NATIONAL FOREST MONITORING SYSTEMS FOR REDD+

REDD+ ACADEMY

LEARNING JOURNAL

EDITION 3 - DECEMBER 2018

ABOUT US

UN-REDD

The UN-REDD Programme is the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (REDD) in developing countries. The Programme was launched in 2008 and builds on the convening role and technical expertise of the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP).

The UN-REDD Programme supports nationally-led REDD+ processes and promotes the informed and meaningful involvement of all stakeholders, including Indigenous Peoples and other forest-dependent communities, in national and international REDD+ implementation.

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The REDD+ Academy is a coordinated REDD+ capacity development initiative led by the UN-REDD Programme and the UNEP Environmental Education and Training Unit, which seeks to match the scale of the global climate change mitigation challenge and enable systematic, focused capacity development to deliver REDD+ on the ground.

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Dear Learner,

Welcome to the second edition of the REDD+ Academy Learning Journals. The journals provide you with state of the art knowledge on REDD+ planning and implementation, developed by some of the world's leading experts at the UN-REDD Programme.

The journals have been designed to accompany you in your learning journey and equip you with the necessary knowledge to understand the various components of REDD+, from the basics to the finer points of setting reference levels, monitoring, allocation of incentives and stakeholder engagement.

With deforestation and forest degradation being the third largest source of greenhouse gas emissions globally, action to reduce deforestation and to rebuild forests globally is vital. By realizing social and economic benefits, REDD+ is also fundamental to delivering on the Sustainable Development Agenda.

Following the adoption of the Paris Agreement, the focus of many developing countries is now firmly on REDD+ implementation. I encourage you to take the REDD+ Academy online course, and apply your knowledge to make REDD+ a national and a global success!

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CONTENTS
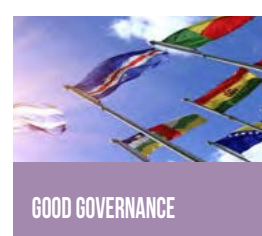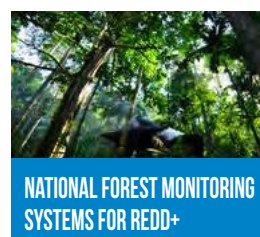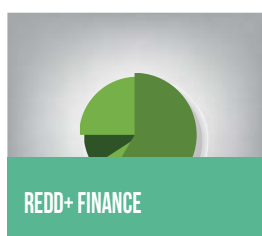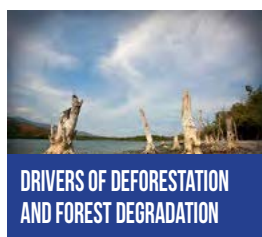
☐ What are NFMS?

☐ Why is NFMS necessary?

☐ Implementing NFMS

☐ Reporting on greenhouse gas emissions and removals

ACTIVITIES

☐ **Exercise**
Multiple choices

☐ **Exercise**
Multiple choices

National Forest Monitoring Systems for REDD+

This module looks at how countries can measure their REDD+ performance in terms of reductions in greenhouse gas emissions.

The module includes explanations about:

- What is meant by National Forest Monitoring Systems (NFMS)

- Why NFMS are required, with reference to the UNFCCC

- How NFMS are developed and implemented

What do you already know about this topic?

NATIONAL FOREST MONITORING SYSTEMS FOR REDD+

WHAT IS A NFMS?

In the context of REDD+, a NFMS is a system for recording and monitoring how land is used in a country, and to develop data which shows the level of greenhouse gas (GHG) emissions and removals related to forests.

The aim of a NFMS is to assess the performance of REDD+ activities. NFMS for REDD+ should be implemented in phases:

● Phase 1: Gathering initial data; developing capacity, institutions and infrastructure;

● Phase 2: Piloting NFMS with REDD+ demonstration activities;

● Phase 3: Full implementation of NFMS with REDD+ policies and measures.

By combining information about how land use patterns are changing through, for example, deforestation or afforestation, with information from a national forest inventory (NFI), it is possible to estimate overall GHG emissions for the forest sector.
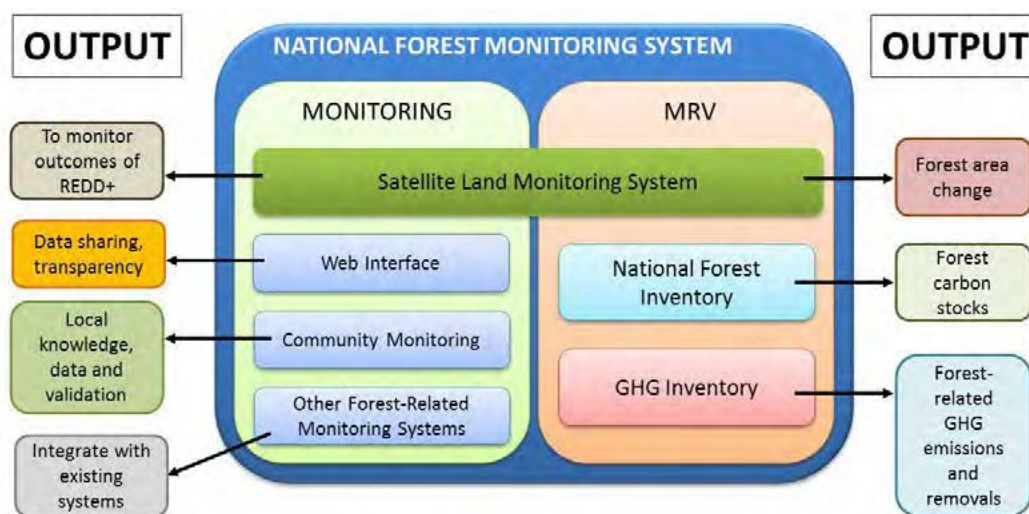
A NFMS has several elements. They are summarized in Figure 1.

Figure 1 Elements of a NFMS

Source: UN-REDD Programme

The various elements of the NFMS perform two functions:

1. Monitoring

2. Measurement, reporting and verification (MRV)

The MRV function is specific to REDD+, while the monitoring function is important for both REDD+ and other purposes in the forestry sector.

Under the MRV function, two things are measured:

1. Changes in extent, quality or type of forestland, usually measured through satellite-based remote sensing technology. This is referred to as activity data (AD). For REDD+, AD must be transparent and freely available.

2. Forest carbon stocks, usually measured through a ground-based NFI. This is used to produce emission factors (EF). An EF is a coefficient that indicates the GHG emissions that will result from a unit of change (e.g. 1 hectare of deforestation) in a particular type of forest.

Emissions of all GHGs are important, but most emissions from the Land Use, Land Use Change and Forestry (LULUCF) sector are of carbon dioxide (CO_2), so EFs are measured in tonnes of CO_2 equivalent (tCO_2e).

Forests and other terrestrial ecosystems sequester carbon in biomass and soil. The rate at which a particular forest type sequesters carbon is known as a removal factor (RF).

The combination of AD with EFs and RFs can be used to develop a national estimate of GHG emissions from forests over a particular period of time. This estimate is part of a country's Greenhouse Gas Inventory (GHG-I).

WHY IS A NFMS NECESSARY?

A NFMS is one of the four elements that countries are required to develop in order to participate in REDD+ under the United Nations Framework Convention on Climate Change (UNFCCC) (see **the module on Understanding REDD+ and the UNFCCC**). The evolution of guidance on NFMS under the UNFCCC is provided below with the Bali Action Plan, and decisions under the Copenhagen, Cancun, and Warsaw Conference of Parties (the Conference of Parties, or COP, is the key decision-making body of the UNFCCC).[1]

COP 13: Bali (2007)

Decision 1/CP.13: The Bali Action Plan:

Paragraph 1 (b) calls for:

■
"Enhanced national/international action on mitigation of climate change, including ... consideration of: ...Nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner..."

The term 'MRV' comes from this paragraph, which refers to mitigation actions in general, not just REDD+. The Bali Action Plan encourages all countries to reduce their GHG emissions in a way that is:

i.   Measurable – i.e. a country can calculate estimates of GHG emissions reductions and carbon sink enhancements

ii.   Reportable – i.e. a country can produce a GHG-I that is transparent, accurate and complete

iii.   Verifiable – i.e. third parties can access all the information required to verify the GHG-I

Decision 2/CP.13: Reducing emissions from deforestation in developing countries: approaches to stimulate action

Paragraph 2:

■
"Encourages all Parties, in a position to do so, to support capacity-building, provide technical assistance, facilitate the transfer of technology to improve, inter alia, data collection, estimation of emissions from deforestation and forest degradation, monitoring and reporting, and address the institutional needs of developing countries to estimate and reduce emissions from deforestation and forest degradation"

This paragraph endorses efforts to provide developing countries with technical and institutional support for developing NFMS for REDD+.

Annex, Paragraph 2:

■
"Estimates of reductions or increases of emissions should be results based, demonstrable, transparent and verifiable, and estimated consistently over time."

This paragraph gives a clear indication of the attributes that a NFMS for REDD+ should have.

COP 15: Copenhagen (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.

REFLECTION POINT

What challenges do you envisage with the measurement of activity data and emission factors?

Can you suggest ways these challenges may be overcome in your specific context – discuss in small groups.

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1   The UNFCCC has gathered the full text of the decisions of the COP relevant to REDD+ in the 'Decision booklet REDD+' (UNFCCC, 2014).

Paragraph 1 points explicitly to the Intergovernmental Panel on Climate Change as the source of guidance and recommended methodologies for a NFMS for REDD+. Specifically, it requests developing country Parties:

"To use the most recent IPCC guidance and guidelines, 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 change."

It also asks them:

"To establish, according to national circumstances and capabilities, robust and transparent national forest monitoring systems and, if appropriate, sub-national systems as part of national monitoring systems that:

1. Use a combination of remote sensing and ground-based forest carbon inventory approaches for estimating, as appropriate, anthropogenic forest-related greenhouse gas emissions by sources and removals by sinks, forest carbon stocks and forest area changes

2. Provide estimates that are transparent, consistent, as far as possible accurate, and that reduce uncertainties, taking into account national capabilities and capacities

3. Are transparent and their results are available and suitable for review as agreed by the Conference of the Parties"

COP 16: Cancun (2010)

Decision 1/CP.16: The Cancun Agreements:

Paragraph 71 requests developing country Parties aiming to undertake REDD+ activities to develop:

"A robust and transparent national forest monitoring system for the monitoring and reporting of REDD+ activities, with, if appropriate, subnational monitoring and reporting as an interim measure, in accordance with national circumstances..."

This paragraph stipulates a NFMS as one of the four elements of REDD+.

Paragraph 73 states that REDD+ activities should be:

"implemented in phases, beginning with the development of national strategies or action plans, policies and measures, and capacity-building, followed by the 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, and evolving into results-based actions that should be fully measured, reported and verified"

This paragraph describes how REDD+, including NFMS, should be developed through a phased approach.

COP 19: Warsaw (2013)

Decision 11/CP.19: Modalities for national forest monitoring systems

Paragraph 2:

"Decides that the development of Parties' national forest monitoring systems ... should take into account the guidance provided in decision 4/CP.15 and be guided by the most recent IPCC guidance and guidelines, as adopted or encouraged by the COP ... as a basis for estimating anthropogenic forest-related greenhouse gas emissions by sources, and removals by sinks, forest carbon stocks, and forest carbon stock and forest-area changes"

This paragraph changes the guidance given in paragraph 1 of 4/CP.15 into a decision.

Paragraph 3:

"Also decides that robust national forest monitoring systems should provide data and information that are transparent, consistent over time, and are suitable for measuring, reporting and verifying anthropogenic forest-related emissions by sources and removals by sinks, forest carbon stocks, and forest carbon stock and forest-area changes resulting from the implementation of [REDD+] activities ... consistent with guidance on measuring, reporting and verifying nationally appropriate mitigation actions by developing country Parties agreed by the COP, taking into account methodological guidance in accordance with decision 4/CP.15"

This paragraph formalises more of the earlier guidance into decisions, and emphasises the importance of following the guidance on MRV set out in 1/CP.13 in relation to Nationally Appropriate Mitigation Actions (NAMAs).

Paragraph 4:

■

"Further decides that national forest monitoring systems ... should:

● Build upon existing systems, as appropriate;

● Enable the assessment of different types of forest in the country, including natural forest, as defined by the Party;

● Be flexible and allow for improvement;

● Reflect, as appropriate, the phased approach as referred to in decision 1/CP.16, paragraphs 73 and 74"

This paragraph emphasises that a NFMS for REDD+ has no fixed formula, will develop according to national circumstances and will, for most countries, not start from scratch.

Decision 14/CP.19: Modalities for measuring, reporting and verifying:

Paragraph 3:

■

"Decides that the data and information used by Parties in the estimation of anthropogenic forest-related emissions by sources and removals by sinks, forest carbon stocks, and forest carbon stock and forest-area changes...should be transparent, and consistent over time and with the established forest reference emission levels and/or forest reference levels..."

This paragraph describes the quality of data that must be used in MRV for REDD+.

Paragraph 4:

■

"Agrees that ... the results of the implementation ... of [REDD+] activities, measured against the forest reference emission levels and/or forest reference levels should be expressed in tCO2e/year"

This paragraph describes the units in which REDD+ results should be measured

Paragraph 5:

■

"Encourages Parties to improve the data and methodologies used over time, while maintaining consistency with the established or, as appropriate, updated, forest reference emission levels and/or forest reference levels ..."

This paragraph indicates that many countries are not expected to have advanced methods and datasets to begin with, but that this should not prevent them from initiating efforts to develop a NFMS for REDD+.

Paragraph 6:

■

"Decides that ... the data and information referred to in paragraph 3 above [the data for REDD+] should be provided through the biennial update reports by Parties ..."

This paragraph describes the means through which countries should report REDD+ results.

Paragraph 7:

■

"Requests developing country Parties seeking to obtain and receive payments for results-based actions, when submitting the data and information referred to in paragraph 3 above, through the biennial update reports, to supply a technical annex..."

This paragraph indicates that when countries report on their REDD+ results, they should describe, in a technical annex, how they conducted their measurements. As with REDD+ in general, however, this is on a voluntary basis, so if a country is not seeking REDD+ payments it does not have to submit a technical annex.

Paragraph 10:

■

"Also decides that, upon the request of the developing country Party seeking to obtain and receive payments for results-based actions, two LULUCF experts from the UNFCCC roster of experts, one each from a developing country and a developed country Party, will be included among the members selected for the technical team of experts"

This paragraph describes how the verification of REDD+ results will be carried out.

Annex: Guidelines for elements to be included in the technical annex referred to in paragraph 7

This annex lists the elements that a country should include in its report on REDD+ results:

1. Summary information from the final report containing each corresponding assessed FREL/FRL (described in **described in the module on Forest Reference [Emission] Levels**);

2. Results are expressed in tCO_2e/year, consistent with the assessed FREL/FRL;

3. Demonstration that the methodologies are consistent with those used to establish the assessed FREL/FRL;

4. A description of national forest monitoring systems and the institutional roles and responsibilities for measuring, reporting and verifying the results;

5. Necessary informatiwon that allows for the reconstruction of the results;

6. A description of how the elements contained in Decision 4/CP.15, paragraph 1(c) and (d), have been taken into account.

Table 2 **Summary of COP decisions regarding NFMS**

Agreement	Summary
UNFCCC: Text of the Convention (1992), Article 4: Commitments:	Parties will publish and make available national inventories of anthropogenic sources and removals by sinks, using similar methods.
Bali Action Plan (2007)	All parties are encouraged to reduce their GHG emissions in ways that are measurable, reportable and verifiable. Capacity building should be supported
Copenhagen (2009)	Emissions from forests should be reported according to IPCC guidelines. NFMS should be established using consistent methodologies.
Cancun (2010)	NFMS is one of the four key elements of REDD+ and should be developed through a phased approach.
Warsaw (2013)	Formalises earlier guidance into decisions, describes the quality of NFMS required for measurement of REDD+ results, and the methods of reporting and verification.

Implementing a NFMAs noted above, a NFMS is a system for monitoring and measuring changes in forest-related land use in a country, and for developing data showing the resulting levels of greenhouse gas (GHG) emissions and removals. As such, it is central to the assessment of REDD+ activities.

IPCC Guidelines

The IPCC has developed detailed methodological guidance on compiling national GHG-I encompassing all land-use types, including forests. The UNFCCC has decided that this guidance should be considered when implementing a NFMS for REDD+.

Thus countries implementing REDD+ should use the Good Practice Guidance for Land Use, Land-Use Change and Forestry, which was adopted in 2003, and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

There are a number of tools to support these guidelines and which can help countries implement NFMS methodologies and calculate greenhouse gas emissions. For example, the Emission Factor Database (EFDB) is a repository of EFs for use in REDD+ reporting. It is available via the homepage of the Task Force on Greenhouse Gas Inventories.

How the IPCC Guidelines help

The IPCC guidelines are designed to help countries produce accurate national or sectoral GHG-I. Countries should neither over- nor under-estimate emissions, as far as can be judged, and reduce uncertainties as far as possible.

Specifically, the guidelines help to develop a GHG-I that is:

1. Transparent

2. Well-documented

3. Consistent over time

4. Complete

5. Comparable

6. Subject to quality control and assurance

They also help countries to use their resources efficiently, and to produce a GHG-I that will become increasingly accurate over time, as more information becomes available.

Categorizing land-use

Land-use categorization provides the basis for the land-use monitoring that can measure changes and provide the data needed to estimate GHG emissions, including those related to forests.

The IPCC divides land into six categories, based on how it is used:

1. Forest land
2. Grassland
3. Cropland
4. Wetland
5. Settlement
6. Other land

Each land-use category is further disaggregated to reflect past and current land use. For example, under forest land there are the sub-categories:

● Forest land remaining forest land

● Grassland converted to forest land

● Cropland converted to forest land, etc.

Land-use categories and sub-categories may be further sub-divided according to land-use practices or biophysical characteristics of the land. For example, forest land can be sub-divided by forest type as follows:

● Lowland tropical forest

● Mangroves, etc.

This categorisation can be represented by a land stratification 'tree' such as the one in Figure 3 produced for Mongolia.

Figure 3 Mongolia categorization of land
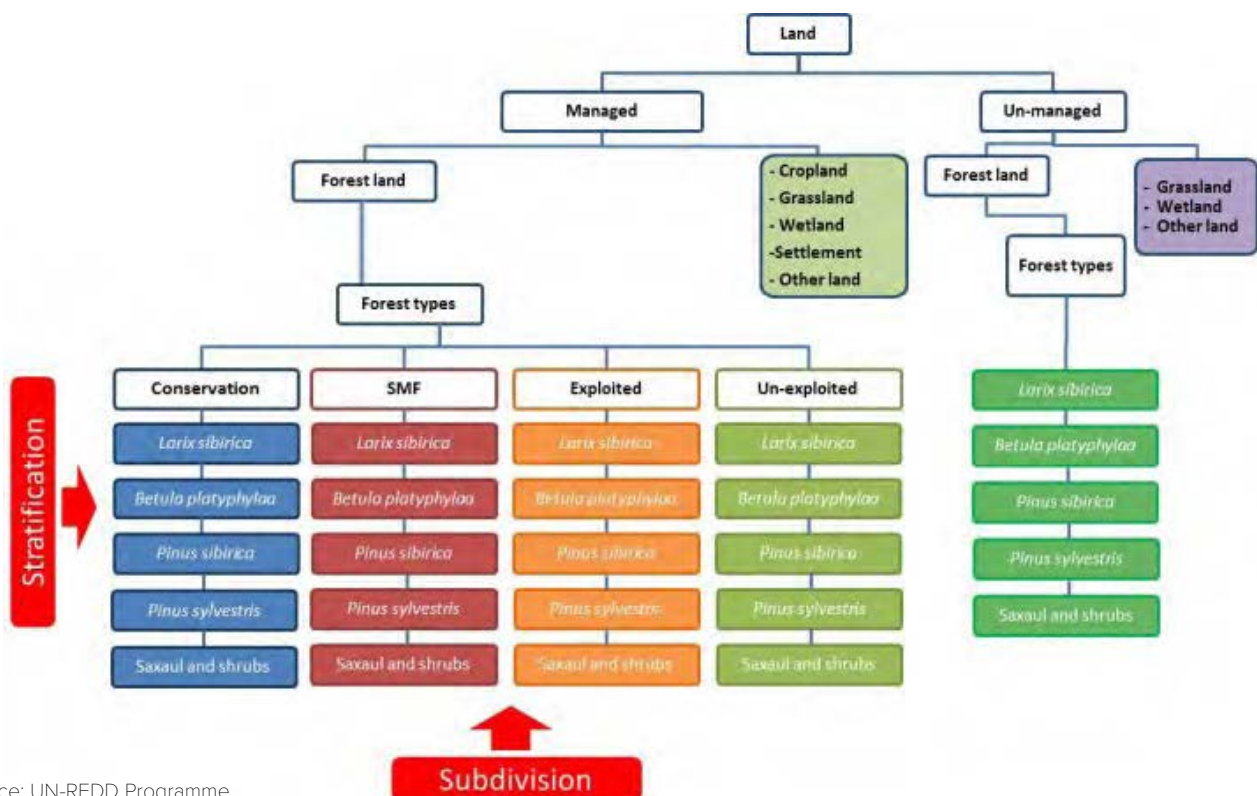
Source: UN-REDD Programme

It is important when designing and maintaining systems for land-use categorization that they are:

● **Adequate**: capable of representing land-use categories, and conversions between land-use categories, as needed to estimate carbon stock changes and greenhouse gas emissions and removals;

● **Consistent**: capable of representing land-use categories consistently over time, without being unduly affected by artificial discontinuities in time-series data;

● **Complete**: that all land within a country should be included, with increases in some areas balanced by decreases in others, recognizing the bio-physical stratification of land if needed; and

● **Transparent**: data sources, definitions, methodologies and assumptions should be clearly described.

Key categories

Countries should identify land-use categories that are particularly significant in terms of greenhouse gas emissions. Categories may be regarded as key if:

● The absolute level of emissions is high in comparison to other categories;

● Emissions are increasing or decreasing fast; and

● There is a degree of uncertainty regarding the level or trend of emissions.

Identifying key categories helps to prioritize the allocation of effort and resources, to make sure that there is better data for these categories. There are also reporting implications for key categories in terms of which tier should be used, as explained in more detail below.

National Forest Inventories

A National Forest Inventory is a detailed periodic survey of the extent, type and quality of forest in a country. For NFMS, an NFI provides data on the carbon stocks held in forested land. These can be used to generate the EFs needed to calculate emissions from changes in forest cover. Governments can also use NFI data also for monitoring and for national and sub-national decision-making.

The IPCC guidelines link NFIs to GHG reporting requirements. When GHG reporting is done at Tier 2 or Tier 3 levels (these terms are explained in the following section on reporting), the NFI must contain:

● Country-specific estimated EFs;

● Inventory data based on multiple time periods;

● Uncertainty analysis of the data within the inventory;

● Quality Assurance and Quality Control (QA/QC) measures taken to ensure accuracy, consistency and reliability of the data.

REPORTING ON GREENHOUSE GAS EMISSIONS AND REMOVALS

Having explained the role of the IPCC guidelines and of NFIs, the Measurement, Reporting and Verification (MRV) function (see Figure 4) will now be examined in detail.

Figure 4 Measurement, reporting and verificiation
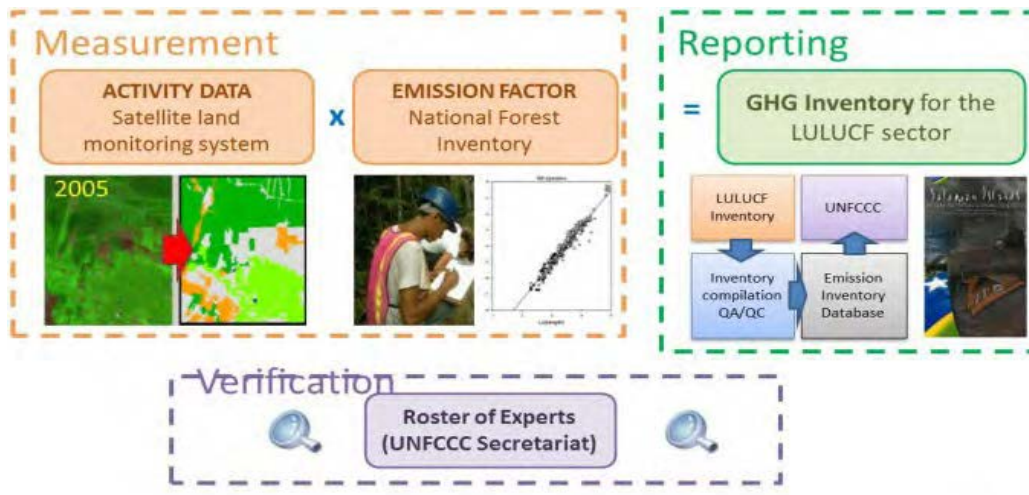
Source: UN-REDD Programme

Figure 5 shows the MRV reporting cycle for GHG emissions estimates under REDD+, summarizing the process of gathering, processing, submitting and verifying forest monitoring data.
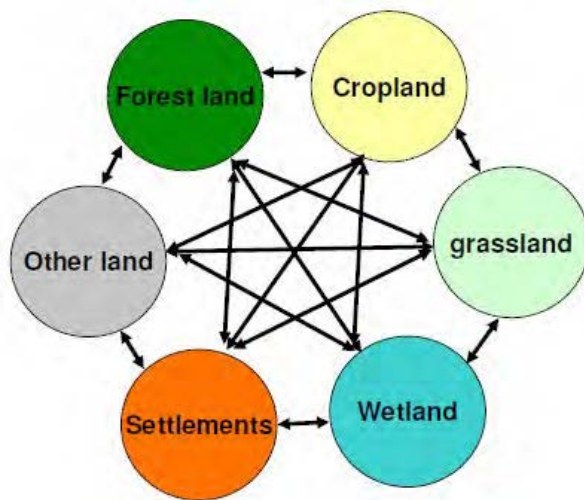
Figure 5 MRV reporting cycle for REDD+
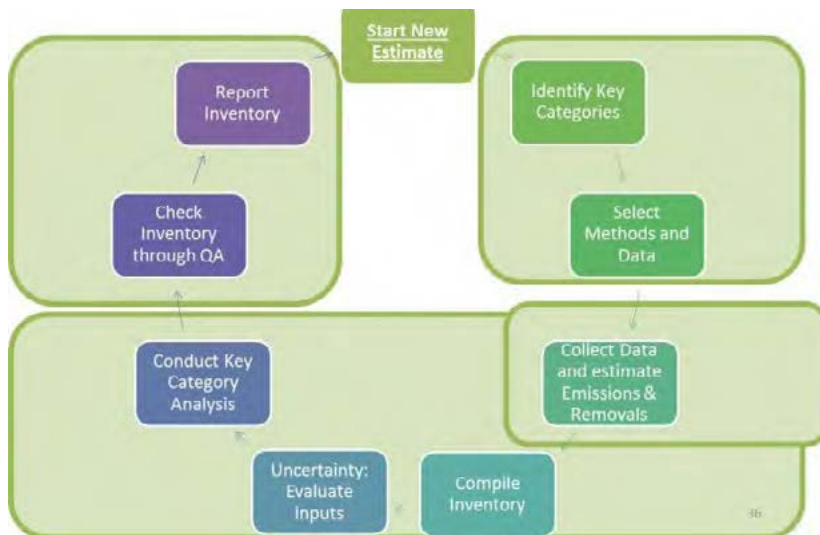
Source: UN-REDD Programme

REFLECTION POINT

Do you know if a National Forest Inventory has been completed in your country?

The ultimate aim of a NFMS is to make reliable estimates of GHGs being emitted into and removed from the atmosphere by a country's forests. The challenge with this activity is that land-use is constantly changing, as illustrated in Figure 6. As an area of land changes from one use to another its net emissions will also change, so the crucial issue with NFMS is keeping accurate records of area of each land use type.

IPCC guidance is that countries should characterize and account for all relevant land areas consistently and as transparently as possible and the data should reflect the historical trends in land-use area.

The IPCC 2003 LULUCF Guidance suggests three approaches:

- Approach 1: Basic land-use data (land-use types at times 1 and 2)

- Approach 2: Survey of land-use and land-use change (changes from and to a category)

- Approach 3: Geographically explicit land-use data (known locations of changes between categories)

In most developing countries the only way to represent land use in a consistent and transparent way with a historical timeframe of 20 years is the use of satellite remote sensing data, which allows the adoption of Approach 3.

Following Approach 3, gathering geographically-explicit land-use data requires spatially explicit observations of land-use and land-use change, for example as shown in Figure 7.

Figure 6 Land use interactions

Source : UN-REDD Programme

Figure 7 Geographically explicit land use data
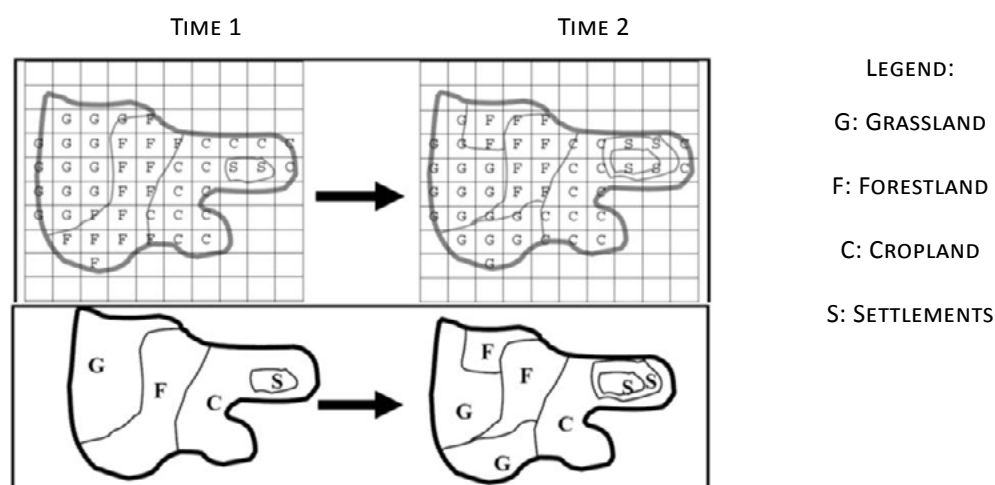
This data may be obtained either by:

- Sampling geographically located points

- A complete tally (wall-to-wall mapping)

- A combination of the two

This method is comprehensive and relatively simple conceptually, yet is data-intensive to implement. There is a range of tools available that can be used to gather, analyse and present data.

- Satellite remote sensing is cost-effective for covering large areas

- A web-GIS portal makes it possible to visualize and transparently share data, including results from the implementation of REDD+ policies

Figure 8 shows, as an example, a web site set up by the government of Papua New Guinea showing results from its monitoring program for REDD+. (More of the data can be seen at http://png-nfms.org/portal/)

Figure 8 **Example of a web-GIS portal in Papua New Guinea**

Users can easily interact with the data, for instance manipulating data layers to select specific areas or layers of interest, or to download statistics. They can also provide feedback on the content.

Role of Local communities and indigenous people in Monitoring

Community monitoring can allow for bottom-up validation of satellite data, and the incorporation of local knowledge into national monitoring. With proper capacity building, engaging indigenous people and local communities in monitoring can build support for REDD+ and promote its effective implementation. Additionally, gender-differentiated needs, uses, skills, and knowledge of forests can provide

critical data that can inform forest monitoring systems. For example, women, given their roles in communities and use of forests, tend to often have highly specialized knowledge of forests in terms of species diversity and management, and thus can help play a vital role in forest monitoring. However, women (as well as other marginalized groups, such as youth, poor, disabled, etc.) often face social, economic and cultural inequalities and legal impediments that limit their engagement in such activities. Therefore, in such community-based monitoring approaches, it is key to ensure that women, men and youth are equitably involved and can meaningfully participate. Doing so can help contribute to the robustness of local forest monitoring systems and increase ownership and sustainability of REDD+.
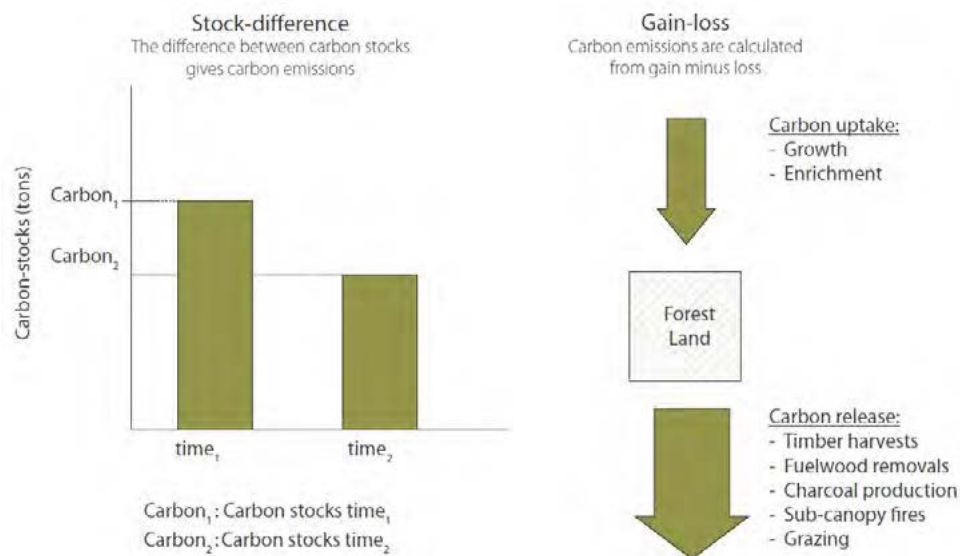
REFLECTION POINT

What technologies does your country use to support forest monitoring?

Measuring carbon stored

There are two ways of measuring changes in the amount of forest carbon. These are summarised in Figure 9.

Figure 9 Two ways of measuring forest carbon

Source: UN-REDD Programme

In the stock-difference method, it is required to know the amounts of carbon present at both times 1 and 2. The change is then simply the difference between the two figures. Although this is simple, most developing countries do not have inventories of carbon at two different times, so instead they almost all use the gain-loss method.

The gain-loss method starts with the figure for the current carbon stock based on a recent NFI, and then estimates:

● Losses due to harvesting, fuel wood removal, charcoal production, sub-canopy fires, grazing, etc

● Gains due to growth and forest enrichment.

Then, the net gain or loss to the current carbon stock figure is added.

This process, of course, relies on data held in the NFI, which shows how important it is that NFI data contains reliable data on:

● Diverse ecological conditions and/or management regimes

● Emissions and removals due to human activity

● Changes in all five carbon pools wherever possible (above-ground biomass, dead wood, soil organic carbon, litter and below-ground biomass)

When the data on land use and changes is entered into a GHG Inventory spreadsheet (such as the one shown in Figure 10), and combined with relevant emission and removal factors, it is possible to calculate the implied emission or removal.

Figure 10 GHG Inventory spreadsheet example

Source: UN-REDD Programme

Determining emission factors

One challenge that countries face when carrying out forest monitoring activities is deciding on emission factors. The guidelines help with this by providing three tiers for reporting:

- Tier 1 –uses IPCC methodology with internationally-derived emission factors
- Tier 2 – applies country- or region-specific

emission and removal factors for the most important land-use categories, then uses IPCC default assumptions and methodology

- Tier 3 – uses country-specific assumptions, methodology and data (which are subsequently reviewed).

This is summarized in table 11.

Table 11 Emission factors

| Emission / Removal Factor	Tier 1	Tier 2	Tier 3
Annual biomass growth rate	• Default values from IPCC 1996GL and GPG2003 • Emission Factor Data Base (EFDB)	• Default values from IPCC 1996GL and GPG2003 • Country-specific data • EFDB	• National Forest Inventory or modelling approaches • Allometric equations
Carbon fraction of dry matter	• Default data of 0.5	• Default data of 0.5	• Species-specific data from laboratory estimations
Biomass Expansion Factor (BEF)	• Default values of 1.8	• Default values of 1.8 • National data for key forest types	• Species-specific data from measurements

Source : UN-REDD Programme

It is possible to use a combination of tiers and methods. For example, in the LULUCF sector, different tiers can be used:

● For different land-use categories (e.g. tier 2 for forest land and tier 1 for grassland); and

● Within a given land-use category for different carbon pools (e.g. tier 1 for below-ground biomass and tier 2 for above-ground biomass).

When using higher tiers, countries need to provide additional documentation to support decisions to use more sophisticated methodologies or country-defined parameters.

Higher tiers should be adopted for key land use categories (wherever possible) together with the use of country-specific and climatic region-specific emission and removal factors. Figure 12 summarizes some of the issues associated with linking categories and tiers. Using Tiers 2 and 3 increases the accuracy and reduces uncertainty but also makes the process more expensive, whereas adopting a Tier 1 approach makes the process more feasible.

Figure 12 Issues associated with linking categories and tiers
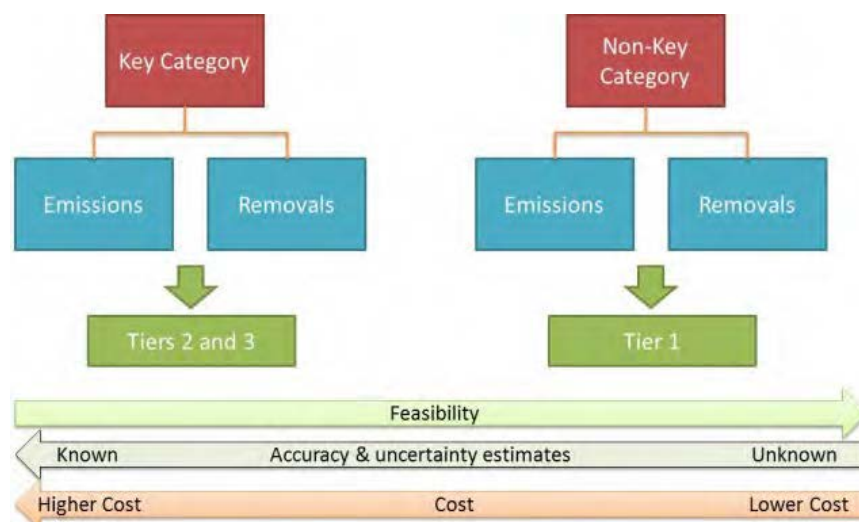
Source : UN-REDD Programme

Reporting for REDD+

There are clearly defined processes for reporting on REDD+ progress. These processes have been designed to make sure that the reporting is:

● **Transparent** – there is sufficient clear documentation showing how the inventory was compiled, following good practice requirements;

● **Complete** – estimates are reported for all sources, sinks and gases;

● **National in coverage**;

● **Comparable** – reporting should follow international guidance and templates;

● **Consistent** – consistent with IPCC guidance and guidelines (such as Forest Reference [Emission] Levels);inventories should aim to reflect the real fluctuations in emissions and removals, and not be subject to changes

resulting from methodological differences;

● **Accurate** – the GHG-I contains neither under-nor over-estimates so far as can be judged, and efforts have been made to reduce bias.

There are two ways for countries to report to the UNFCCC on progress with REDD+. Both are channels for communicating a country's overall GHG emissions and mitigation efforts:

1. **National Communications** (NC), which include data and information on:

● National circumstances

● Vulnerability assessment

● Financial resources and technology transfer for climate change

● Education, training, public awareness

● National GHG inventory

2. Biennial Update Reports (shortened to BUR), to which a country may add a Technical Annex of results from the implementation of REDD+ activities in order to access REDD+ finance.

The aim of a BUR is to provide an update on the most recently submitted National Communication in the following areas:

- National circumstances and institutional arrangements;
- National GHG inventory;
- Mitigation actions and their effects, including methodologies;
- Constraints and gaps and related financial, technical and capacity needs;
- Level of support received to prepare and submit the BUR;
- Domestic measurement, reporting and verification.

GIZ has developed guidelines and a template for preparing a BUR[1].

Quality control of country reports

After submission, reports are subjected to a thorough quality control and assurance process.

For quality control, there are routine and consistent checks to identify and address errors and omissions, ensure data integrity, correctness and completeness. Inventory material is documented and archived, and a record is made of all QA activities.

For QA, reviews should be carried out on a finalized inventory following the implementation of the QC procedures, and this should preferably be done by independent third parties.

Verification

During the final verification stage, two LULUCF experts assess the technical annex of the BUR following the International Consultation and Analysis (ICA) process, and then prepare a technical report reflecting their assessment. This report will include an analysis of the results in the annex and areas identified for improvement. The technical assessment includes the possibility of discussions with the country for clarifications.

A final report by the LULUCF experts, including comments from the country, is then published on the UNFCCC REDD+ web platform.

REFLECTION POINT

The NFI plays an integral part in the MRV process and it therefore requires reliable data. In different country contexts there are going to be different challenges. What do you believe are the challenges associated with the NFI and the data it requires in your country? Do you have any lessons to share from your country's experience?

REFLECTION POINT

Your country may be reporting to the UNFCCC on a number of possible mechanisms. What is your country's experience with the UNFCCC reporting processes?

✎ EXERCISE

Both of the following multiple choice exercises refer to UNFCCC COP 19 decisions (Warsaw, 2013):

Multiple choice quiz – NFMS and the UNFCCC. The Warsaw Framework for REDD+. Decision 14/CP.19.

With reference to the text for Decision 14/CP.19 (Modalities for measuring, reporting and verifying), answer the following questions (complete the exercise individually then compare your answers with your neighbour)

a

b

c
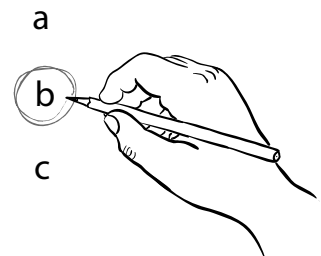
i. What should be Measured Reported and Verified (MRV):

   a. Anthropogenic forest-related greenhouse gas emissions by sources and removals by sinks

   b. Forest carbon stocks

   c. Forest carbon stock changes

   d. Forest area changes

   e. All the above

ii. REDD+ MRV systems should be consistent with:

   a. MRV systems for Nationally Appropriate Mitigation Actions

   b. Landsat

   c. NGOs

   d. All the above

iii. REDD+ MRV systems should be:

   a. Transparent

   b. Consistent with a countries established Forest Reference Emission Level (FREL)

   c. Used to maximize REDD+ payments

   d. Answers a and b above

iv. REDD+ MRV reporting is:

   a. Voluntary

   b. Mandatory

   c. Required for results-based payments under the UNFCCC

   d. Answers a and c above

v. REDD+ MRV reporting should be done through:

   a. NGOs

   b. A technical annex to Biennial update reports to the UNFCCC

   c. Wikipedia

   d. All the above

✎ EXERCISE

Multiple choice quiz – NFMS and the UNFCCC. The Warsaw Framework for REDD+.   Decision 11/CP.19.

With reference to the text for Decision 11/CP.19 (Modalities for national forest monitoring systems), answer the following questions (complete the exercise individually then compare your answers with your neighbour):
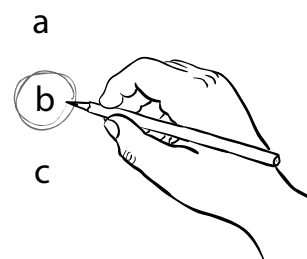
i. National Forest Monitoring Systems should be guided by:

   a. Intergovernmental Panel on Climate Change

   b. The Kyoto Protocol

   c. The United Nations Convention on Biodiversity and Desertification

   d. All the above

ii. National Forest Monitoring Systems should be:

   a. Transparent

   b. Consistent over time

   c. Suitable for Measurement Reporting and Verification (MRV)

   d. All the above

iii. National Forest Monitoring Systems should be:

   a. Applied at a regional level

   b. Applied at a national level

   c. Applied sub-nationally as an interim measure (moving to a national system)

   d. Answers b and c

iv. National Forest Monitoring Systems should be:

   a. Built on existing systems

   b. Flexible and allow for improvement

   c. Enable the assessment of different types of forest in the country

   d. Reflect the phased approach to REDD+

   e. All the above

🔍 KEY MESSAGES

- A NFMS is one of the four elements that countries are required to develop in order to participate in REDD+ under the UNFCCC;

- There are two functions to a NFMS: measuring, reporting and verification (MRV) of REDD+ and forest monitoring;

- The technical pillars of the NFMS are Satellite Land Monitoring Systems, National Forest Inventory and GHG Inventory;

- The IPCC has developed a number of guidelines that can be used to help countries implement NFMS.

✏️ WHAT FURTHER QUESTIONS DO YOU HAVE ABOUT THIS TOPIC?

✎ NOTES

References and resources

- IPCC (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme. Eggleston, H.S., Buendia, L., Miwa, K., Ngara, T. and K. Tanabe (eds). IGES, Japan. Available at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

- 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., and F. Wagner (eds). IGES, Japan. Available at: http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html

Web resources

- Task Force on National Greenhouse Gas Inventories, at http://www.ipcc-nggip.iges.or.jp/public/index.html. The site, hosted by the IPCC, gives access to technical materials and tools including the Emission Factor Database (EFDB).

- REDD+ Web Platform, at http://redd.unfccc.int/. The UNFCC's hub for sharing information and lessons learned about REDD+ activities.

- UNFCCC website, at https://unfccc.int/2860.php (not unfccc.int). A source of information on the convention and, in its 'Land Use and Climate Change' section, on REDD+. The IPCC guidance on compiling greenhouse gas inventories can also be found at https://unfccc.int/land_use_and_climate_change/redd_web_platform/items/6734.php

- UN-REDD Programme, at: http://www.un-redd.org/, and its Collaborative Online Workspace, at http://www.unredd.net/. Provides resources and a discussion forum to support countries engaged in REDD+ and promote stakeholder engagement.

- Wageningen University, GOFC-GOLD, World Bank FCPF, 2015. REDD+ training materials, including on forest monitoring, at https://www.forestcarbonpartnership.org/redd-training-material-forest-monitoring.
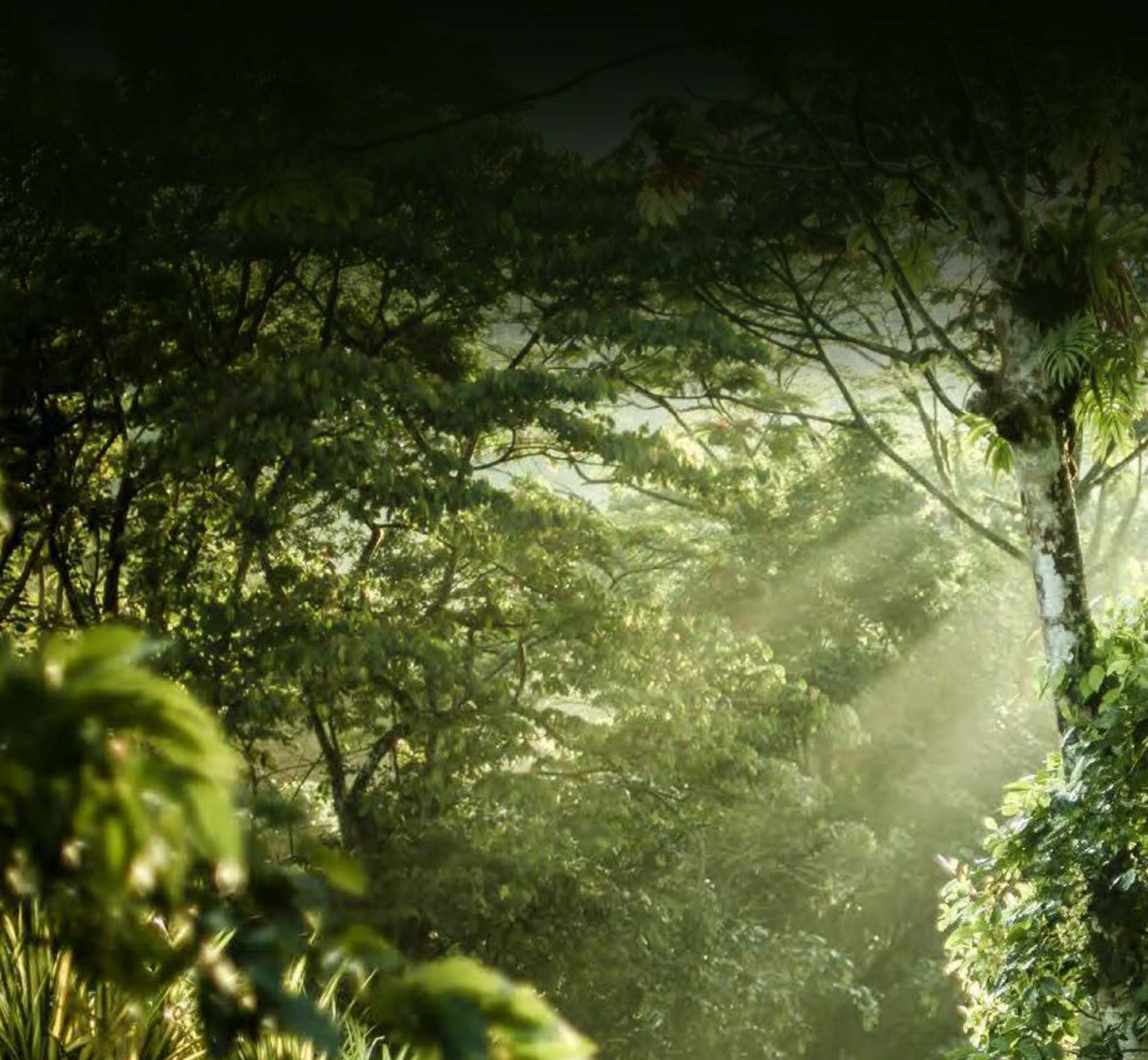
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PROGRAMME

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UNDP
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UN environment

unitar
United Nations Institute
for Training and Research