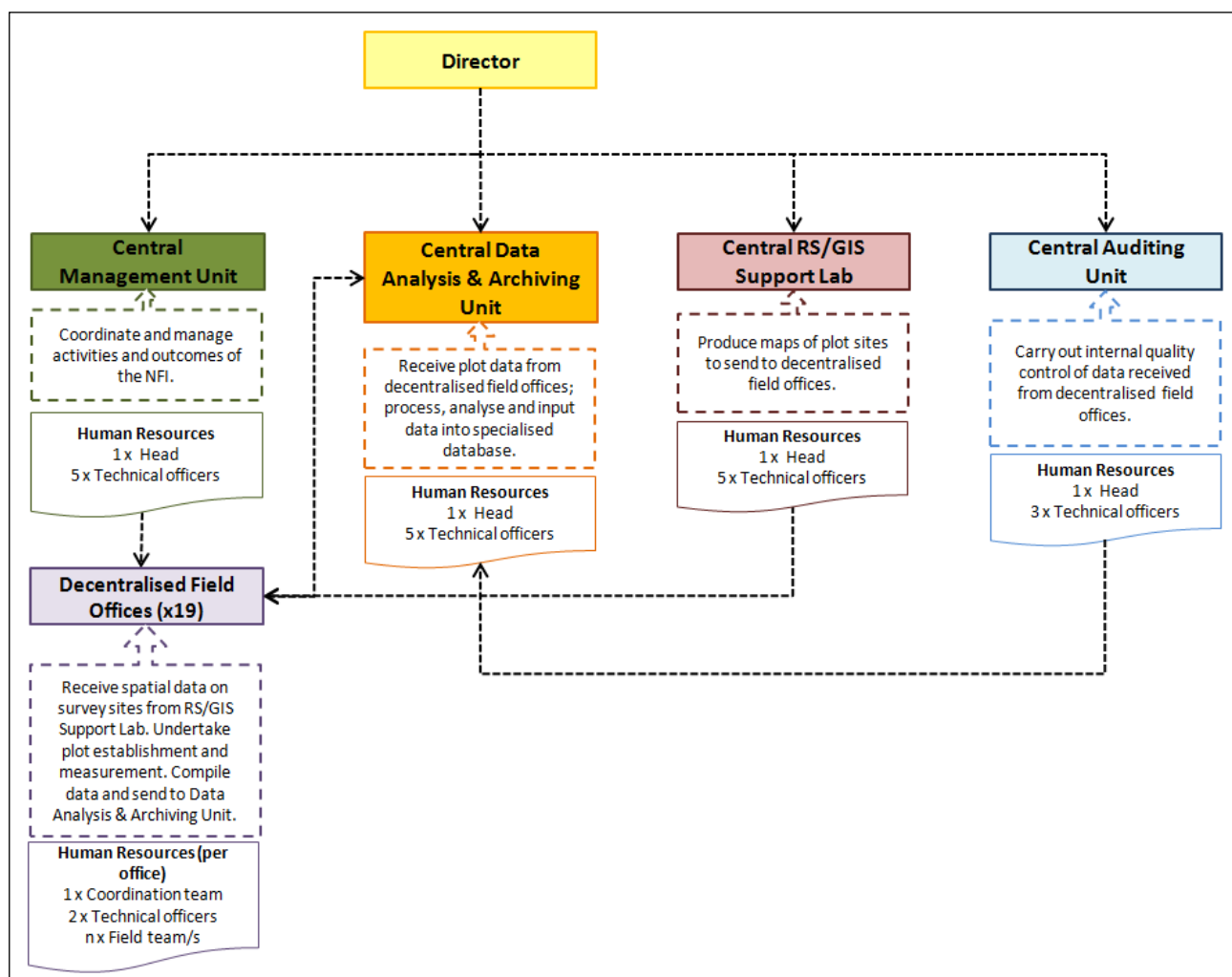


Figure 10. Institutional structure for the National Forest Inventory for REDD+.

4.2 NATIONAL PEATLAND SURVEY

The vast carbon stores in Indonesia's peatlands, estimated at 55 ± 10 GtC (Jaenicke et al., 2008), justify the inclusion of a separate entity, a National Peatland Survey (NPS), with the objectives to:

- Generate and collate information to assess the EFs derived from their draining, clearance and/or conversion;
- Identify and test options for protection and sustainable management of peatlands;
- Enhance understanding and involvement of key stakeholders in peatland management.

The NPS will pass data and information generated on EFs for incorporation into the NFI and the REDD+ GHG-I. The NPS will be undertaken by a consortium of research institutions and government, including the Ministry of Environment. The structure of the NPS is to be developed.

4.3 REDD+ GHG INVENTORY

The function of Indonesia's national GHG-I is to estimate and report anthropogenic emissions by sources and removals by sinks. Under the UNFCCC, information reported in GHG inventories² represents an essential link between science and policy, providing the means by which the COP can monitor progress made by Parties in meeting their commitments and in achieving the Convention's ultimate objectives. The information reported in a National GHG-I provides the basis for assessing each Party's performance as compared to its reference emission level/reference level (or commitment), and is therefore a requisite antecedent for assigning any incentives or penalties.

The quality of GHG inventories relies not only upon the robustness of the science underpinning the methodologies and the associated credibility of the estimates – but also on the way this information is compiled and presented. Information must be well documented and consistent with the reporting requirements outlined in the UNFCCC guidelines (UNFCCC 2004). The IPCC has developed specific reporting guidelines (IPCC 2006) in order to support Parties in providing information and estimates of anthropogenic GHG emissions and removals.

A national inventory of anthropogenic GHG emissions and removals is typically divided into two parts: reporting tables (standardized data tables that contain mainly quantitative (numerical) information) and an inventory report (comprehensive and transparent information about the inventory e.g. overview of trends, inventory compilation methodology and information on uncertainties). See Annex 1 for methodological guidance on GHG-I development.

Once Indonesia fully establishes its REDD+ Safeguards Information System, SLMS and NFI, it will be in compliance with the requirements of REDD+ under the UNFCCC. The ultimate objective of the MRV System for REDD+ is to implement Indonesia's National GHG Inventory for reporting to the UNFCCC in order to access the funds from payments for verified performance. REDD+ activities are listed in the UNFCCC framework as part of the AFOLU sector. Other inventory sectors are Energy, Industrial Processes and Product Use (IPPU), Waste and other.

The **MRV Institution** will be responsible for the National GHG-I for REDD+ (which will form part of the country's four-yearly National Communication to UNFCCC) as well as the National Inventory Report which must be submitted to the UNFCCC every two years. The data for these reports and communications will be quality-checked by the **Central Statistical Agency** before being compiled into the reports and passing to the **MoE**. From here the report is submitted to **DNPI** which, as official UNFCCC focal point, will retain its responsibility for submitting National Communications to the UNFCCC every four years (to include inventories, information on mitigation actions and their effects, and support received). These three agencies will also need to coordinate the biennial submission of update reports containing updates of national GHG-I, including a national inventory report and information on mitigation actions, needs and support received.

The work of the GHG Unit within the MRV Institution will be divided into two streams (Figure 11). The main work stream will follow IPCC methods to develop the GHG-I for REDD+ activities, through training lead by FAO/UNDP under the UN-REDD Programme. This training will result in adherence to Tier 2 reporting in Phase 2 using the Gain-Loss Method (implemented by 2012), and Tier 3 reporting in Phase 3 using the Stock-Difference Method (implemented by 2014).

The secondary work stream will comprise the implementation of the Australia-funded National Carbon Accounting System (INCAS), which aims to provide a comprehensive and credible account of Indonesia's land-based emissions profile and sinks capacity, with the ultimate objective of informing national REDD efforts. Information for INCAS is compiled through remote sensing, data analysis (land use and

² The UNFCCC established the commitment for Parties to report national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, to the extent its capacities permit, using comparable methodologies to be promoted and agreed upon by the Conference of the Parties.

management, climate and soil, growth and biomass), and spatial and temporal ecosystem modelling. Under this stream, one technical officer of the MRV GHG Unit will undergo AusAID-lead training to facilitate the development of this system.

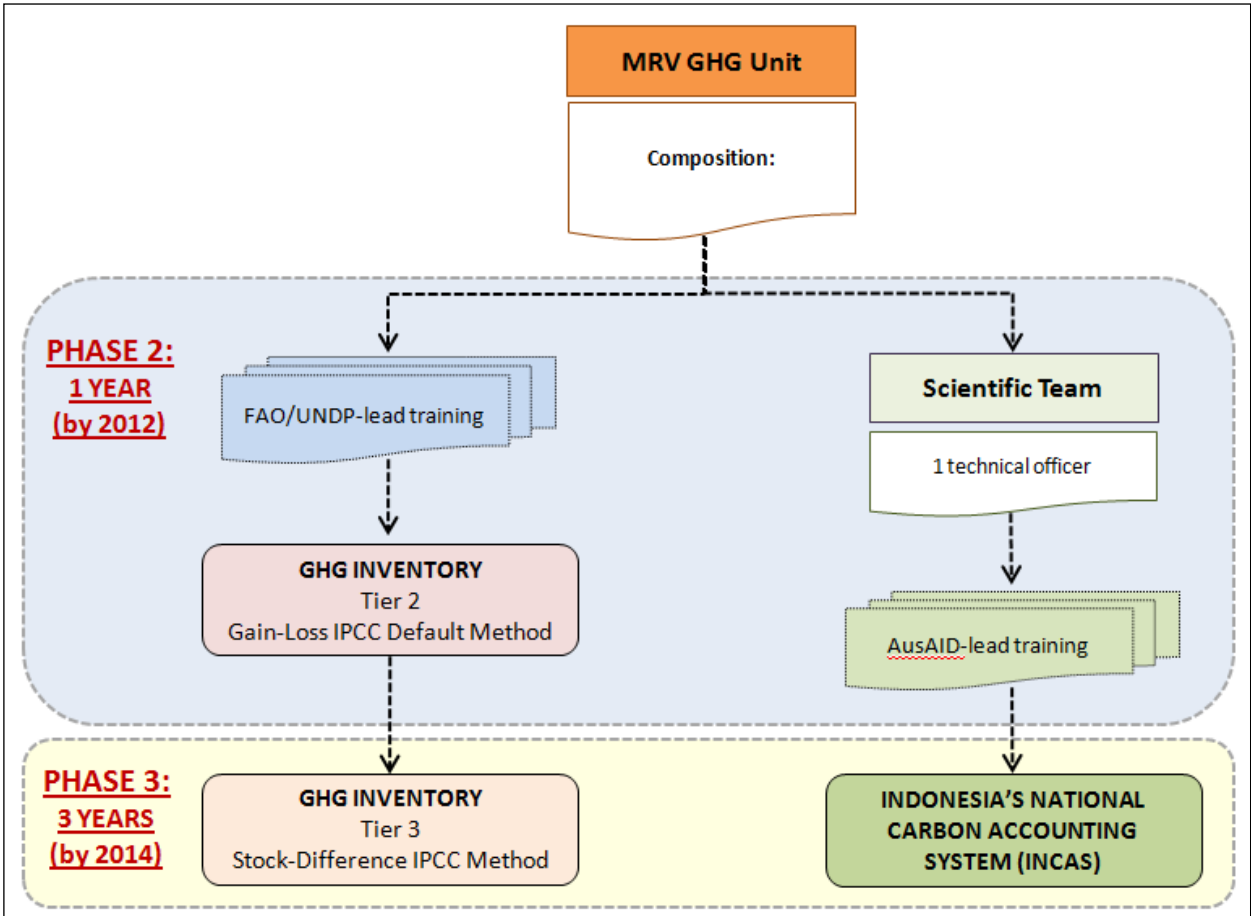


Figure 11. Structure of, and phased approach to, the National GHG Inventory.

5. REFERENCES

Boer, R., Sulistyowati, Las, I., Zed, F., Masripatin, N., Kartakusuma, D.A., Hilman, D., Mulyanto, H.S., 2010. Indonesia's Second National Communication under the United Nations Framework Convention on Climate Change (UNFCCC). Ministry of the Environment, Jakarta.

IPCC, 2003. Good Practice Guidance for Land Use, Land-Use Change and Forestry. Penman, J., Gytarsky, M., Hiraishi, T., Krug, T., Kruger, D., Pipatti, R., Buendia, L., Miwa, K., Ngara, T., Tanabe, K., Wagner, F. (eds.). IGES, Japan.

IPCC, 2006. Guidelines for National Greenhouse Gas Inventories. Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). IGES, Japan.

Jaenicke, J., Rieley, J.O., Mott, C., Kimman, P., Siegert, F., 2008. Determination of the amount of carbon stored in Indonesian peatlands. *Geoderma* 147, 151-158.

Maniatis, D., Mollicone, D., 2010. Options for sampling and stratification for national forest inventories to implement REDD+ under the UNFCCC. *Carbon Balance and Management* 5, 9.

UNFCCC, 2004. Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories (FCCC/SBSTA/2004/8). UNFCCC, Bonn.

UNFCCC, 2005. Decision 20/CP.7. Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol. UNFCCC, Bonn.

UNFCCC, 2009. Decision 4/CP.15. Methodological guidance for activities relating to reducing emissions from deforestation and forest degradation; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. UNFCCC, Bonn.

UNFCCC, 2010. Decision 1/CP.16. The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention. UNFCCC, Bonn.

6. ANNEXES

ANNEX 1: MRV METHODOLOGIES

REDD+ Safeguards Information System

To be developed in close collaboration with the project supported by GIZ.

Activity Data Estimation: SLMS

The IPCC indicates that countries should accurately and completely represent and report all land areas in a country where human activities take place (land-use categories). This land representation should also reflect the historical trends in land-use area (20 years as a default value as suggested by the IPCC 2003, 2006) and information be reported to ensure transparency and comparability of estimates. In the context of REDD+, activity data (AD) refers to the aerial extent of an emission and removal category. For example, in the case of deforestation, this would refer to the area of deforestation in hectares over a known time period.

The SLMS for Indonesia described in this section is an operational wall-to-wall system based on Approach 3 (explained further below) of the IPCC GHG reporting guidelines (2006b), with satellite remote sensing data that monitors annual changes in land use (and not land cover) with a methodological approach that must be consistent with historical deforestation and degradation rate assessments, in line with UNFCCC reporting requirements. The proposed SLMS for Indonesia could be based on the TERRA-AMAZON system, an open source software platform, developed by the Brazilian Space Agency (INPE) and used in the Amazonian operational monitoring systems (PRODES-DETER-DEGRAD).

The guiding principles for the development of the SLMS are:

- Compliance with UNFCCC reporting for consistent land use representation;
- Based on the successful proven operative SLMS and adapted to country's needs;
- Cost-effective for annual national coverage;
- Operational performance;
- Wall-to wall based on multi-data approach;
- Fully open source, no license costs/ dependency.

The strengths of remote sensing stem from its ability to provide spatially explicit information and repeated coverage, including the possibility of covering large and/or remote areas that are difficult to access otherwise. Archives of remote sensing data span several decades and can therefore be used to reconstruct past time-series of land cover and land use.

IPCC APPROACHES TO AD MEASUREMENT

The IPCC (2003) proposes three Approaches to measure AD. We present them here in order of increasing information content, but they are not hierarchical or mutually exclusive. Approach 1 identifies the total area for each individual land-use category, but does not provide information on changes of area between categories and is not spatially explicit. Approach 2 expands on Approach 1 by introducing tracking of land-use changes between categories. Approach 3 extends Approach 2 by tracking land-use changes on a spatial basis (i.e. geographically explicit).

The UNFCCC (2006) and the IPCC (2003) call for an adequate, consistent, complete, transparent approach to AD reporting. Further, AD reporting under REDD+ will be required to go back 20 years, cover the entire territory of the country, and assign uncertainty values to the reported data. Given these methodological considerations, it is advisable for Indonesia to use Approach 3. This implies the use of geographically explicit data collected in the field or through remote sensing techniques. The strategic methodological

option of using remote sensing data rather than field data to assess AD simultaneously allows (i) the assessment of forest area change; (ii) the observation of trends in forest area change (at present and up to 20 years back); and (iii) significantly reduction of the amount and cost of measurements to be undertaken in the field (Stach et al., 2009).

WALL-TO-WALL MONITORING

As the removal of emissions in one place could result in an increase of emissions elsewhere, the concept of 'displacement of emissions' will need to be addressed in the context of REDD+ (FCCC/AWGLCA/2009/L.7/Add.6). To address national level leakage (as opposed to international leakage), the SLMS needs to provide full coverage (wall-to-wall) of the national territory, to detect and prevent leakage occurring from one region to another.

THE TERRA-AMAZON PLATFORM

REDD+ implementation will require advanced ways of monitoring forest carbon stocks nationally. In collaboration with Brazil's INPE, the UN-REDD Programme through FAO will facilitate countries in the training with the Brazilian forest monitoring system in order to improve their national technical capacity, providing the opportunity for REDD+ countries to set up independent SLMSs that will be valuable also as a tool to report greenhouse gas (GHG) emissions, following the IPCC's Guidelines and Guidance. The INPE platform TerraAmazon is freely available and provides options, tools and algorithms which can be adapted to country needs. The goal of the collaboration in this capacity building effort is to train technical forest and IT personnel from Indonesia. This will allow them to use the system, adapt it to Indonesian needs and use training on the TerraAmazon system as a capacity building tool to establish a national forest monitoring system.

INPE's technology to support their Amazonia monitoring systems is composed of three operational and complementary systems: DETER, DEGRAD and PRODES. This is the largest and most robust operational forest monitoring system in the world and has been providing official annual rates of gross deforestation to the Brazilian government since the late 1980s. Monthly information on forest cover changes in Amazonia have been provided to the government control and enforcement agency since 2004, allowing early measures to be taken to prevent further non-authorized deforestation activities. As open source products, DETER, DEGRAD and PRODES are distributed free of charge. Further, INPE proposes capacity building in the form of an intensive training course at the recently created Regional Training Centre in Belem, Brazil (INPE Amazonia), at a minimum cost. These training courses aim to improve knowledge on the use of remote sensing, information technology (IT) and modelling aspects of a SLMS. Country-specific activities such as the assessment of historical forest cover change will be carried out during this training course. The knowledge gained will also be valuable to expand monitoring of the entire Indonesian national territory, which may become relevant for GHG inventories related to LULUCF or AFOLU.

Emission Factor Estimation: NFI

STRATIFYING INDONESIA'S FOREST LAND

Countries seeking to implement REDD+ need to focus their efforts on forest-related emissions and removals from key activities. To this end, Indonesia will need a stratification system, where key activities will be associated with strata (i.e. homogeneous forest populations). For example, in Kalimantan, emissions could be reduced by avoiding deforestation; whereas in Papua the emphasis could be on conservation. The forest area of a country is not homogeneous in terms of species composition, management practices (e.g. unexploited, under sustainable management, conservation, etc.) or drivers of carbon stock changes (e.g. drivers of deforestation). In response to this diversity, the government will need to implement a set of diversified policies and measures to achieve sustainable management of its land resources.

In terms of MRV, this translates into a need for a detailed stratification of the entire national territory, as follows:

1. A stratification of the forest land area to identify and monitor areas of land with different biophysical properties, subject to different policies, measures and activities – i.e. the stratification of the entire national territory according to biophysical and socio-economic variables.
2. Within a single stratum, different activities and institutional arrangements related to the management of forest carbon stocks will be identified, resulting in a more detailed sub-stratification.

For each stratum and/or sub-stratum, technical and methodological arrangements aimed at achieving the highest quality estimates in a cost-effective manner will be implemented. All on-going local monitoring activities will be taken into account or directly included in the GHG inventory system while the national monitoring activities verify the local estimates. Indonesia will need to develop a stratification scheme (such as the one shown in Figures 12 and 13) which incorporates the IPCC’s indications (e.g. ‘managed land’ concept as a proxy to identify ‘anthropogenic’ emissions by sources and removals by sinks) and reflects outcomes from the technical negotiations under the UNFCCC.

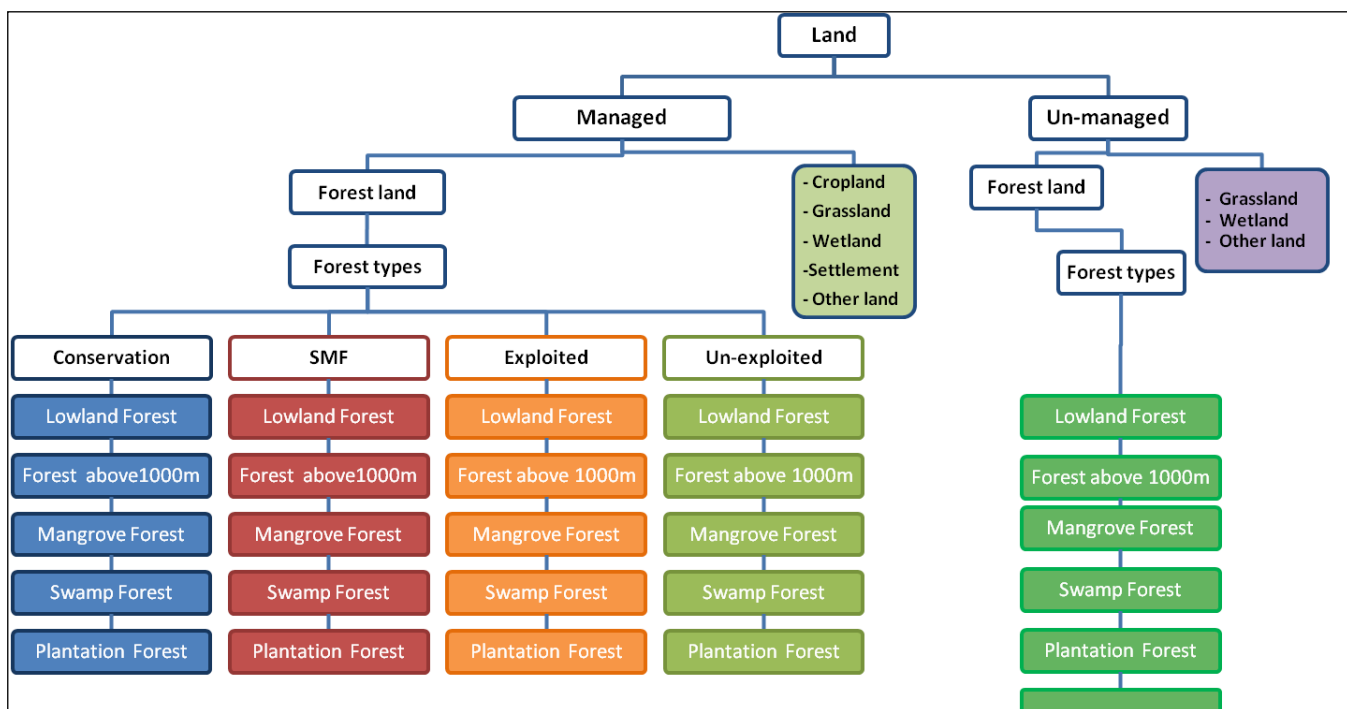


Figure 12. Potential land use classification/stratification system for Indonesia’s national territory, based on land categories defined in the National Forest Inventory of Indonesia, Final Forest Resources Statistics Report (1996).

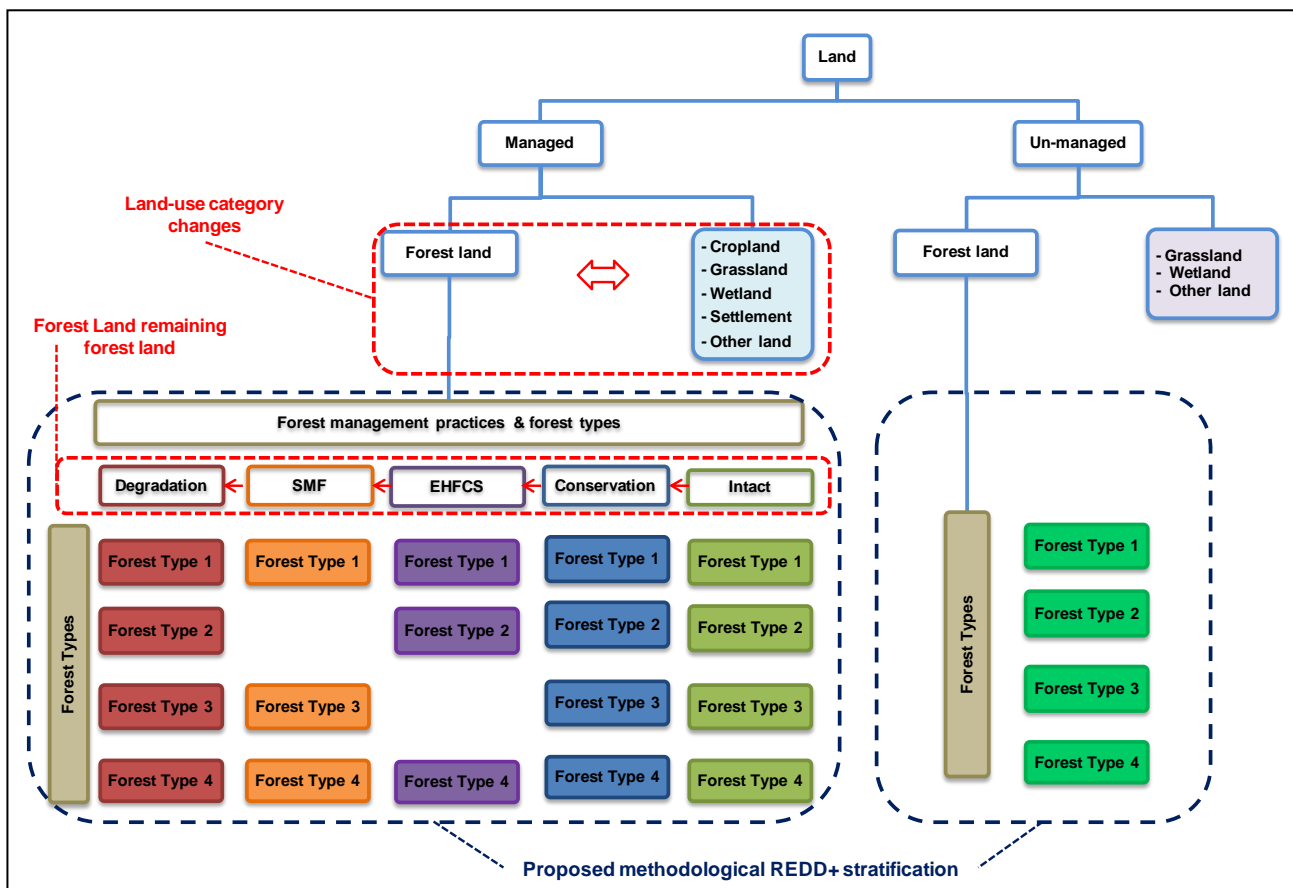


Figure 13. Land stratification scheme based on forest type and forest management practices.

With this scheme Indonesia may report on changes in carbon stock due to land use change activities (afforestation, reforestation and deforestation) reporting differences in carbon stock between forest land and cropland, grassland, wetland, settlement and other land. It may also report on changes in carbon stock in forest land remaining forest land while reporting on differences in carbon stock between and within the different forest management practices and forest types. SMF and EHFC stand for Sustainable Management of Forest and Enhancement of Forest Carbon Stocks, respectively. The figure will be updated once all stakeholders have agreed on Indonesia’s main forest types.

METHODOLOGY TO IMPLEMENT INDONESIA’S REDD+ NFI

[To be completed]

IPCC’s approach for GHG-Inventories

TIER LEVELS

Information on carbon stock changes can be obtained in various ways. The IPCC has categorized these approaches into three levels of increasing data requirements and analytical complexity called ‘Tiers’ (IPCC 2003, 2006). Moving from Tier 1 to Tier 3 increases the accuracy (which is unknown for Tier 1) of the GHG estimates while increasing the complexity of the monitoring and analyses.

KEY CATEGORIES

Numerous sources of emissions and removals by sinks exist on land. In the context of reducing GHG emissions and establishing GHG inventories, Indonesia will have to pay particular attention to its major sources of emissions as they are required to report on them with increasing accuracy. Large sources of emissions have been coined ‘Key Categories’ by the IPCC. Indonesia will have to prioritise its resources and monitoring efforts to provide accurate estimates of such Key Categories, and evaluate which REDD+ activities (e.g. deforestation) will represent a Key Category, for which it is good practice to use higher Tiers (2 or 3). However, national circumstances are always important and in the absence of better data Tier 1 could also be accepted for a Key Category in some cases.

THE METHODS: STOCK DIFFERENCE & GAIN-LOSS METHOD

The IPCC identifies two methods to assess carbon stock changes in the carbon pools: i) the process-based approach ('Gain-Loss Method'), which estimates the net balance of additions to and removals from a carbon stock and ii) the stock-based approach ('Stock Difference Method'), which estimates the difference in carbon stocks at two points in time. The Gain-Loss method includes all processes that bring about changes in a pool including statistics on losses by harvest, fires, etc, while the Stock Difference Method measures the carbon stocks in relevant pools at two points in time to assess carbon stock change. Indonesia will use the Gain-Loss Method for reporting in Phase 2 of REDD+ and Stock Difference in Phase 3.

THE 'MANAGED LAND' PROXY AND LAND-USE CATEGORIES

Countries will have to report on carbon stock changes (emissions and/or removals by sinks) only if these are human induced. In that respect the IPCC advises the use of the 'managed land' concept as a proxy to discriminate human induced emissions and removals. Only changes in managed land will have to be estimated and reported. If human activity occurs on land where there was previously no human activity ('unmanaged' land), it immediately becomes 'managed' land. In practical terms this means that a country territory will have to be divided into 'managed' and 'un-managed' land, or in other words, land where human activity occurs and land where human activity is absent. Countries will have to provide detailed definitions and a national approach to distinguish between unmanaged and managed land in a transparent manner (IPCC 2006b).

Countries will also have to divide their national territories into the following six land-use categories that the IPCC has defined for GHG reporting (IPCC 2003): (i) forest land; (ii) cropland; (iii) grassland; (iv) wetlands; (v) settlements and (vi) other land. It is good practice to ensure compatibility with the six land-use classes described above when developing national land classification systems (IPCC 2003). These categories can be further subdivided into categories which reflect national circumstances. When using a Tier 2 and 3 method, it is good practice to evaluate interactions between management practices that affect emission/stock change factors.

THE FIVE CARBON POOLS THAT DESCRIBE THE CARBON CYCLE AND CARBON FLUXES

The IPCC defines five carbon pools: aboveground biomass, belowground biomass, dead wood, litter and soil organic matter, which have to be measured and reported for GHG inventories. The generalised flowchart of the carbon cycle (Figure 14) shows all five pools and associated fluxes including inputs to and outputs from the system, as well as all possible transfers between the pools. The carbon cycle includes changes in carbon stocks due to both continuous processes (i.e. growth and decay) and discrete events (i.e. disturbances like harvest, fire, insect outbreaks, land-use change and other events). Continuous processes can affect carbon stocks in all areas in each year, while discrete events cause emissions and redistribute ecosystem carbon in specific areas (i.e. where the disturbance occurs) in the year of the event.

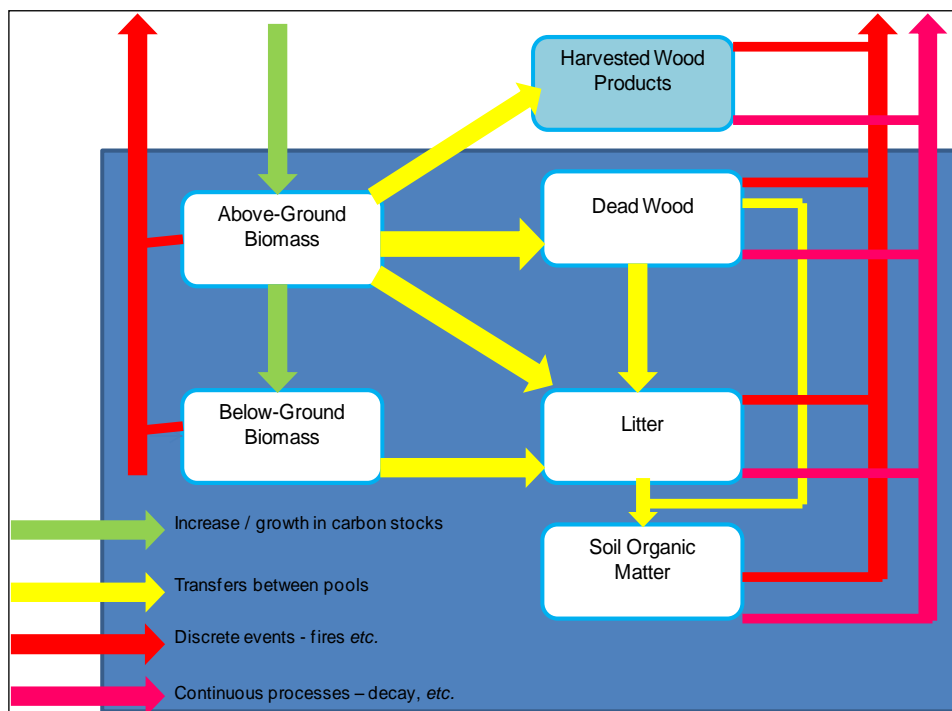


Figure 14. Generalised carbon cycle of terrestrial AFOLU ecosystems. This figure shows the flows of carbon into and out of the system as well as between the five carbon pools within the system (adapted from figure 2.1 IPCC 2006).

QUALITY CONTROL AND QUALITY ASSURANCE

It is important to assess the quality of data collection, compilation and analysis in order to have error estimates and improve future measurements. The IPCC 2006 Guidelines for National Greenhouse Gas Inventories (IPCC 2006b) contain the necessary clarifications regarding quality control (QC) and quality assurance (QA) for GHG inventories. QC procedures are internal to the process of inventory preparation, while QA consist of an external (independent) assessment of the quality of the reported estimates. It should also be noted that the UNFCCC Secretariat, through its roster of experts, will verify the methods and data in the National GHG Inventory that Indonesia uses to report.