

Expert Workshop on Strengthening the Global Core Set of Forest Indicators to support the implementation of the 2030 Agenda and the UN Strategic Plan for Forests 2030,
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“Progress, status and needs for further developing methodologies and data availability on Global Core Set of forest-related indicators, classified as Tier 3 and Tier 2.”

Background Paper

*Monica Madrid Arroyo
International Consultant
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Acronyms and abbreviations

ABT	Aichi Biodiversity Targets
ASD	Agenda for Sustainable Development
CGIAR	Consultative Group for International Agricultural Research
CIFOR/ICRAF	Center for International Forestry Research and World Agroforestry
COFO	FAO Committee on Forestry
CPF	Collaborative Partnership on Forests
EWS	Expert Workshop
FAO	Food and Agriculture Organization of the United Nations
FIES	Food Insecurity Experience Scale
FLEGT	Forest Law Enforcement, Governance and Trade
FPS	FAO Forest Products and Statistics
FRA	Forest Resource Assessment
GCF	Governors' Climate and Forests Task Force
GCS	Global Core Set
GFA	Global Framework for Action
GFFFN	Global Forest Financing Facilitation Network
GFG	Global Forest Goals
GHG	Green House Gases
GOF	Global Objectives on Forests
HLPE	High-Level Panel of Experts
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IPM	Multidimensional Poverty Index
IRENA	International Renewable Energy Agency
IRES	International Recommendations for Energy Statistics
ISIC	International Standard Industrial Classification of All Economic Activities
JWEE	Joint Wood Energy Enquiry
NBI	Unsatisfied Basic Needs
NFM	National Forest Monitoring
NFMS	National Forest Monitoring System
NSS	National Statistical Systems
OECD	Organization for Economic Cooperation and Development
OLADE	Organización Latinoamericana de Energía
OLI	Organization-Led Initiative
OPHI	Human Development and Poverty Reduction Initiative
PROFOR	The WB Program on Forests
SDG/IAEG	Expert Group on SDG Indicators
SDGs	Sustainable Development Goals
SEEA	System of Environmental-Economic Accounting
SFM	Sustainable Forest Management
UNDP	United Nations Development Program
UNECE	United Nations Economic Commission for Europe
UNESC	United Nations Economic and Social Council
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
UNFI	United Nations Forest Instrument
UNSD	United Nations Statistical Division
UNSPF	United Nations Strategic Plan for Forests
VPA	Voluntary Partnership Agreements
WB	World Bank
WCA	World Census of Agriculture

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Executive Summary

A Global Core Set (GCS) of indicators for the study of any subject is considered an important instrument for data production, compilation, organisation and dissemination at an international and national level. The Collaborative Partnership on Forests (CPF)¹ started in 2016 a joint work for proposing a concise GCS of forest-related indicators to measure progress towards Sustainable Forest Management (SFM)², the United Nations Strategic Plan for Forests (UNSPF) and its Global Forest Goals (GFGs) and associated targets, the 2030 Agenda for Sustainable Development³ and the report of the Aichi Biodiversity Targets, Land Degradation Neutrality, the Paris Agreement and other international forest-related commitments and goals. The result was a set of twenty-one indicators on the economic, social and environmental dimensions of sustainability.

In 2018, the twenty-fourth session of FAO Committee on Forestry (COFO) as well as the thirteenth session of the United Nations Forum on Forests (UNFF) encouraged continued work on the further development of Tier 2 and Tier 3 indicators. The CPF took up the task of further development of these indicators and continue to report on progress in that regard.

Of the twenty-one indicators of the GCS forest indicators set, twelve have been classified in Tier 1, constituting those indicators that currently are reported periodically by the countries to the Forest Resources Assessment (FRA) or to different forest information systems and whose production does not represent methodological challenges for National Statistical Offices (NSOs) or Government agencies in charge. While five indicators were classified in Tier 2 and four in Tier 3. These Tier 2 and Tier 3 indicators, present in general, certain challenges in the sense they require additional efforts since data is not available or the development of sound methodologies and data sources is required at some level.

As part of the activities planned for the advancement of the GCS, an Expert Workshop (EWS) is held to discuss and make progress on five of the Tier 2 and Tier 3 indicators, primarily those that deal with socio-economic and financial aspects (indicators 10, 12, 13, 14 and 15).⁴ This document is part of the general information prepared to guide and enrich discussions that will take place at the meeting.

Following the structure of the metadata sheets used by the Inter-agency and Expert Group on Sustainable Development Goals Indicators (SDG/IAEG), a brief analysis of the progress, status and needs of the GCS indicators classified as Tier 2 and Tier 3 was developed. For each area of the metadata sheets, an assessment was made (concepts and definitions, methodology, data availability, data sources, data providers, data compilers and calendar). Based on information available, each area was analyzed according to ratings such as fully adequate, when data collection methods were assessed as complete and data were available; adequate, when adjustments/improvements could be proposed and inadequate, when further work is still required, both on methods or data collection.

¹ The CPF is an informal, voluntary arrangement among fifteen international organizations and secretariats with substantial programmes on forests. These agencies share their experiences and build on them to produce new benefits for their respective constituencies. They collaborate to streamline and align their work and to find ways of improving forest management and conservation and the production and trade of forest products. More information can be found at <http://www.cpfweb.org/en/>.

² The UN describes SFM as “[a] dynamic and evolving concept [that] aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations” (Resolution A/RES/62/98). According to FAO (2018d), forest management is the process of planning and implementing practices for the stewardship and use of forests and other wooded land to meet specific environmental, economic, social and cultural objectives. It deals with the overall administrative, economic, legal, social, technical and scientific aspects related to natural and planted forests. It may involve varying degrees of deliberate human intervention, ranging from actions aimed at safeguarding and maintaining forest ecosystems and their functions, to those favouring specific socially or economically valuable species or groups of species for the improved production of forest goods and services.

³ The 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) set out the international community’s commitment to rid the world of poverty and hunger and achieve sustainable development in its three dimensions – economic, social and environmental.

⁴ The document also contains a brief introduction on the status of four GCS indicators (indicators 3, 6, 7 and 21) that are mostly related to biophysical characteristics of forest. However, the EWS’s discussions will not address these indicators.

Data required for the construction of the GCS of forest indicators classified as Tier 2 and Tier 3 will be the result of the interaction between diverse agencies within the NSS and of the utilization of existent data. In addition, the combination of other existing sources such as administrative records and tools e.g. modelling methods, remote sensing and geospatial technology will be essential for the population of the GCS of forest indicators. Considering what is recommended in the international manuals for implementing statistical operations, an analysis of how countries have been producing forestry data through population and agriculture censuses, National Forest Monitoring Systems, household, agriculture and forestry surveys, was made.

In general, the analysis results show that while countries could report indicator 10 by using available international methodology and energy statistics available in global databases, gaps in production and consumption of wood energy at household level remain. To address those gaps countries are encouraged to revise the estimates available in international databases and complete this information with data produced in country studies. In the case of indicator 12, the report depends on the decision of continuing to reporting as it has been doing in the FRA or to move to the employment concept. Countries already produce data on employment by following ILO international standards though it is advisable to revise if existent surveys samples cover the employment in the forest sector.

To move forward with indicator 13, the selection of both the definition of forest-dependent people and the method to measure extreme poverty in forest-dependent people is required. Equally, a methodological assessment will need to be carried out to explore how best to integrate different data sources along the two dimensions. For indicator 14 is necessary to cover all contributions of forest to food security and nutrition (FSN). In this case, the approach of having sub-indicators for each type of contribution needs to be further analyzed along with the need to develop a methodology on the measurement of contributions of forest to FSN.

Lastly, indicator 15 could be operative by using the definition as the financial resources that contribute directly or indirectly, explicitly or implicitly, to sustainable management of any type of forests or trees outside of forests. The challenge of this indicator is to track the financial flows that fall in the three categories identified as SFM financing. The report on indicator 15 could start by using the OECD/DAC dataset; countries also need to assess the availability of data on government expenses in the forest sector. Private financing information collection and compilation needs to be further analyzed.

Introduction: context and purposes

Forests and trees play vital social and economic functions, including the provision of goods and services, such as food income and employment. These are necessary conditions to advance inclusive and sustainable economic growth. They also provide ecosystems services that are critical for the wellbeing of humanity (UNFF, 2019, p.8).

Evidence is key to opening up forest pathways to sustainable development. In recent years, there have been many developments on measuring progress towards sustainable development and SFM, with mechanisms being put in place to fulfil the mandates of a wide variety of global and regional organizations. All this is being done with the interest of finding truly evidence-based, policymaking, and improved communication at all levels.

Original ideas about the creation of a core set of forest indicators were born within the XIV World Forestry Congress in 2015. Later, in 2016, international experts met to strengthen collaboration on criteria and indicators for the sustainable management of the world's forests. The focus of that meeting was how to work together to mobilize the full potential of criteria and indicators to promote and demonstrate sustainability in view of the Sustainable Development Goals (SDGs).

Since then, a mechanism for review and follow-up of the 2030 Agenda and the SDGs contained therein has been implemented. In addition, the International Arrangement on Forests (IAF)⁵ has been reviewed; and the vision, objectives and the Four-Year Programme of Work have been under discussion while the planning of the next global Forest Resource Assessment (FRA 2020) was started.

The significant interest in finding major synergies between all these processes and streamlining global reporting on forests constituted the foundation of the Organization-Led Initiative (OLI). The OLI is a joint effort of all members of the CPF. Through this organization, an open, informal, transparent and informed discussion on a common and concise set of global forest indicators for supporting the implementation of the 2030 Agenda and the emerging UNSPF (2017-2030), was initiated.⁶

The OLI has focused its work on identifying the main users and producers of forest-related information. Likewise, a need for both providing sufficient evidence on why to develop a GCS of forest-related indicators and identifying the major obstacles to develop a comprehensive global set of forest indicators was identified by the OLI. Such group also has identified the requirements for a GCS of forest-related indicators, focusing on the measurement of the progress towards SFM and the UN Forest Instrument⁷ and all the requirements evidenced in other international agreements.

Therefore, through the combination of all suggestions and the analysis done, the OLI has come up with the first proposal of a GCS of forest-related indicators. This proposal was submitted for consultation between agencies, the OLI participants and other stakeholders; with the aim of agreeing on a global core set of indicators, and presenting it for review to the United Nations Forum on Forests (UNFF), the SDG/IAEG, the FRA Advisory Group, and relevant bodies under the Rio conventions.⁸

In January 2017, during the special session of the UNFF, the UNSPF 2017-2030 was adopted. The UNSPF provides a global framework for action at all levels to sustainably manage all types of forests and trees outside forests and to halt deforestation and forest degradation. It also provides a framework for forest-related contributions

⁵ The IAF has five main components: the UN Forum on Forests (UNFF) and its Member States, the UNFF Secretariat, the Collaborative Partnership on Forests (CPF), the UNFF Global Forest Financing Facilitation Network (GFFFN), and the UNFF Trust Fund. Some of the key objectives of the IAF include: Promoting implementation of SFM, in particular the implementation of the UN Forest Instrument; enhancing the contribution of forests to the post-2015 development agenda; enhancing cooperation, coordination, coherence and synergies on forest-related issues; fostering international cooperation, public-private partnerships and cross-sectoral cooperation; strengthening forest governance frameworks and means of implementation; strengthening long-term political commitment towards the achievement of SFM; enhancing coherence, cooperation and synergies with other forest-related agreements, processes and initiative. More information can be consulted at <https://www.un.org/esa/forests/documents/international-arrangement-on-forests/index.html>.

⁶ The main objectives of the OLI, were: to propose a common and concise set of global indicators for monitoring progress in achieving the forest-related targets of the SDGs and relevant goals and targets of other forest-related global processes; to provide inputs to the development of a proposal on cycle and format for reporting; to provide inputs and guidance to the process of developing FRA 2020 in order to ensure its continued relevance as a global source of forest information.

⁷ See https://www.un.org/esa/forests/wp-content/uploads/2018/08/UN_Forest_Instrument.pdf.

⁸ Documents related to the entire process followed by OLI can be consulted at <http://www.cpfweb.org/95270/en/>.

to the implementation of the 2030 Agenda and many other international forest-related instruments, processes, commitments and goals.⁹ The plan also guides the forest-related work for the UN system and provides a framework to ensure that all efforts and actions on the forest are done in a collaborative, coordinated and coherent manner.

Six Global Forest Goals and twenty-six associated targets to be achieved by 2030 represent the heart of the Strategic Plan. These GFGs and targets fully encompass and build on the solid foundation provided by the four Global Objectives on Forests included in the UN Forest Instrument. Moreover, they aim at contributing to progress on the SDGs, the Aichi Biodiversity Targets, the Paris Agreement adopted under the United Nations Framework Convention on Climate Change (UNFCCC) and other international forest-related instruments, processes, commitments and goals.¹⁰

In addition, in support of the Forum and anticipating the need for monitoring and reporting of progress towards the forest-related SDGs and targets, and possible indicators, which at the time were the draft targets for the strategic plan - the CPF continued the work on the GCS that was initiated during the OLI. As mentioned, the GCS of forest-related indicators consisted of twenty-one indicators, which addressed efficiently and comprehensively the topics identified in high-level political commitments on forests; and at the same time addressed forest-related aspects of SDG indicators, in particular, the SDG 15 "Life on Land."¹¹ To facilitate the implementation of the GCS and organize the indicators' report, they were classified in Tier 1, Tier 2 and Tier 3, based on the level of methodological development and the availability of data.

UNFF in its thirteen-session encouraged the application of the GCS indicators that were ready for use and requested the CPF to continue developing the remaining indicators and reporting on any progress in that regard to the Forum at its fourteenth session in 2019. In 2018, at its twenty-fourth session, the COFO acknowledged the progress made on the GCS and invited the Forum and the CPF governing bodies of the member organizations to consider the use of Tier 1 and Tier 2 indicators in their reporting processes. COFO requested FAO to continue working with the CPF on the further development of Tier 2, Tier 3 candidate indicators and to continue reporting on the progress in that regard. The FAO Council subsequently endorsed the GCS in December 2018.

Consequently, FAO's Forestry Department, in coordination with the UNFF, is working on assessing data availability, identifying data gaps and developing appropriate data collection methods, data analysis and reporting modalities that facilitate the production of GCS. The result of this work needs to be presented, analysed, discussed and agreed with experts worldwide during an EWS that is scheduled to be held at the FAO headquarters in October 2019.

This background paper "Progress, status and needs for further developing methodologies and data availability on GCS of forest-related indicators, classified as Tier 3 and Tier 2" seeks to identify the measurement frameworks able to produce statistically sound statistics for the construction of the GCS of forest indicators classified in Tier 2 and Tier 3. The document will be presented in the EWS as a benchmark for the participants, as well as a starting point for additional methodological work. This work also seeks to identify the major measurement gaps and outline options for improvement as well as possible additional research needs. This document does not aim to exhaustively review and discuss internationally established methodologies and available standards, or data regularly produced by countries. Instead, this review hopes to provide a general outlook on the status of the GCS of forest indicators concerning the socio-economic dimension and open the discussions that will take place in the different working groups prepared for the following days of the EWS. This background document was prepared by the consultant under the overall lead and supervision of FAO and UNFF. It does not however represent the views of either of the two organizations.

⁹ The agreement on the first-ever UN Strategic Plan for Forests was forged at a special session of the UN Forum on Forests held in January 2017 and provides an ambitious vision for global forests in 2030. The plan was adopted by the UN Economic and Social Council (UNESCO) on 20 April 2017 and was subsequently adopted by the UN General Assembly on 27 April 2017. More information is available at <https://www.un.org/esa/forests/documents/un-strategic-plan-for-forests-2030/index.html>

¹⁰ More information is available at <https://www.un.org/esa/forests/wp-content/uploads/2019/04/Global-Forest-Goals-booklet-Apr-2019.pdf>

¹¹ SDG Indicator 15 Life on land is aimed to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. More information can be consulted at <https://www.globalgoals.org/15-life-on-land>

While the background paper provides a status update for each of the Tier 2 and Tier 3 indicators, the EWS will focus on the analysis of five socio-economic GCS forest-related indicators under Tier 2 and Tier 3 classifications.

The document is structured as follows: Chapter 1 provides a brief description of the process followed in the conception of the GCS of forest-related indicators. In chapter 2, a general analysis on the status, progress and challenges associated with the production of the GCS of forest-related indicators is developed. Chapter 3 concerns the analysis of the major sources for producing the GCS on forest-related indicators. The way forward on further developing and generating data on GCS Tier 2 and Tier 3 indicators is presented in chapter 4. Finally, chapter 5 refers to the follow-up action on developing and generating data, and possible actions to enhance the use of GCS Tier 2 and Tier 3 indicators. The annexes contain tables and pertinent information related to some of the indicators and the sources to produce data for populating the indicators.

To conclude, the EWS will provide the opportunity to have in-depth discussions on the Working Group Papers prepared by the working group leaders, aiming to ensure the overall soundness of the methodological proposals. The conclusions of the EWS will guide the remaining developments related to the formulation of final methodological proposals and above all, the implementation and use of the GCS of forest-related indicators.

1. The Global Core Set of Forest-related Indicators

Generally speaking, developing a global core set of indicators for the study of any subject is considered an important instrument for the production, compilation, organization and dissemination of data at international and national level. The global core set of indicators facilitates global comparisons and it can be used as a benchmark against which the situation and capacity of countries in the production of statistics are evaluated.

However, current data requirements exceeded what any country might produce on an annual basis. In order to facilitate countries in determining the priorities of national statistical programs for collecting basic data, it is required to provide the countries with a comprehensive framework based on an item list of common statistics, which eventually could be expanded with relevant items of national interest.

Since 2016, the CPF has been working on a concise set of GCS of Forest-related indicators to measure progress towards SFM, the UNSPF and its GFGs and associated targets, the 2030 Agenda and the report of the Aichi Biodiversity Targets, Land Degradation Neutrality, the Paris Agreement, and other international forest-related commitments and goals. The CPF established a joint initiative for improving the previously proposed GCS and streamlining the forest-related reporting.

The CPF work was further strengthened in 2018 when participants of the UNFF thirteen session welcomed the progress made in developing GCS of forest-related indicators and acknowledged the value of the core set in assessing progress towards achieving the GFGs, in other internationally agreed forest-related goals and, in better focusing data collection efforts in order to reduce data duplication. Moreover, the UNFF13 encouraged member organizations of the CPF and other relevant bodies to apply those indicators from the global core set which are ready for use and requested the Partnership both to continue developing the remaining indicators and to report on progress.

According to UNFF (2018), “the aim of the GCS was not to generate another set of indicators to compete with the existing sets, each of which has its own objectives, institutional framework and geographic scope. [...] Rather, elements of the set of indicators are derived from those reporting processes, which in turn will benefit from the existence of information in a common platform. The aim is to articulate a core set with a limited number of indicators that address efficiently the topics identified by the various high-level forums and thus focus data collection efforts on the questions of the highest policy importance and avoid report duplication” (p.8).

Moreover, the GCS of forest indicators are operational and measurable targets and strengthen cost-efficient monitoring as it produces links between forestry and other sectors at national and international levels. The cross-sectoral nature of the GCS promotes institutional planning and coordination including raising awareness among policymakers and government entities. The reporting burden reduction at the national level is another functionality of the GCS, so that information is provided only once, and the same information could be held in all international data banks, contributing to avoid discrepancy of data. This characteristic is even useful to enhance coordination and collaboration between agencies working to strengthen joint understanding of metadata, validation and sharing of data.

The GCS of forest-related indicators proposed by CPF went through a series of international consultations (online and at meetings).¹² The result was a set of twenty-one indicators, that cover all the seven thematic elements of SFM,¹³ and that are distributed in topics such as economic, social and environmental.

¹² The synthesis of online consultation on GCS of forest-related indicators can be consulted at http://www.fao.org/fsnforum/activities/discussions/forestry_indicators

¹³ SFM consists of the following seven thematic elements, which are acknowledged by the UNFF and used as a reporting framework for the FRA: a. Extent of forest resources; b. Forest biological diversity; c. Forest health and vitality; d. Productive functions of forest resources; e. Protective functions of forest resources; f. Socio-economic functions of forests and g. Legal, policy and institutional framework.

These indicators were classified as Tier 1, Tier 2 and Tier 3 based on the existence of an internationally established methodology and availability of comparable data. Tier 1 indicators are those for which data can be readily collected, sound methodology is established and data is available. Tier 2 indicators are those for which a sound methodology is available but further work is needed for data collection, building on/consolidating various existing data sources. Tier 3 indicators are those for which data is generally lacking, and both methods and data collection poses significant challenges (See Table 1).

Of the twenty-one indicators, twelve have been classified in Tier 1, constituting those indicators that currently are reported by the countries periodically either to the FRA or to the different forest information systems, and whose production does not represent methodological challenges for NSOs or concerning Government agencies. These indicators are most related to the extent of forest resources, forest biological diversity, forest health and vitality, productive and protective functions of forest resources and legal policy and institutional framework.

Five of the twenty-one indicators are classified in Tier 2. These indicators pose an intermediate challenge because the indicators are conceptually clear, internationally established methodology and standards are available, but data are not regularly produced by countries.

Four indicators are classified in Tier 3. Out of the four, three are associated with socio-economic and financing aspects. These indicators are conceptually not clear, and no internationally established methodology or standards are yet available. These indicators deal with issues directly related to reporting on GFG 2.1 “about the eradication of extreme poverty for forest-dependent populations”, GFG 2.3 “on the contribution of forests and trees to food security”, and GFG 4.1 and 4.2 “about mobilizing significant resources and increasing forest-related financing from all sources”. As mentioned in the introduction, the EWS will focus on the analysis of five socio-economic GCS forest-related indicators:

Tier 2 indicators

- Indicator 10: Wood-based energy share of total final energy consumption;
- Indicator 12: Employment related to the forest sector.

Tier 3 Indicators

- Indicator 13: Number of forest-dependent people in extreme poverty;
- Indicator 14: Contribution of forests to food security;
- Indicator 15: Financial resources from all sources for the implementation of SFM.

However, this background paper also provides a brief status on the remaining indicators under Tier 2 and Tier 3 although they will not be discussed during the EWS:

Tier 2 indicators

- Indicator 3: Net Green House Gases GHG emissions
- Indicator 6: Proportion of forest area disturbed
- Indicator 21: Existence of traceability system(s) for wood products

Tier 3 indicator

- Indicator 7: Area of degraded forest

Table 1. Global Core Set of forest-related indicators according to the classification tiers and their linkages to various high-level forums

#	Indicator	Tier	Data supplier	Linkages to globally agreed goals and targets
1	Forest area as a proportion of total land area	1	FAO/FRA	Measures progress towards SDG target 15.1 and GFG 1. SDG indicator 15.1.1
2	Forest area annual net change rate	1	FAO/FRA	Measures progress towards SDG target 15.2 and target 1.1 of the UNSPF. Sub-indicator of SDG 15.2.1.
3	Net Green House Gases GHG emissions (source)/removals (sink) of forests, and carbon balance of harvested wood products	2	UNFCCC	Measures progress towards targets 1.2 and 2.5 of the UNSPF. Linkages with SDG goal 13 and measuring, reporting and verifying (Measurement, Reporting and Verification) requirements under UNFCCC.
4	Proportion of forest area located within legally established protected areas	1	FAO/FRA	Measures progress towards SDG 15.2 and targets 2.5 and 3.1 of the UNSPF and Aichi target 11. Sub-indicator of SDG 15.2.1.
5	Change in area of primary forests	1	FAO/FRA	Measures progress towards target 1.3 of the UNSPF and Aichi Target 5. Linkages with SDG goal 15.
6	Proportion of forest area disturbed	2	FAO/FRA	Measures progress towards target 1.4 of UNSPF
7	Area of degraded forest	3	FAO/FRA	Measures progress towards target 1.3 of UNSPF. Linkages with SDG target 15.3 as well as Aichi target 15. Linkages to UNCCD SO 1 and UNFCCC
8	Above-ground biomass stock in forest	1	FAO/FRA	Measures progress towards SDG 15.2 and target 1.2 and 2.5 of the UNSPF as well as Aichi target 7. Sub-indicator of SDG 15.2.1.
9	Volume of wood removals	1	JFSQ	Measures progress towards target 2.4 of UNSPF
10	Wood-based energy share of total final energy consumption	2	FAO, UNECE/FAO	Linked to SDG target 7.2
11	Forest area with a designated management objective to maintain and enhance its protective functions	1	FAO/FRA	Linked to target 1.4 of the UNSPF
12	Employment related to the forest sector	2	FAO/FRA	Measures progress towards target 2.4 of the UNSPF
13	Number of forest-dependent people in extreme poverty	3	FAO and UNFF	Measures progress towards GFG 2 and its target 2.1 of UNSPF
14	Contribution of forests to food security	3	FAO and UNFF	Measures progress towards GFG 2 and its target 2.3 of UNSPF
15	Financial resources from all sources for the implementation of sustainable forest management	3	OECD, WB	Measures progress towards GFG 4 and its targets 4.1 and 4.2 of UNSPF. Linkages with SDG target 15a and 15b
16	Existence of national or subnational policies, strategies, legislation, regulations and institutions which explicitly encourage SFM	1	FAO/FRA	Measures progress towards GFG 5 of the UNSPF
17	Existence of national or sub-national forest assessment process	1	FAO/FRA	Measures progress towards target 4.5 of the UNSPF
18	Existence of national or sub-national stakeholder platform for participation in forest policy development	1	FAO/FRA	Measures progress towards target 4.5 of the UNSPF
19	Proportion of forest area under a long-term forest management plan	1	FAO/FRA	Measures progress towards SDG 15.2 and targets 1.3 and 3.2 of UNSPF, Aichi target 7. Sub-indicator of SDG 15.2.1.
20	Forest area under an independently verified forest management certification scheme	1	FAO/FRA	Measures progress towards SDG 15.2 and targets 1.3 and 3.3 of UNSPF. Sub-indicator of SDG 15.2.1.
21	Existence of traceability system(s) for wood products	2	FAO/FRA	Measures progress towards target 3.3 and 5.2 of UNSPF

Source: FAO, 2019.

The GCS of forest-related indicators is a cornerstone instrument of the UNSPF. Indicators included should be enough for comprehensive analysis and monitoring of SFM at the local and global level. In addition, the GCS helps national statistical systems to develop capacity for the more effective use of statistics, since indicators are useful at a national level in order to orient and assess policies; and they represent the prompt response that a country can give to international and regional organizations such as UNFF, FAO, OEDC, WB, UNSD, among others that regularly demand data.

To sum up, in the framework of the 2030 Agenda and the SDGs, most of the Goals and related indicators are directly linked to forestry, as mentioned above. One goal focuses on the forest, SDG15-Life on land. However, in the State of the World's Forests 2018 (SOFO, 2018), it was analyzed in-depth that the impacts of forests and trees go well beyond SDG15 to contribute to the achievement of multiple goals and targets and that evidence is

key in achieving recognition of the true value of forests in the 2030 Agenda.¹⁴ The GCS aims to provide a framework to enable and support national and international statistical systems to produce the data and information needed to guide decision making related to forestry. The GCS of forest-related indicators will lead to the improvement of data production to support reporting under the process to implement the 2030 Agenda and other frameworks. Thus, the development and adoption of harmonized methodological references and the activities favoring implementation complying with international standards – from practical guidelines to capacity-building – derived of the GCS process, are likely to enhance countries’ ability to produce data relevant for SDG indicators.

¹⁴ SOFO (2018) recognized that information availability is critical in calculating incentives and managing sector trade-offs, fashioning forest and food security initiatives, measuring out social safety nets, investing in technology and innovation, and determining the level of support needed for different sectors of the economy.

2. Status and needs, progress and gaps associated with the production of the GCS of forest-related indicators classified as Tier 2 and Tier 3

To assess the status and needs, progress and availability of data sources for the GCS of forest indicators under analysis, it was taken as a reference the format of the statistical metadata sheets used in the development of the SDGs indicators.¹⁵ The study consisted in the analysis, by indicator, of the main areas covered in the metadata sheets (concepts and definitions, methodology, data sources, data availability, data providers, data compilers and calendar).

Latter, a qualitative assessment was completed. This assessment was proposed exclusively for the purpose of this background document, which is to provide with general insights on the status of GCS forest indicators classified as Tier 2 and Tier 3, to the EWS participants. Based on the information available, each area was analyzed according to the following ratings:

- Fully Adequate: When data collection methods were assessed as complete and data were available.
- Adequate: When adjustments/improvements could be proposed.
- Inadequate: when further work is still required, both on methods or data collection.

The results are briefed in Table 2 and described in Section 2.2. The EWS participants could have different views of the methodological proposals prepared for the discussions that will take place in the working groups planned for the EWS' following days. As stated, the aim of this assessment is to enrich these subsequent discussions.

2.1. Overview – status and gaps in metadata information of GCS forest indicators classified as Tier 2 and Tier 3

As mentioned above, an analysis was made in each area of the methodological sheets, based on documents available and feedback received from experts (see Table 2). The summary results of this analysis will serve to orient the working group discussions during the EWS, and to guide the development of the methodological proposals, and perhaps to corroborate whether the indicators have been properly classified or might be reclassified.

¹⁵ The metadata sheet format used in the development of the SDGs indicators is an internationally recognized structure, which was considered useful for this study because it covers basic information and relevant areas of the standard process for statistical operations. More information can be consulted at: <https://unstats.un.org/sdgs/metadata/>

Table 2. Assessment of status and gaps in metadata information related to GCS forest-related indicators classified as Tier 2 and Tier 3

Indicator	Concepts and definitions	Methodology	Data Sources	Data availability	Data providers	Data Compilers	Calendar
Indicator 3: Net greenhouse gas emissions	<i>Fully Adequate</i> Widely developed in volume 4 of the 2006 IPCC and in the FRA (2018).	<i>Adequate</i> Lack country-specific emission factors.	<i>Adequate</i> Not all the countries have self-sustained National Forest Monitoring Systems.	<i>Fully adequate</i> Default emission factors are available in the IPCC publications. FRA collecting data and time series from 1990 onwards.	<i>Adequate</i> Need to strengthen transparency of reporting and co-operation and collaboration among different government bodies.	<i>Fully adequate</i> Countries reporting on carbon stock and its changes to UNFCCC and FRA.	<i>Fully adequate</i> Countries reporting on carbon stock and its changes to UNFCCC and FRA (biannually / five-years).
Indicator 6: Proportion of forest area disturbed	<i>Inadequate</i> Lack of consistent and comprehensive national level data and monitoring systems for disturbances.	<i>Adequate</i> Although monitoring systems do exist for disturbances, there are significant data gaps.	<i>Adequate</i> Disturbance monitoring can be expensive and in the absence of operational monitoring systems the disturbance data may need to be supplemented with expert estimates and information derived from thematic studies.	<i>Adequate</i> Possible overlaps between categories of disturbances and data inconsistencies affect the quality and comparability of the indicator.	<i>Adequate</i> High degree of interdependence between different government bodies that demands close cooperation and collaboration (e.g. fire monitoring).	<i>Adequate</i> FAO FRA collecting data on disturbances, but the reporting is inconsistent.	<i>Adequate</i> According to the FRA cycle.
Indicator 7: Area of degraded forest	<i>Inadequate</i> Forest degradation lacks commonly agreed definition and operational monitoring systems. Through FRA 2020 countries report on existing definitions and describe their forest degradation monitoring systems and results. The countries' inputs will serve further analysis of how data on degraded forest could be collected and analyzed in the future.	<i>Inadequate</i> The major difficulty in measuring forest degradation is the imprecise, multiple and often subjective interpretations of the concept. In 2011, FAO developed guidelines for assessing forest degradation. Forest Europe, has developed the Criteria and Indicators for SFM in Europe, including for forest degradation. However, these guidelines have not been implemented globally.	<i>Inadequate</i> Data on forest degradation are not collected systemically for all countries and territories.	<i>Inadequate</i> Data not available for all countries and territories.	<i>Inadequate</i> Data not available for all countries and territories.	<i>Inadequate</i> Data not available for all countries and territories.	<i>Inadequate</i> No systematic data collection for all countries and territories.
Indicator 10: Wood-based energy share of total final energy consumption	<i>Fully Adequate</i> International Recommendations for Energy Statistics (IRES, 2018) provides concepts and definitions, thus the indicator is conceptually clear.	<i>Adequate</i> IRES provides methodological guidelines for energy statistics and energy balances. Data on woodfuel production and consumption is missing for the household sector in many developing countries (Africa). In the absence of data, models are used, but these have many limitations. For example differences in wood species, humidity and ash content are not well accounted for.	<i>Adequate</i> Wood energy is a highly informal and decentralized sector. Sources of wood energy are not clear. Data on woodfuel production and consumption is key to measure energy produced from wood, but is missing for the household sector in many developing countries (Africa).	<i>Adequate</i> Many organizations collect primary global and country-level data on energy consumption and production, each database has a specific scope defined by the organization's mandates. However, as woodfuel data are unsystematically collected, figures contained in the international energy organizations are very often estimated. The level of aggregation with which data is available in these databases could eventually be problematic for users.	<i>Adequate</i> The level of detail on national wood energy data needs to be improved as well as the collaboration across relevant actors (forestry, energy, NSOs offices, ministries, industry, etc.) to improve data availability and quality.	<i>Adequate</i> With the exception of the JWEI, the level of aggregation with which data is available on these databases could eventually be problematic for users.	<i>Fully Adequate</i> Energy statistics and energy balances are produced annually in most countries. Energy statistics are usually published two years after the reference year, whereas forest products figures are usually available within twelve months.
Indicator 12: Employment related to the forest sector	<i>Adequate</i> The indicator is not conceptually clear. It is pertinent to clarify whether it is necessary to continue with the report in terms of labour-input (FTE) or if it is expected to extend the measurement to the concept of employment, as it is used in the SDGs framework. For this indicator, it is also key to determine accurately the scope of the forestry sector. The current specifications from FRA suggest only using the category of "forestry and logging" (ISIC Rev. 4	<i>Adequate</i> For the data required in the indicator's construction, an internationally established methodology and standards are available. Through the International Conference of Labour Statisticians (ICLS), international standards for labour statistics have been set. However, the indicator is regularly reported in terms of labour-input measures. This concept has a number of challenges that complicate measurement and affect international	<i>Adequate</i> A variety of primary data sources are used to estimate employment and hours worked. These vary substantially across countries; the most widely used primary data sources are population census, labour force surveys, business surveys and administrative records. The main source used to estimate labour-input data are the business surveys; but they usually exclude small establishments, agricultural establishments and/or informal sector establishments.	<i>Adequate</i> Data on employment are available through national/satellite accounts, labour force surveys or other household surveys with sufficient labour modules that would allow to compute key labour market statistics with the internationally agreed methodology. ILOSTAT provides relevant, timely and comparable statistics on as many labour market topics as possible.	<i>Adequate</i> Data providers are usually ministries of labour or NSOs that release labour force survey reports and headline numbers with or without the associated microdata.	<i>Fully Adequate</i> ILOSTAT provides relevant, timely and comparable statistics on as many labour market topics as possible. Employment data at the 2-digit level can be downloaded from the ILOSTAT website (depends on the sample size in each category), and some additional cross-tabulations are available in this regard.	<i>Adequate</i> Labour-force statistics availability varies by country.

Indicator	Concepts and definitions	Methodology	Data Sources	Data availability	Data providers	Data Compilers	Calendar
	division 02); however, other data collection on forestry also considers the manufacturing of forest-products (ISIC Rev. 4 divisions 16 and 17). In addition, it is needed to analyze if all types of activities around the concept of ecotourism might be reported as part of the forest sector.	<p>comparability of productivity levels; e.g. countries where no data exist on hours worked, but even in countries with data, differences in the coverage of data sources and their alignment with national accounts concepts of output, and the range of adjustments used to estimate actual hours worked may differ.</p> <p>Data on labour-input cannot be treated as equal to data on employment.</p> <p>The information on formal employment in the forestry sector may be easy to collect from existing LFS or ad-hoc data collection instruments. Capturing informal employment may require additional efforts related to the coverage of forestry activities occurring in rural areas.</p>	<p>The main underlying data sources for employment in the forestry sector in alignment with ICLS guidelines are labour force surveys.</p> <p>The variety of possible sources for statistics on employment is difficult for international comparability, as each type of source has its own coverage, scope and characteristics. The use of non-standard definitions and the heterogeneity of operational criteria applied further hamper cross-country comparisons.</p> <p>If the mentioned sources already cover forestry units and households performing forest-related activities, data available can be used for the indicator's calculation. If this is not the case, any method will require additional efforts in terms of capturing the population to ensure that the smallest (and informal) forestry units are included in the sample.</p> <p>Labour force survey only provide employment data at the more aggregated 1-digit level, thereby not allowing for identification of the forestry sector. It is recommended to use data compiled by ILOSTAT that publishes employment data at the 2-digit level.</p>	<p>However, data collection on labour input or employment are not always regularly implemented, and when compiling information at international level additional sources such as modelled estimations may be used to fill the data gaps.</p> <p>Official statistics on employment could differ from the ILOSTAT data because at the national level the use of own definitions of employment can occur. For consistency and comparability, it is recommended the use of ILOSTAT data.</p>			
Indicator 13: Number of forest-dependent people in extreme poverty	<p><i>Inadequate</i> Indicator is not conceptually clear. The relevance and comparability of this indicator rely on the clear and agreed-upon definition of forest-dependent people and on the decision of the method for measuring extreme poverty.</p> <p>Livelihoods and spatial relationship seem to be the main dimensions to analyze the dependence on forest.</p> <p>A primary categorization on whom can be considered as forest-dependent people, based on the proximity to forest, could serve as a starting point to make the concept operational for countries. The proximity threshold needs to be discussed.</p> <p>Livelihood dimension could be analyzed from the perspective of the income from a forest-based economic activity or a subsistence activity.</p> <p>In relation to the data required for the calculation of extreme poverty, it is needed to</p>	<p><i>Adequate</i> To achieve the number of forest-dependent people an internationally established methodology and standards are not available.</p> <p>The approaches to analyses in the attainment of data on extreme poverty are: (i) the International Poverty Line and/or National Poverty Line (indirect method) and (ii) the Multidimensional Poverty Index (direct method). Both methods are already developed, however, no country reports on forest-dependent extreme poor.</p> <p>It is not assured that surveys can provide representative data on forest-dependent people. Reaching this population is operationally challenging and costly. If this is the case, a computation method using available data from household surveys on extreme poverty crossed with georeferenced data on forest proximity (of the population censuses and/or agricultural censuses and/or National</p>	<p><i>Adequate</i> Very few countries have nationally representative surveys that cover the socio-economic conditions of forest-dependent people.</p> <p>In the sampling of forest-dependent people, population censuses and/or agricultural censuses and/or National Forest Inventories georeferenced data could serve as a starting point.</p> <p>To measure the extreme poverty, households surveys (Household Income and Expenditure Survey -HIES, Household Budget Survey -HBS, Living and Standard Measurement Study -LSMS) are the means commonly implemented.</p> <p>Challenges of measuring poverty remain: timeliness, frequency, quality, and comparability of household surveys needs to increase substantially.</p> <p>As the surveys include detailed questions on sources of income and how it was spent, the data quality is highly</p>	<p><i>Inadequate</i> There is little reliable data on forest-dependent people. Some estimations were made at global and national levels, however estimates vary depending on the definitions used and data sources implemented.</p> <p>In terms of poverty data, a good number of countries produce information. The adaptation of poverty in each country can vary significantly, as well as the means used for data collection, and the coverage of the sample. However, it is complex at the moment to establish with certainty which countries and through which means can provide data related to extreme poverty among people who depend on the forest.</p> <p>Data on poverty is available annually in the Global Poverty Working Group of the WB.</p>	<p><i>Adequate</i> Data on poverty is collected by NSOs at country level; however, 30% of middle-income countries do not monitor poverty.</p>	<p><i>Adequate</i> The Poverty and Equity Data Portal is the WB Group's comprehensive source for the latest data on poverty, inequality, and shared prosperity.</p>	<p><i>Adequate</i> For survey data the schedule of source collection is determined by country governments. Some are annual, and most others are less frequent.</p>

Indicator	Concepts and definitions	Methodology	Data Sources	Data availability	Data providers	Data Compilers	Calendar
	revise the methods currently used by countries and decide which of them are the most convenient for the indicator construction, in terms of the quality and availability of data.	Forest Inventories), could be developed and tested.	dependent on the accuracy of respondents' answers and the trained personnel who recorded the information. Comparisons of countries at different levels of development are problematic because of differences in the consumption of nonmarket goods, as the local market value of all consumption in kind need to be included in total consumption expenditure. Most survey data now include valuations for consumption or income from own production, but valuation methods vary.				
Indicator 14: Contribution of forests to food security and nutrition (FSN)	<i>Fully Adequate</i> Indicator is conceptually clear. World Food Summit (1996) provided an internationally recognized definition for Food Security (FSN) and its four main dimensions. The HLPE (2017) provided a comprehensive analysis of the diverse, direct and indirect contributions of forests and trees to FSN (food provision, bio-energy, economy and livelihoods, ecosystem services, health and well-being, resilience of wood systems).	<i>Inadequate</i> This indicator does not have an internationally established methodology and standards, and data are not regularly produced by countries. The concept of FSN is multidimensional, finding an appropriate method for its measurement is challenging. The Food Insecurity Experience Scale –FIES, developed in the frame of the initiative Voices of the Hungry of FAO is one approach to analyses. However, FIES method is based on a perception of food insecurity, as the it is designed cannot give indications on the objective contributions of forest and trees to FSN. Measuring the direct provision of food and its contribution to FSN is a complex for undertaking, products provided by forests (wild nuts, berries, roots, fruits and wild animals) are typically not or are badly captured by using existing data collection instruments. To group all contributions of forest to FSN in one indicator is challenging. Perhaps, it may be advisable to adopt a sub-indicators approach. The report on indicators 10 and 12 can be used as proxy for the contributions of forest to employment and wood energy provision. The option of reviewing in detail the data collected through the Food Balance Sheets should be explored to analyses the potential of this database in terms of the provision of figures on the production of fruits and nuts from dispersed forests and trees Measuring at large scale the ecosystem services that forest provide is impractical, fraught by uncertainties and biases at	<i>Inadequate</i> Data on contribution of forest to FSN is not collected systematically for all countries and territories.	<i>Inadequate</i> Data not available for all countries and territories.	<i>Inadequate</i> Data not available for all countries and territories.	<i>Inadequate</i> Data not available for all countries and territories.	<i>Inadequate</i> No systematic data collection for all countries and territories.

Indicator	Concepts and definitions	Methodology	Data Sources	Data availability	Data providers	Data Compilers	Calendar
		multiple levels (e.g. spatial aggregation of effects), complex (and therefore difficult to implement) and costly.					
Indicator 15: Financial resources from all sources for implementation of Sustainable Forest Management (SFM)	<p><i>Adequate</i> For this indicator, the concept of SFM is clear and internationally accepted. However, there is not an internationally agreed definition for SFM financing.</p> <p>Definition provided by Singer (2016) can be used as a starting point: "Financial resources for SFM are also called "SFM financing" are the financial resources that contribute directly or indirectly, explicitly or implicitly, to the SFM of any type of forest or trees outside of forest".</p> <p>When using the SFM financing based on the source of flows the following categories can be distinguished: Public International Financing; Public Domestic Financing, and Private Financing.</p>	<p><i>Inadequate</i> This indicator does not have an internationally established methodology and standards, and data are not regularly produced by countries.</p> <p>There are data gaps at all levels, domestic and international, public and private. In particular, there is a lack of data on private financing.</p> <p>In addition, there are overlaps in finance flows between different tracking initiatives and there are different methods applied in the tracking and reporting of SFM financing, definitions between data sources vary and make it difficult to provide a systematic overview of SFM financing.</p> <p>Public International financing are reported by donors to the OECD-DAC database by following the OECD methodology. While public domestic expenditure in forest has been reported by countries to the FRA.</p>	<p><i>Inadequate</i> Data on SFM Public International Financing is provided to country donors to the OECD/DAC.</p> <p>Sources of SFM Public Domestic Financing data included in the general government expenses are registered in the country's budget, accounting records, administrative records and economic surveys.</p> <p>No source of data on SFM Private Financing currently exist.</p>	<p><i>Adequate</i> In general, there is not systematic information available on domestic investment or private foreign investment in the forestry sector in developing countries.</p> <p>Information available only on SFM Public Domestic Financing, even those data are often inaccurate and incomplete. For Public International Financing the OECD/DAC has a database on forestry-related ODA. However, OECD/DAC reflects figures for the forest sector rather than SFM.</p>	<p><i>Inadequate</i> Data on SFM Public International Financing is provided to country donor to the OECD/DAC.</p> <p>SFM Public Domestic Financing data come from the central bank or statistical reporters in national administrations (AID agencies, Ministries of Foreign Affairs or Finance, NSOs).</p> <p>There is no coordinated effort to collect information on SFM private Financing.</p>	<p><i>Adequate</i> OECD/DAC compile information on Public International Financing.</p> <p>FRA collects information on SFM Public Domestic Financing.</p>	<p><i>Inadequate</i> Data reported to OECD/DAC have an annual calendar year basis.</p> <p>The recommendation is to produce this information every year, but data availability is not ensured.</p>
Indicator 21: Existence of traceability systems for wood products	<p><i>Inadequate</i> Through the FRA 2020 countries are asked to report if they have a traceability system(s) for wood products. The results of this consultation will serve as an important input to start the development of a proposal to analyses these systems and report on this indicator.</p>	<p><i>Inadequate</i> Methodology to be further developed and refined after the analysis of FRA 2020 results.</p>	<p><i>Inadequate</i> Not available for all countries and territories.</p>	<p><i>Inadequate</i> Not available for all countries and territories.</p>	<p><i>Inadequate</i> Not known providers available for all countries and territories.</p>	<p><i>Inadequate</i> Not systematically compiled for all countries and territories.</p>	<p><i>Inadequate</i> Not systematically compiled for all countries and territories.</p>

- Indicators Classified in Tier 2
- Indicators Classified in Tier 3

2.2. Indicators classified in Tier 2

2.2.1. Indicator 3: Net greenhouse gas emissions

Concepts and definitions

Fully Adequate

The needed definitions relative to this indicator are Growing Stock Composition, Biomass Stock and Carbon Stock, all of them have been widely developed in Volume 4 of the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories and in the FRA terms and definitions document of 2018 (FAO, 2018b).

Methodology

Adequate

The net greenhouse gas emissions (GHG) indicator can be associated with the FRA Indicator 3 "Forest growing stock, biomass and carbon", which has been reported by countries to the FRA since 1990 in a five-year cycle. From the perspective of the internationally established methodology, the indicator is operative. However, the uncertainties affecting the underlying land-use data and the lack of country-specific emission factors in many developing countries may be among the primary factors undermining the quality of this indicator. While IPCC Tier 2 approaches require the use of country-specific emission or sequestration coefficients, these parameters are also likely to be generated by models or not be available at the proper level of disaggregation. This will contribute to increasing the uncertainty affecting the final indicator. The above mentioned inadequacies led to rating the methodology as *adequate*.

Data sources

Adequate

Countries report their GHG emissions and removals from all sectors via national GHG Inventories, submitted to the UNFCCC in accordance with international climate policy agreements and technical guidelines developed by the IPCC.

Nevertheless, not all the countries have self-sustained National Forest Monitoring Systems. Thus, no single, comprehensive and specific source or collection method for forest-related indicators relevant data exists across the countries (developing and developed). Countries collect forest data on different occasions and with different methods, ranging from expert opinions to administrative data and from surveys with personal interviews to remote sensing. FAO (2018c) has been identified as the main sources of information for the construction of Net greenhouse gas emissions indicator, the following:

- National Forest Inventory;
- Sample-based remote sensing assessment – The national data point is derived from a sample-based assessment of plots using remote sensing techniques;
- Full cover forest/vegetation maps – The national data point is derived from full cover mapping of forest/land cover/vegetation either by direct generation of statistics from raster or vector data or adjusted through a sample-based accuracy assessment;
- Registers/questionnaires – The national data point is derived from data in national/subnational registers of administrative forest units, or through questionnaires;
- Other – to be specified by the national correspondent.

In any case, the documentation of the national data sources is extremely important to get an idea of the reliability of the data. For each national data point, a category is assigned that describe the methodology for data collection.

Data availability

Fully Adequate

Default emission factors are available in the IPCC publications. FRA collecting and disseminating data and time series from 1990 onwards.

Calendar

Fully Adequate

Countries reporting on carbon stock and its changes to UNFCCC and FRA (biannually/five-years).

Data providers

Adequate

Various stakeholders and relative work arrangements are generally involved in the production of forestry statistics. Challenges posed by forest statistics are generally higher than for most other types of statistics, most significant perhaps is the fact that NSOs must rely heavily on other agencies to collect and supply the primary data. Such a high degree of interdependence between different government bodies, demands close cooperation and collaboration.

The need to strengthen the transparency of the reporting and co-operation and collaboration among different government bodies has led to rate this area as adequate.

Data Compilers

Fully Adequate

UNFCCC and FRA compile carbon stocks and its changes in data.

In line with recent developments on climate change relevant statistics, FAO produces estimates of GHG emissions from agriculture and land use, land-use change and forestry, based on the guidelines and methodology of IPCC, internationally approved by countries reporting to UNFCCC.

The FRA database provides estimates at the IPCC Tier 1 default method, representing a useful international reference that countries can use for gap filling or advanced quality analysis of their national inventories. The FRA emissions estimates include emissions from deforestation and forest degradation obtained through the stock-change method of IPCC, obtained by combining information on changes in forest carbon stocks from living biomass above and below-ground, and changes in the forest area. In addition, they include estimates of emissions from the degradation of peatlands, obtained through analysis and aggregation of multiple sources of geospatial information. The emission estimates are disseminated through FAOSTAT reports along with the underlying activity data. In addition, forest growing stock, biomass and carbon data have been available in FRA reports since 1990 and has been reported in the reporting years 2000, 2010 and 2015.

2.2.2. Indicator 6: Proportion of forest area disturbed

Concepts and definitions

Inadequate

The indicator "Proportion of forest area disturbed" is directly connected to the FRA Indicator 5 "Forest disturbances". In the FRA guidelines and specifications (2018b), countries are requested to report the forest area affected by insects, diseases, severe weather events and other disturbances. The indicator is completed with the area affected by the fire and the area of degraded forest. The reporting should be done according to the primary/major disturbing agent/event and the areas reported should be exclusive.

This area is rated as *inadequate* because the lack of a consensually agreed definition of degraded forest, which is a concept difficult to quantify, that could have many causes, occurs in different forms with a varying intensity and is perceived differently by different stakeholders.

Methodology

Inadequate

The reporting of this indicator has been annual starting from the year 2000 until the year 2017, countries report this indicator based on the methodology proposed by the FRA, providing, when necessary, explicative notes for estimates produced by experts.

However, monitoring disturbed forest is an expensive process, in most of the cases problematic for developing and transition countries, even for some industrialized countries.

Data collected for FRA 2010 on forest health and vitality was focused on the following categories:

- Area of forest significantly affected by insects;
- Area of forest significantly affected by diseases;
- Area burned (separated into areas of forest, other wooded land and other land);
- Number of wildfires (separated into those affecting forests, other wooded lands and other land);
- Proportion of wildfires and planned fires;
- Area of forest significantly affected by other biotic factors (such as wildlife browsing, grazing and physical damage by animals);
- Area of forest significantly affected by abiotic factors (such as air pollution, wind, snow, ice, floods, landslides, tropical storms, drought and tsunamis);
- Area of forest significantly affected by invasive species (woody species only).

One issue associated with the categories listed above is that they are not exclusive; hence, an area of land with two or more types of disturbance that affect the health and vitality of the forest could be included under each type of disturbance. Thus, the total area affected by disturbances is, therefore, not necessarily the sum of the individual disturbances as these may overlap.

Another issue related to the report, is that countries are asked to provide data averaged over five years so that large variations would not affect the data series.¹⁶ In addition, the area of forest affected by fires is severely underreported, with information missing from many countries, especially in Africa. For example, in the FRA report of 2005 (FAO, 2005), only a small percentage of countries reported data on this indicator and then weak figures had to be supplemented with information derived from thematic studies on forest fires (developed by FAO in 2007 and in 2009).

Concerning the area of degraded forest, there is not an agreed international definition for this category and each country defines what it considers is a degraded forest. In the FRA guidelines and specifications (2018b), this item does not require data input, rather a description, if existing, of degraded forest and in case a monitoring process is in place at the national level. Countries are asked to provide a brief description of the methodology and results.

Through the FRA 2020 round, countries should document their definition or description of degraded forest and provide information on how this data is being collected. The countries' inputs will serve to further analysis of how data on degraded forest could be collected and analyzed.

This indicator clearly does not have an internationally agreed methodology allowing comparability of the data across countries. The first methodological gap resides in the lack of agreed-upon definition on the different types of disturbances, source of possible overlaps and inconsistencies affecting the quality and comparability of the indicator.

The second challenge refers to the measurability of the area affected by different types of disturbances: while national and international monitoring and early warning systems generally exist to detect and assess the impact of fires and wildfires on forests (such as the Global Forest Watch platform),¹⁷ this is much less the case for other sources of disturbances such as pests or climatic events.

¹⁶ In the FRA 2010 data were presented for 1990 (an average of the period 1988–1992), 2000 (average of 1998–2002) and 2005 (average of 2003–2007).

¹⁷ See www.globalforestwatch.org

Given these limitations in the data collection system (which cannot be easily overcome in the short-run), this indicator is affected by a high risk of under coverage, large (and unmeasurable) uncertainties and discrepancies across countries. These measurement gaps can be addressed, to some extent, by compiling evidence from the literature on the impact of the major pests or climatic events on forests, but this type of approach is necessarily ad-hoc and would not be implemented in a systematic and consistent way across countries.

For the reasons stated above, this area is assessed as *Adequate* and it is suggested to pursue the efforts towards harmonizing definitions, measurement methods and assessment approaches.

Data availability

Inadequate

Data is available in the FRA system. However, possible overlaps between categories of disturbances and data inconsistencies affect the quality and comparability of the indicator.

Data providers

Inadequate

The need to strengthen the transparency of the reporting and co-operation and collaboration among different government bodies (e.g. fire monitoring) has led to rate this area as inadequate.

Data Compilers

Inadequate

FAO FRA collecting data on disturbances, but the reporting is inconsistent.

Calendar

Inadequate

No systematic data collection and report for all countries and territories.

2.2.3. Indicator 10: Wood-based energy share of total final energy consumption

Concepts and definitions

Fully Adequate

This indicator is conceptually clear and countries are provided with definitions specified in the International Recommendations for Energy Statistics- IRES, adopted by the UN Statistical Commission (UNSD, 2018).¹⁸ Basic knowledge on wood energy is provided in one of the modules of Sustainable Forest Management developed by FAO (SFM Toolbox, FAO, 2017).¹⁹ Final energy consumption is defined by the IRES (UNSD, 2018).

¹⁸ The main purpose of IRES is to strengthen energy statistics as part of official statistics by providing recommendations on concepts and definitions, classifications, data sources, data compilation methods, institutional arrangements, approaches to data quality, metadata and dissemination policies. Developing energy statistics in compliance with the IRES will make these statistics more consistent with other fields of economic statistics. Concerning the scope of energy statistics in the IRES, the recommendations contained in this publication are focused on basic energy statistics and energy balances. The basic energy statistics refer to statistics on energy stocks and flows, energy infrastructure, the performance of the energy industries, and the availability of energy resources within the national territory of a given country during a reference period. The energy balances are an accounting framework for compilation and reconciliation of data on all energy products entering, exiting and used within that territory. Besides, the IRES provides a brief description of some of the uses of basic energy statistics and balances such as the compilation of environmental-economic accounts, indicators and greenhouse gas emissions. International Recommendations for Energy Statistics" (UNSD, 2018, p.4).

¹⁹ The modules can be consulted at: <http://www.fao.org/sustainable-forest-management/toolbox/modules/wood-energy/basic-knowledge/en/>

This indicator is linked to the SDG indicator 7.2.1: Renewable energy share in the total final energy consumption, which is a Tier 1 indicator, and it is already reported by countries.²⁰

Methodology

Adequate

Reliable and robust energy statistics are a priority issue for the international statistical community, thus an internationally established methodology and standards are available for the indicator's calculation.²¹

The recommendations contained in IRES are focused on basic energy statistics and energy balances that are an accounting framework for data compilation and reconciliation on all energy products entering, exiting and used within a territory.

Despite this indicator is based on the development of comprehensive energy statistics used to produce a national energy balances, the share of energy consumption from the use of wood and charcoal by households in the developing world is generally scarce globally. According to Angelou, *et al.* (2013, p. 197) in many countries this is an informal sector, and data availability and accuracy are acknowledged to be poor and subject to large errors. Different data sources and methodologies produce varying estimates. This issue makes that this area is rated as adequate.

As mentioned, data on woodfuel is often missing for the household sector in many developing countries, especially in most African countries where wood remains the main source of energy for heating and cooking. In countries where data on woodfuel consumption by households is not collected regularly or with sufficient coverage or consistency, data is often estimated using models relying on assumptions of average wood consumption per household or capita.

The use of the model-generated artificially smoothens differences in terms of wood species, moisture and ash content which affect the calorific content and the total energy supply. While in the absence of wide-scale survey on woodfuel production and consumption covering the household sector, countries are encouraged to enrich their model-based estimates by better specifying typical fuelwood mixes and average water content and establishing country-specific conversion factors between volume and mass. Guidelines for the measurement of woodfuel and the determination of calorific values are provided in the IRES. However, estimates based on models may not necessarily be the proper method to derive wood energy data.

For collecting data on woodfuel consumption in the household sector, population and housing censuses in developing countries frequently contain questions on household fuel sources (see section 3.2 of this document). Surveys also constitute the most direct, cost-efficient and robust approach. Most countries conduct household surveys to measure consumption, expenses, income and other variables such as the degree of implication in farming activities. These household surveys have been used to measure woodfuel consumption by including woodfuel-related questions,²² which enable collecting this information at a marginal additional cost, taking the advantage of the large representative sample size of household surveys and offering the possibility of carrying-out cross-validations and tabulations with other variables of the main survey.

²⁰ Metadata sheet for indicator 7.2.1. is available at: <https://unstats.un.org/sdgs/metadata/?Text=&Goal=7&Target=7.2>

²¹ Additional conceptual and methodological guidance for energy statistics compilation can be found in the *Energy Statistics Manual*. OECD-IEA-Eurostat, 2005. Available at http://www.iea.org/publications/freepublications/publication/statistics_manual.pdf and Energy accounts can also be compiled using the SEEA CF methodology. The document can be found in the UNSD SEEA website <http://unstats.un.org/unsd/envaccounting/energy.asp>. SEEA-Energy is a SEEA 'sub-system' and it aims to provide compilers and analysts with agreed concepts, definitions, classifications, tables, and accounts for energy and energy-related air emission accounts. SEEA-Energy expands and elaborates on guidance on accounting included in the IRES. The SEEA Energy document is available from https://seea.un.org/sites/seea.un.org/files/documents/seea-energy_final_web.pdf.

²² Section 3 of the document on the document "Review of National Surveys and Censuses that Could Incorporate a Woodfuel Supplementary Module", summarizes the many different data collection initiatives, censuses and surveys that focus partially or entirely on woodfuel use; the section includes a description of larger surveys, along with the questions included and the woodfuel information currently available from past survey iterations. The document can be consulted at <http://gsars.org/wp-content/uploads/2017/02/TR-03.02.2017-Developing-a-Woodfuel-Survey-Module-for-Incorporation.pdf>.

According to GSARS (2016), national household surveys that have included questions on primary fuel use could also serve as sampling frameworks in estimating the quantities of woodfuel consumed at the national level, through subsequent rapid assessments. As well as providing information of direct interest at national and subnational levels, surveys can provide invaluable information on the evolving relationships between variables such as woodfuel consumption, conversion technologies used, urbanization, availability of forest resources and other supply sources, and income. Such information, collected in surveys carried out across a number of countries, could be used to estimate regional and global patterns of woodfuel consumption with much greater accuracy than is possible with currently available data (p.16).

Many of these surveys do not extend beyond enquiries on the types of fuel used in different household applications, with the focus often limited to the primary fuel used for cooking. Some surveys also include questions on time spent gathering fuelwood and woodfuel expenditure. It should be noted that overlaps in coverage between the different statistical collections exist and have not been fully resolved and most importantly, it should also be noted that few of these initiatives include information on quantities of woodfuel consumed, a core variable for calculating the figure of final wood energy consumption.

In response to this gap, the Global Strategy for Improving Agricultural and Rural Statistics (GSARS) developed in 2018 the Guidelines for the Incorporation of a Woodfuel Supplementary Module into Existing Household Surveys in Developing Countries.²³ Key recommendations for the implementation of the module are in section 3.4 of this document.

While this approach offers many benefits, using household surveys as an anchor for a wood-fuel module may have its drawbacks. First, household surveys are already long enough, and the current tendency is to expand them further by adding new modules, such as agriculture, labour or gender modules. Longer surveys put a higher burden on respondents and interviewers and risk affecting the quality of the collected data. Secondly, it is advisable to analyse if the sample used for household surveys is fully relevant for measuring wood-fuel consumption and if households, which heavily rely on wood for heating and cooking, often located in remote areas, can be covered adequately. Household surveys in Europe have been instrumental in improving information on wood energy, sometimes showing previous estimates were approximately one-quarter of the level shown by surveys.

Data sources

Adequate

This indicator will require information on wood products used for energy conversion and direct consumption, and final energy consumption. Information on final energy consumption is available on a global level in energy statistics. Information on wood products for energy conversion and direct consumption is weak however.

The most important statistics produced by the energy authorities or NSOs cover the production of energy by different types of non-renewable and renewable energy sources, production of primary and secondary energy, transformation, total energy supply and final consumption of energy. Final consumption of energy is broken down by economic activity and households.

Wood energy is a highly informal, decentralized sector. Logging, transportation, transformation (e.g. charcoal), distribution and utilization are often difficult to account for national statistics. Wood energy statistics are commonly collected and disseminated by specialized institutions, such as energy authorities and/or the NSOs. These institutions usually collect and disseminate these statistics on physical and monetary value, with varied periodicity as informational needs require; but in general terms, annual production of these statistics is common.

Production statistics play a key role in determining the total final consumption of woodfuel used in households. Many of the national and international energy statistics use woodfuel figures in their national energy balances. Sources of wood energy are usually not clear (wood from forests, processing or post-consumer). However, as

²³ The complete document can be consulted at <http://gsars.org/wp-content/uploads/2018/10/GS-WOODFUEL-GUIDELINES-EN-10.pdf>.

mentioned, population and housing censuses in developing countries frequently contain questions on household fuel sources. The GSARS (2018) identified 92 national population and housing censuses implemented between 2003–2015 containing information on use of woodfuel for cooking.

In the same line, FAO publication “The State of World’s Forests 2014” (FAO, 2014) analyzed the socio-economic benefits derived from the world’s forests, a major element of which is the use of woodfuel for cooking. Data were obtained from national censuses and large-scale surveys implemented by international agencies. Some of the data sources on the proportion of households using woodfuel for cooking used for this publication were: Multiple Indicator Cluster Survey (MICS) by the United Nations Children’s Fund (UNICEF); the World Health Survey (WHS) by the World Health Organization (WHO); the Demographic and Health Survey by the United States Agency for International Development (USAID); and the United Nations Compendium of Housing Statistics.

Other sources of information on woodfuel production and consumption at the household level are the Living Standard Measurement Study surveys (LSMS), the Core Welfare Indicators Questionnaire surveys, the Labour Force Surveys, the Child Labour Surveys, the Comprehensive Food Security and Vulnerability Analyses, and other country specific national household surveys. Their main features and wood energy related variables included are discussed in GSARS (2017).

Despite the sources available, they often only cover the primary type of household cooking fuel used, and not quantities of woodfuel consumed, as well as purposes other than cooking, such as lighting and heating are not included. This information is of core importance in assessing global forest products production, forestry sector emissions and energy demand, and promoting sustainable natural resource management.

Data availability

Adequate

Many organizations collect primary global and country-level data on energy consumption and production, each database has a specific scope defined by the organization’s mandates.²⁴ However, as woodfuel data are unsystematically collected, figures contained in the international energy organizations are very often estimated.

The most comprehensive databases are the following:

FAOSTAT

Through the FAOSTAT database, since 1961, FAO publishes national figures for removals of coniferous (C) and non-coniferous (NC) woodfuel and consumption of woodfuel as well as wood charcoal production and consumption. The Joint Forest Sector Questionnaire (JFSQ) is the instrument requested to the country statistical correspondents to inform about these items. Flags are provided to indicate the source of the figures, most of them (around the 70%) are estimated by FAO.²⁵ When countries do submit official data to FAO, information on their sources is often not available; therefore, their reliability cannot be assessed. "The FAOSTAT figures constitute the most complete, best-documented and probably most reliable global data sets on woodfuel consumption" (GSARS, 2016 p. 24). International energy statistics often use FAO’s woodfuel and charcoal figures for completing energy balances.

²⁴ Annex 1 elaborates in the different scopes and definitions used in the FAOSTAT database, UNECE/FAO JWEE and IRES.

²⁵ According to GSARS (2016) "when countries do not submit woodfuel and charcoal production figures to FAO, modelled estimates of fuelwood and charcoal consumption are used to estimate production, taking into account any submitted import and export data. The modelled consumption estimates are based on household and non-household fuelwood and charcoal consumption data from field-based surveys and official national woodfuel consumption data submitted to FAO by countries. The majority of the models employ a range of explanatory variables encompassing income, forest area, urban proportion of the population, land area, temperature and oil production. Where less than 10 official woodfuel production records had been reported to FAO by any one country prior to 2000, forecasts and hind casts were based on these figures, together with income and/or population data. Coniferous/non-coniferous (C/NC) proportions of woodfuel production are based on the figures submitted to FAO by countries in 1999 or, where figures were not submitted, woodfuel is assumed to be 100 percent non-coniferous for tropical countries and 100 percent coniferous for high-latitude countries" (p.22). Database can be consulted at <http://www.fao.org/faostat/en/#data/FO>.

The International Energy Agency (IEA)

The IEA publishes national aggregate production and consumption figures on renewables and waste, including solid biofuels and charcoal, for 34 OECD countries and 108 non-OECD countries and territories. Data for most countries is available back to 1990.

Figures are provided on an annual basis in terajoules for the following:

- Production of solid biofuels (excluding charcoal) including: (i) Fuelwood, wood residues and by-products; (ii) Wood pellets; (iii) Black liquor; (iv) Bagasse; (v) Animal waste; and (vi) Other vegetal materials and residues.
- Consumption of solid biofuels and of charcoal by different sectors: Industry, Transport Commercial and public services; Residential; Agriculture/Forestry; Fishing; Not elsewhere specified (Other).

In relation to household woodfuel production and consumption in developing countries, the IEA figures are available only in terajoules, and are based on estimation procedures. The “Solid biofuels” category also includes items that are not of direct interest in relation to household woodfuel use: black liquor, bagasse, animal waste and other vegetal materials and residues (GSARS, 2016).

The United Nations Statistics Division (UNSD)

The UNSD Energy Statistics Database provides statistics on production, trade, transformation and consumption (end-use) for solid, liquid, and gaseous fuels, electricity, and heat. The database contains data in their original units (e.g. metric tons, GWh) as well as calorific values to allow inter fuel comparison in a common energy unit (terajoules).

The main source of information for this database is the UNSD Annual Questionnaire on Energy Statistics that is sent every year to NSOs, ministries of energy or other authorities responsible for energy statistics in the countries.²⁶ This database is the core of the annual publication of Energy Statistics Yearbook, a collection of international comparable energy statistics that covers the most recent years in the database. The database also contributes to various statistical publications of UNSD, such as the Statistical Yearbook.

The UNSD Energy Statistics Database contains data on annual household fuelwood and charcoal consumption in the biomass and waste category. Fuelwood consumption data are reported in cubic metres and are available for 210 countries. Charcoal consumption data are reported in metric tons and are available for 179 countries. Data are available online back to 1990; fuelwood and charcoal data from before 1990 may be available in the full database.

The UNSD data is more heterogeneous and not available until sometime after IEA information is reported.

The International Renewable Energy Agency (IRENA)

IRENA publishes detailed statistics on renewable energy capacity, power generation and renewable energy balances. Data are obtained from a variety of sources, including: the IRENA questionnaire; official statistics; industry association reports; and other reports and new articles. Other figures that are estimated by IRENA from a variety of different data sources.

IRENA provides statistics and spatialized data about renewable energy through:

- The Global Renewable Energy Atlas hosted on the IRENA website, which maps solar and wind sources, country by country;
- Renewable Energy Country Profiles.²⁷

²⁶ Additional sources of information for the database include national, regional and international statistical publications - including, but not limited to publications from the International Energy Agency (IEA), the Statistical Office of the European Communities (Eurostat) and the Organización Latinoamericana de Energía (OLADE). The Statistics Division prepares estimates where official data are incomplete or inconsistent.

²⁷ See <http://www.irena.org/Publications/index.aspx?mnu=cat&PriMenuID=36&CatID=141>.

The United Nations Economic Commission for Europe (UNECE)/FAO Forestry and Timber Section Joint Wood Energy Enquiry (JWEE)

The UNECE/FAO Forestry and Timber Section, with the encouragement of the Joint ECE/FAO Working Party on Forest Statistics, and in collaboration with the IEA, FAO and the European Commission (EC) decided in June 2006 to develop and launch a JWEE. The JWEE is implemented in UNECE countries and collates national-level information on wood energy through a biennial questionnaire. The enquiry collects disaggregated data on the supply and use of wood energy, and does not require official data. As such, official data on wood energy is critically assessed and complemented with empirical data from studies, science and the industry. Expert estimates may also be included.

The World Bank Energy Sector Management Assistance Program (ESMAP)

ESMAP conducted numerous projects in the 1970s and 1980s, covering 39 African countries. Project documents contained original data and information on woodfuel.

Calendar

Fully Adequate

Energy authorities and/or the NSOs usually collect and disseminate these statistics on physical and monetary value, with varied periodicity as informational needs require; but in general terms, annual production of these statistics is common. The IRES recommends that the Energy Balances need to be produced with a periodicity of one year. Energy statistics are usually published two years after the reference year, whereas forest products figures are usually available within twelve months.

Data providers

Adequate

Wood energy statistics are commonly collected and disseminated by specialized institutions such as the energy authorities and/or the NSOs. Renewable energy production and final consumption statistics are primarily produced by the energy/electricity authorities and possibly by the NSOs in the form of energy statistics and energy balances. The level of detail on national wood energy data needs to be improved as well as the collaboration across relevant actors (forestry, energy, NSOs offices, ministries, industry, etc.) to improve data availability and quality.

Data compilers

Adequate

UNSD collects energy statistics from more than 190 countries and both updates and maintains the Energy Statistics Database, which contains energy statistics for the period 1950-2013. The statistics cover items such as production, trade, transformation and final consumption (end-use) for a range of primary and secondary energy products derived from conventional, non-conventional or renewable energy sources.²⁸

Besides, various publications from the IRENA analyses the main global trends in renewable energy production and use around the world.²⁹ Additionally, the IRENA features the Renewable Energy Policies and Measures Database,³⁰ as well as the Studies on Renewable Energy Potential³¹ around the world including wind, solar, biomass, hydro, marine and geothermal.

²⁸ The Energy Statistics Database can be accessed from <http://unstats.un.org/unsd/energy/edbase.htm>. The database is also available in non-aggregated format on-line through UN data <http://data.un.org/>

²⁹ <http://www.irena.org/Publications/index.aspx?mnu=cat&PriMenuID=36&CatID=141>

³⁰ See

<http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=35&CatID=109&SubcatID=158&RefID=158&SubID=170&MenuType=Q>

³¹ http://www.irena.org/potential_studies/

Since 1948, the FAO has been collecting and disseminating wood fuel and wood charcoal statistics on production and trade. In 2012, wood pellet production and trade data was introduced into forest products' statistics.³²

With the exception of the JWEE, the level of aggregation with which data is available on these databases could eventually be problematic for users.

2.2.4. Indicator 12: Employment related to the forest sector

Concepts and definitions

Adequate

The indicator is conceptually not clear. As the FRA system is reporting the indicator on "Employment in forestry and logging" by Full Time Equivalent (FTE),³³ which is a measure of labour productivity, then it is pertinent to clarify whether it is necessary to continue with the report in terms of labour-input (FTE) or if it is expected to extend the measurement to the concept of employment, as it is used in the SDGs framework.

The purpose of this indicator needs to be clearly defined as it determines the kind of data collection and/or compilation efforts that will be required from countries to report relevant and comparable information. The first dimension that has to be defined is whether this indicator will focus on the measurement of labour- input in forestry (the amount of labour that is put into forestry activities, irrespective of the formality of employment or type of contractual arrangements), on the measurement of employment, distinguishing formal and informal employment and extending to socio-economic characteristics that go beyond monetary retribution (nature of work, level of physical effort required, age or gender limitations, etc.), or both.

Measuring labour-input is a pre-condition to assess economic indicators such as labour productivity, total productivity, production costs and profitability. Measuring labour-input, especially for self-employed workers in a small farming and/or forestry units also helps to assess the income generated by the activity in the absence of wage or other types of payment (the time spent can be valued/imputed at market rates or the produce valued as a proxy of income).

If the focus is placed on the category of employment, more emphasis will be placed on: the number of individuals involved in the activity (not necessarily the time spent by them), the nature of their respective contractual arrangements and other components of employment that may help to assess the sector's share in employment (in the primary sector, for example), its contribution to formal or informal employment and labour-related health risks, among others.

For this indicator, it is also key to determine accurately the scope of the forestry sector. This scope has to be consistent for all the GCS of forest indicators as well as aligned with the International Standard Industrial Classification of all Economic Activities (ISIC) to guarantee comparability and consistency in methodological approaches used per country. The current specifications from FRA suggest only using the category of "forestry and logging" (ISIC Rev. 4 division 02); however, other data collection on forestry also considers the manufacturing of forest-products (ISIC Rev. 4 divisions 16 and 17). In addition, it is needed to analyses if all types of activities around the concept of ecotourism might be reported as part of the forest sector.

³² Legacy of FAO's work in 2012 HS revision.

³³ More complex measures of employment are sometimes produced by measuring the number of hours worked or by converting the number of hours into FTE units. According to OECD (2018), "statistics on working time were first collected with the aim of assessing and monitoring working conditions, giving rise to the concept of normal hours worked, defined as the number of hours of work fixed by laws or collective agreements, or by the number of hours in excess of which any time worked is remunerated as overtime and/or forms an exception. The concept of hours actually worked was developed later as a tool for economic analysis and, in particular, to construct economic indicators such as labour productivity, average hourly earnings and average labour cost per unit of time" (p.9).

Methodology

Adequate

For the data required in the indicator's construction, an internationally established methodology and standards are available.³⁴ The Department of Statistics of the International Labour Organization (ILO) is the focal point of labour statistics within the United Nations and has developed international standards with a view to improving the measurement of labour issues and enhancing international comparability. Through the International Conference of Labour Statisticians (ICLS), international standards for labour statistics have been setting. The department of statistics of ILO compiles, produces and disseminates relevant, timely and comparable statistics on labour market topics as possible and supports member states in developing and improving their labour statistics via trainings, capacity building and technical assistance.

However, as mentioned before, the indicator is regularly reported in terms of labour-input measures. From the perspective of productivity measurement, labour-input is most appropriately measured as the total number of hours actually worked. The concept of hours actually worked was developed as a tool for economic analysis and, in particular, to construct economic indicators such as labour productivity, average hourly earnings and average labour cost per unit of time. This concept seems to be simple, but in practice, there are a number of challenges that complicate measurement and that may affect international comparability of productivity levels.³⁵ At the extreme end of the scale are countries where no data exist on hours worked, but even in countries with data, differences in the coverage of data sources and their alignment with national accounts concepts of output, and the range of adjustments used to estimate actual hours worked may differ.

Typically the main source used to estimate labour-input data are the business surveys; however, these surveys report hours paid or contractual hours, which differ from the concept of hours actually worked which refers to all hours engaged in production, whether paid or not, and excludes hours not used in production, even if some compensation is received, such as paid holidays and sick leave. Moreover, business surveys are not able to provide information on labour input for many unobserved activities in the informal economy, as the activities that occur in small forestry units.

Data on labour-input cannot be treated as equal to data on employment. Data on labour-input reported to the FRA is provided by NSOs through national correspondents produced from household surveys, mainly labour force surveys (LFS),³⁶ followed by business surveys, administrative records and populations censuses. However, the

³⁴ Methods and guidance available to countries for the compilation of the data at the national level: Resolution concerning the measurement of employment-related income, adopted by the Sixteenth International Conference of Labour Statisticians (January 1998), available at http://www.ilo.org/global/statistics-and-databases/standards-and-guidelines/resolutions-adopted-by-international-conferences-of-labour-statisticians/WCMS_087490/lang-en/index.htm; Resolution concerning the International Classification of Status in Employment (ICSE), adopted by the Fifteenth International Conference of Labour Statisticians (January 1993), available at http://www.ilo.org/global/statistics-and-databases/standards-and-guidelines/resolutions-adopted-by-international-conferences-of-labour-statisticians/WCMS_087562/lang-en/index.htm; Resolution concerning an integrated system of wages statistics, adopted by the Twelfth International Conference of Labour Statisticians (January 1973), available at http://www.ilo.org/global/statistics-and-databases/standards-and-guidelines/resolutions-adopted-by-international-conferences-of-labour-statisticians/WCMS_087496/lang-en/index.htm; ILO manual: An integrated system of wages statistics, available at http://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/presentation/wcms_315657.pdf.

³⁶ LFS is the most comprehensive and well-established source for information on the composition and characteristics of the labour force. International harmonization is achieved by complying with definitions set out by the ILO (1982 and 2013), although sample selection, survey techniques, survey responses and the implementation of ILO concepts may vary between countries. An advantage of the LFS is that it covers a broad range of employment situations, including the self-employed, unpaid family workers and informal employment, as well as collecting information on multiple-job holdings, hours usually and actually worked, and paid and unpaid overtime. Moreover, it provides information on the structure of employment in terms of age, sex, education level and professional status. Its main limitation from the perspective of national accounting, and hence, productivity analysis, is the often limited consistency with output and value added measures, in particular, by industry, as the LFS is a household survey for which the stratification process may not adequately capture the homogenous strata required in productivity analysis. In addition, in many countries, the LFS does not cover some groups of the population such as persons below or above certain age thresholds (which varies by country), those living and working in communal establishments. In addition, the sampling structure of LFS is based on the population usually residing in the country and includes workers in non-resident production units, whereas non-resident cross-border workers working in resident production units are excluded. There may also be biases in LFS responses, reflecting the self-reporting nature of LFS, and these biases, that may also be cultural, appear to be significant with respect to responses on hours

quality of the indicator reported is difficult to ascertain due to the variety of sources and methods used in its calculation.

The employment is defined as the number people engaged in productive activities in an economy. The concept includes both employees and the self-employed. The two main measures used for employment are the number of persons employed or the number of employees (EUROSTAT, 2019). The information on formal employment in the forestry sector may be easy to collect from existing LFS or ad-hoc data collection instruments, capturing informal employment may require additional efforts. Firstly, in terms of the population scope to be considered in the survey and thus to ensure that the smallest and informal forestry production/consumption units are included in the sample. This is not guaranteed in farm surveys, which typically consider forestry only if it is related to agricultural activity (e.g. in the case of agroforestry systems) or when the forestry represents a secondary farm activity. In general, household surveys are nationally representative. If these surveys cover only urban areas in certain countries, the numbers of employment in forestry would only be representative in the urban areas in this context. Therefore, during reporting it is crucially important that the metadata such as the source, the coverage and the target population be presented with the employment figures.

Data sources

Adequate

A wide variety of primary data sources are used to estimate employment and hours worked. In practice, these vary substantially across countries, the most widely used primary data sources are population census, labour force surveys, business surveys and administrative records.

Typically the main source used to estimate labour-input data are the business surveys; but they usually exclude small establishments, agricultural establishments and/or informal sector establishments.

The main underlying data sources for employment in the forestry sector in alignment with ICLS guidelines are labour force surveys which are specifically designed to capture labour statistics. Questionnaires are shaped around labour-related topics with sufficient probing questions to ensure accuracy of results. An advantage of the LFS is that it covers a broad range of employment situations, including the self-employed, unpaid family workers and informal employment, as well as collecting information on multiple-job holdings, hours usually and actually worked, and paid and unpaid overtime. A disadvantage of the LFS is that the quality of the data is highly dependent on the accuracy of respondents' answers.

Nonetheless, as mentioned, employment can also be captured from other sources, including population censuses and other types of household survey, such as Household Income and Expenditure Surveys, Living Standards Surveys or Time-use Surveys, provided these include labour modules that contain sufficient questions to identify employment.

The variety of possible sources for statistics on employment difficult international comparability, as each type of source has its own coverage, scope and characteristics. The use of non-standard definitions and the heterogeneity of operational criteria applied further hamper cross-country comparisons.

Data availability

Adequate

Data on employment are available through national/satellite accounts, labour force surveys or other household surveys with sufficient labour modules that would allow to compute key labour market statistics with the internationally agreed methodology. However, the information from these data sources should be interpreted carefully due to the integration of different sources and conceptual reasons. Data collection enabling the provision of statistics on labour input or employment relative to the forestry sector are not always regularly

actually worked. On the other hand, despite reassurances that the LFS is purely for statistical purposes, there may be a tendency to hide or under-report hours actually worked by those working in the grey or informal economy (OECD, 208).

implemented, and when compiling information at international level additional sources such as ad-hoc studies and/or some estimations based on alternative sources are also taken into account.

Official statistics on employment could differ from the ILOSTAT data because at the national level the use of own definitions of employment can occur. For consistency and comparability, it is recommended the use of ILOSTAT data.

Labour force survey reports are unlikely to provide employment data at the 2-digit level. Instead, they only provide employment data at the more aggregated 1-digit level, thereby not allowing for identification of the forestry sector. As mentioned, it is recommended to use the microdata published by ILOSTAT employment which is available at the 2-digit level (depending on the sample size in each category).

Calendar

Adequate

Labour-force statistics availability varies largely by country.

Data providers

Adequate

Data providers are usually ministries of labour or NSOs that release labour force survey reports and headline numbers with or without the associated microdata.

Data compilers

Fully Adequate

ILOSTAT provides a readily available, comparable and standardize source of data on employment. Employment data at the 2-digit level can be downloaded from the ILOSTAT bulk download facility on the ILOSTAT website, and some additional cross-tabulations are available in this regard. Additional and customized cross-tabulations can be proposed from the ILO Microdata Repository. A full list of variables is available in ILO (2018).³⁷

2.2.5. Indicator 21: Existence of traceability systems for wood products

Concepts and definitions

Inadequate

The definition provided by the FRA (2018) is related to a system that provides the ability to trace the origin, location and movement of wood products utilizing recorded identifications. This involves two main aspects: (1) identification of the product by marking, and (2) the recording of data on movement and location of the product all the way along the production, processing and distribution chain.

Several examples can be presented of the development of traceability systems in various contexts. In the technical paper on traceability: A management tool for enterprises and governments (FAO, 2016), are presented some cases such as the voluntary partnership agreements (VPAs) of the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan of the European Union (EU) that represent good examples of traceability systems already implemented.

Many initiatives are underway in relation to the certification of forest products. However, only a small number of them are operational and for a small volume of wood. Some of the most recognized are the Forest

³⁷ Consult <https://ilostat.ilo.org>

Conservation Program of Scientific Certification Systems, the Smart Wood Certification Program of Rainforest Alliance, the Responsible Forestry Program of the Soil Association, the Programme for the Endorsement of Forest Certification and the Forest Stewardship Council.

Methodology

Inadequate

Methodology to be further developed and refined after the analysis of FRA 2020 results.

Data Sources, data availability, and data providers

Inadequate

Not available for all countries and territories.

Data compilers

Inadequate

No known providers available for all countries and territories.

Calendar

Inadequate

Not systematically compiled for all countries and territories.

2.3. Indicators classified as Tier 3

2.3.1. Indicator 7: Area of degraded forest

Concepts and definitions

Inadequate

Forest degradation lacks commonly agreed definition and operational monitoring systems. There is not an agreed international definition for “degraded forest”; each country defines what it considers to be a degraded forest. Perceptions of forest degradation are many and varied, depending on the driver of degradation and the goods or services of most interest.

Methodology

Inadequate

The major difficulty in measuring forest degradation is the imprecise, multiple and often subjective interpretations of the concept. FAO, together with CPF members have taken a number of steps to tackle this problem. For example, in 2011, FAO developed guidelines for assessing forest degradation. The document pulled together a range of views and approaches to the assessment of forest degradation and was a precursor to the development of comprehensive guidelines for assessing forest degradation.³⁸ However, these guidelines have been not globally implemented.

In the same line, the Ministerial Conference on the Protection of Forest in Europe (Forest Europe), through the Pan-European Forest Process, has developed the Criteria and Indicators for Sustainable Forest Management in

³⁸ The complete document is available at: <http://www.fao.org/3/a-i2479e.pdf>

Europe and has developed the Operational Level Guidelines. Under these guidelines, European countries have agreed on a definition and methodology for reporting degraded forestland.³⁹ The forest degraded definition refers to “forest land severely damaged by e.g. desertification, fires, grazing, air pollution, erosion, unsustainable management, etc. that lost tree cover and with soil damaged to a degree, that severely hampers or delays the re-establishment of stocking.” (UNECE, FAO & Forest Europe, 2018). This definition and methodology will be used by European countries in the FRA 2020 reporting.

Through the FRA 2020, countries will report on existing definitions and describe their forest degradation monitoring systems and results. The countries’ inputs will serve further analysis of how data on degraded forest could be collected and analyzed in the future.

Data availability, data providers and data compilers

Inadequate

Data on forest degradation are not collected systemically for all countries and territories.

Calendar

Inadequate

No systematic data collection for all countries and territories.

2.3.2. Indicator 13: Number of forest-dependent people in extreme poverty

Concepts and definitions

Inadequate

This indicator is not conceptually clear. The relevance and comparability of this indicator rely on the clear and agreed-upon definition of forest-dependent people and on the decision of the method for measuring extreme poverty.

The term forest-dependent people is widely used to describe human populations that gain some form of benefits from forests. A number of authors have studied the concept since decades. A recent study on the issues related to forest-dependent people and the role of forests in poverty eradication and food security was conducted by Joshi in 2018 for the UNFF Secretariat. This author concludes that “there seems to be a general acceptance in the literature that it is based on a few key elements - proximity, connectedness, sense of place, cultural/spiritual link, subsistence, income and employment in forest products and services industries, and reliance on forest-based environmental benefits including, climate change, water, pollination and recreation” (p. 14). The author also suggests to consider a list (livelihoods and spatial relationship seem the main dimensions prioritized by the author) as a starting point for identifying forest-dependent people.⁴⁰

Forest-dependent people concept does not have a consensus and, even if they can be circumscribed, their measurement is subject to several challenges and limitations. While Joshi (2018) provides a primary categorization and a better identification of the scope concept, it needs to be further refined in light of the indicator objective and making this concept operational for countries wishing to undertake data collection.

³⁹ The guidelines can be consulted at https://foresteurope.org/wp-content/uploads/2016/10/3AG_UPI_Updated_Backgr_Info.pdf

⁴⁰ The list includes: Indigenous people who reside in forests since ancient time and rely on forests for their subsistence as well as for social, cultural, and spiritual values; Shifting cultivators, nomadic forest-dwelling people, hunters and gathers; Rural small farmers (or peasantry) within and in periphery of forest areas, who rely on forests for their livestock, firewood, plant and animal based food, farm fertilizers, etc. for subsistence; Rural People, living in or at the margins of forests; Forest labor; Forestry professionals; Owners and workers in forest-based enterprises, whose livelihoods are dependent on supply of forest goods and services; Urban dwellers who enjoy forests for recreational and environmental values; and Public at large (domestic and global).

In relation to the data required for the calculation of extreme poverty, it is needed to revise the methods currently used by countries and decide which of them are the most convenient for the indicator construction, in terms of the quality and availability of data. The approaches to analyses in the attainment of data on extreme poverty are: (i) the International Poverty Line and/or National Poverty Line (indirect method) and (ii) the Multidimensional Poverty Index (direct method). The method used in the calculation of the SDG 1.1.1: Proportion of population below the international poverty line, by sex, age, employment status and geographical location (urban/rural) is the indirect method.

Methodology

Adequate

To achieve the number of forest-dependent people an internationally established methodology and standards are not available. Some estimations were made at global and national levels using information of different studies. As recommended, a primary categorization on whom can be considered as forest-dependent people based on the proximity to forest, could serve as a starting point to make the concept operational for countries. In this case, the proximity threshold needs analyzed in order to reflect local specificities.

It is not assured that surveys can provide representative data on forest-dependent people. Reaching this population is operationally challenging and costly. If this is the case, a computation method using available data from household surveys on extreme poverty crossed with data on forest proximity (with georeferenced data of the population censuses and/or agricultural censuses and/or National Forest Inventories), could be developed and tested.

Livelihood dimension could also be analyzed from the perspective of the income from a forest-based economic activity or a subsistence activity. Including forestry workers, professionals, owners of forest-based enterprises or urban dwellers would be possible through existing data from sectoral surveys. Other data collection instruments are required in terms of targeting population that derive most of their income or subsistence from the forest and which are either in poverty or on the edge of it. However, from a data collection perspective, reaching this target group would be operationally challenging and costly, given that most existing surveys, including agricultural and household surveys, tend to exclude or badly cover indigenous populations living in forests, nomadic cultivators or even small farming units with an area below the survey inclusion thresholds (e.g. half a hectare or less).

Extreme poverty

When talking about poverty, there is a certainty that there is a consensus on what it means. Based on this indicator under analysis, the methodological proposal must contain two elements: i) the concept of poverty; ii) the measurement methodology that allows accounting for the extent of poverty, its evolution over time and the comparison between countries.

Of the two elements, greater importance has been given to the measurement precision and accuracy. The measurement requires a clear and precise reference: basic conditions for surviving. As mentioned before, any poverty measurement is based on a previous definition of the concept. This is the reason why poverty indicators vary according to the approach from which they start. In recent decades, the understanding of poverty contents can be grouped into three broad categories:

- a) Poverty contemplated from the perspective of income and that exclusively considers the minimum requirements for survival;
- b) Poverty based on basic needs, from the most basic ones such as education, health and housing, which include other requirements needed for an adequate social life; and
- c) Relative deprivation, which establishes a more comprehensive view of the person, and is defined when people are prevented from welfare opportunities to which they could have access.

When determining the poverty threshold, the question that arises is what is most appropriate for this, income or consumption. Depending on the option adopted, two measurement methods are distinguished:

- a) The indirect method: so-called since it establishes the threshold through an intermediate element such as the income that people or households have. It can be affirmed that if such amount is available, it is potentially sufficient to acquire the goods and services considered minimum; and,
- b) The direct method, which starts from satisfaction results data, that is to say of the needs actually covered, for which it uses the actual consumption data.

The reality is that, in terms of practical reasons, greater ease of measurement and data availability, the most commonly used method has been the indirect method that is based on income levels as a criterion for determining poverty. The basic tool of this method is the poverty line, which determines the theoretical income necessary to cover the minimum quality of life requirements of any person or any household in a given country. A person or household is considered as poor if they are located below the poverty line. Two levels are often distinguished: extreme or indigent poverty, which sets the income necessary to cover food needs; and moderate poverty "or simply poverty" which also includes minimum non-food needs. Therefore, the poverty lines offer a clear and unequivocal criterion of poverty; they are the mechanism to determine who are poor.

The methodologies used to elaborate the poverty lines in the poorest countries can be reduced to two: a) those adopted by the WB, which serves as a reference to set the global objectives of the fight against poverty;⁴¹ and b) those prepared by each country from the determination of a basic reference of real needs, known as a basic basket.

National poverty is a different concept than global poverty. National poverty rate is defined at country-specific poverty lines in local currencies, which are different in real terms across countries and different from the \$1.90-a-day international poverty line. Thus, national poverty rates cannot be compared across countries or with the \$1.90-a-day poverty rate.

On the other hand, the direct method or the approach to basic needs starts with the need to find other references for poverty, which would give greater guarantees of both covering and measuring poverty in its complexity. The central characteristic is that it intends to take into account the real levels of deprivation, directly addressing the needs of people in meeting the needs that are considered basic. To do this, defining what is considered as basic needs become a fundamental issue.

Similar as in the indirect method, the poverty line according to income serves to set the poverty threshold. The method of unsatisfied basic needs (NBI) is also proposed to define a poverty threshold from basic needs.⁴² In addition, the United Nations Development Program (UNDP) together with the Human Development and Poverty Reduction Initiative, Oxford University, (OPHI) launched the proposal for multidimensional poverty (UNDP, 2010).⁴³ The Multidimensional Poverty Index (MPI) measures the multiple deficiencies faced by poor people at

⁴¹ In 1990, the WB proposed defining the world poverty line. To do this, the national poverty lines of a group of the poorest countries were taken, converted to dollars using purchasing power parity (PPP), averaged and obtained a poverty line that was approximately US\$ 1 a day for person. In 2005, the international poverty line was revised and set at US\$ 1.25 per day a person. The most recent revision has set the level at US\$ 1.90 a day, which is the new line that measures extreme poverty. With this new indicator, in 2015 there were 700 million people in extreme poverty, slightly less than 10% of the world's population. Two central criticisms are made of this WB methodology. First, that poverty has many other dimensions than income. The second, which takes as reference the poverty lines of certain poor countries but does not make an objective assessment of the person's needs. That is, there is no basis to be able to affirm that the level of income that it establishes is sufficient to cover the most basic needs of a person.

⁴² In this method, first, the needs to be taken into account and their corresponding indicators are selected. Second, an ideal value is defined for each indicator, understanding that whoever is below it is considered poor. Subsequently, household surveys are conducted to know the reality of the satisfaction of these needs according to the levels that have been set for each of them as minimum. In principle, the basic needs approach broadens the concept of poverty as mere biological subsistence, by introducing other minimum requirements for people to be considered as active members of the societies or communities where they live, and not only from family or individual requirements of survival and efficiency.

⁴³ The starting point is that, although most of the countries of the world define poverty as lack of money, however, the poor themselves consider their experience of poverty to be much broader than the lack of income. A person who is poor may suffer multiple disadvantages

the same time in areas such as education, health, among others. It allows comparisons to be made between countries and regions, as well as within each country according to ethnic groups, urban or rural areas, as well as other characteristics of households and the community.⁴⁴

While the concept of extreme poverty is intrinsically multidimensional and it cannot be fully summarized in a monetary metric, most countries that measure poverty through national-scale surveys use monetary indicators. Poverty thresholds provided by the WB or the United Nations, among others, are also based on monetary values. Measuring poverty and extreme poverty through the monetary lens offers the benefit of simplicity and compatibility with existing data collection instruments at national or international scales. Non-monetary concepts, while they are fully valid from a theoretical perspective to measure poverty, are difficult to implement in practice. Furthermore, assuming that these concepts can be measured, they would need to be combined into a single metric if they are to be used to categorize households according to their poverty status. This aggregation process is fraught with uncertainties and biases, as the choice of weights necessarily includes a certain degree of subjectivity.

Finally, although reducing the measurement of extreme poverty to monetary poverty may be limiting, it is also true that many of the non-monetary indicators of poverty are correlated to monetary income or a proxy of it. For example, variables such as the type of housing, education level or access to health services are known to be closely correlated to household income. Hence, - from a cost-efficiency perspective –using data on monetary income for the targeted households may be sufficient to cover monetary as well as at least some (apparently non-monetary) components of extreme poverty.

Data sources

Adequate

Very few countries have nationally representative surveys that adequately cover the socio-economic conditions of forest-dependent people. In the sampling of forest-dependent people, population censuses and/or agricultural censuses and/or National Forest Inventories georeferenced data could serve as a starting point.

To measure the extreme poverty, households surveys (Household Income and Expenditure Survey -HIES, Household Budget Survey –HBS, Living and Standard Measurement Study -LSMS) are the mean commonly implemented.⁴⁵ However, challenges of measuring poverty remain. According to WB (2016), "the timeliness, frequency, quality, and comparability of household surveys needs to increase substantially, particularly in the poorest countries. The availability and quality of poverty monitoring data remains low in small states, countries with fragile situations, and low-income countries and even some middle-income countries" (p.2). From the quality perspective, as the surveys include detailed questions on sources of income and how it was spent, the

at the same time, for example, may be in poor health or undernourished, lack clean water or electricity, have a precarious job or have very little education. In conclusion, focusing on a single factor, such as income, does not capture the true reality of poverty. Multidimensional poverty measures allow a more complete picture and show who they are poor and how they are, that is, the set of different deficiencies they experience.

⁴⁴ The MPI consists of three basic dimensions: education, health and quality of life. Within each one, several indicators are presented, two for each of the first two and six for the third. The indicators are as follows: a) Education: i) years of schooling: no access if no household member has completed five years of schooling; ii) school children: no access if school-age children do not attend school; b) Health care - health: i) infant mortality: if a child has died in the family; ii) nutrition: no access if an adult or child is malnourished; c) Quality of life - social welfare: i) electricity: no access if the household has no electricity; ii) sanitation: no access if the home does not have a bathroom with sufficient conditions or if its bathroom is shared; iii) drinking water: no access if the household does not have access to drinking water or drinking water is more than 30 minutes walk from home; iv) soil: no access if the floor of the home has dirt, is sand, earth or manure; v) household fuel: no access if cooked with firewood, coal or manure; vi) goods: no access if the household does not have more than one of the following goods: radio, television, telephone, bicycle or motorcycle. A person is considered poor if they do not have access to at least 30% of the weighted indicators (UNDP, 2015).

⁴⁵ Other sources have been identified as collecting data in forest income. For example the Living Standard Measurement Study– Integrated Surveys on Agriculture (LSMS-ISA), the National Socioeconomic Surveys in Forestry, the National Forest Monitoring Systems (NFMSS)- Forest Surveys and the surveys of the Centre of International Forestry Research - Poverty Environment Network (CIFOR-PEN) are good examples. Sessions 3.3 and 3.4 of this document elaborate more on these sources.

data quality is highly dependent on the accuracy of respondents' answers and the trained personnel who recorded the information.

Another issue is concerning to comparability. Comparisons of countries at different levels of development also are problematic because of differences in the consumption of nonmarket goods, as the local market value of all consumption in kind (including own production) need to be included in total consumption expenditure. Most survey data now include valuations for consumption or income from own production, but valuation methods vary (WB, 2016).

Data availability

Inadequate

There is little reliable data source on forest-dependent people. Some estimations were made at global or national levels through different studies by organizations based on different definitions, understanding and assumptions. For example, Chao (2012) compiled estimates on numbers of forest-dependent people from studies published between 1994 to 2011. However, the report showed how estimates vary depending on the definitions used and data sources implemented.

The picture is somewhat better in terms of poverty data since a good number of countries produce information on such a topic. The adaptation to the concept of poverty in each country can vary significantly, as well as the means used for data collection, and the coverage of the sample. However, it is complex at the moment to establish with certainty which countries and through which means can provide data related to extreme poverty among people who depend on the forest.

The Global Poverty Working Group of the WB (GPWG) is in charge of the collection, validation and estimation of poverty estimates. GPWG archives the datasets obtained from NSOs and then harmonizes them, applying common methodologies. The objective of the GPWG is to ensure that poverty and inequality data generated, curated, and disseminated by the WB are up to date, meet high-quality standards, and are well documented and consistent across dissemination channels. Poverty indicators include the poverty headcount ratio, poverty gap, and number of poor at both international and national poverty lines.

There is no imputation in the traditional sense for missing country data. However, to generate regional and global aggregates for reference years, country-level data are imputed for the years when surveys are not conducted. These imputed data are to be used for aggregation, but not for replacing the actual survey data.

WB (2016) states regarding data availability (measured in terms of the number of countries that have at least 1 data point by region):

- 2010 to present: Asia and Pacific: 23 (40 if modelled estimates are considered); Africa: 23 (48 if modelled estimates are considered); Latin America and Caribbean: 19 (21 if modelled estimates are considered); Europe, North America, Australia, New Zealand and Japan: 17 (25 if modelled estimates are considered).
- 2000-2009: Asia and Pacific: 38 (40 if modelled estimates are considered); Africa: 47 (48 if modelled estimates are considered); Latin America and Caribbean: 21 (21 if modelled estimates are considered); Europe, North America, Australia, New Zealand and Japan: 20 (25 if modelled estimates are considered).

Calendar

Adequate

At country level, survey data production varies. Some surveys are produced every year, and others are less frequent.

At global level, the GPWG updates poverty data every year, data are released at the World Bank's Annual Meetings in October every year.

Data providers

Adequate

Data on poverty are collected by NSOs at country level; however, 30 percent of middle-income countries do not monitor poverty.

Data compilers

Fully adequate

As mentioned, the GPWG of the WB is in charge of the collection, validation and estimation of poverty estimates.

2.3.3. Indicator 14: Contribution of forests and trees to food security

Concepts and definitions

Fully Adequate

Indicator is conceptually clear. The World Food Summit (1996) provided an internationally recognized definition for Food Security and Nutrition (FSN) and its four main dimensions.⁴⁶

The High-Level Panel of Experts (HLPE, 2017) provided a comprehensive analysis of the diverse, direct and indirect, contributions of forests and trees to FSN, also reviewed the state of the world's forests and identified challenges and opportunities for forestry in relation to FSN and discussed how to optimize the contributions of forests and trees to FSN in a sustainable manner.

From the HLPE (2017), it is possible to list the direct and indirect contributions of forests, trees and agroforestry to FSN in the following table:

Table 3. Direct and indirect contributions of forests, trees and agroforestry to FSN

Direct provision of food	<ul style="list-style-type: none"> Contribute to dietary quality and diversity and play a critical role in the FSN of forest-dependent communities. Contribute to diverse and balanced diets for people living far from forest. Provide animal-sourced foods: bush meat, fish and aquaculture, and insects. Trade of forest products in national and even international markets. Use as a source of fodder by farmers and pastoralists in traditional extensive systems and in more intensive silvo-pastoral systems. Have a critical role to buffer food scarcity.
Provision of bio-energy, especially for cooking	Wood energy is often the only source of energy available and accessible in rural areas and is especially important for poor people in developing countries, particularly in Africa.
Contributions to economy and livelihoods	<ul style="list-style-type: none"> Income generation from the sale of wood and Non-Wood Forest Products (NWFPs). Generate forest-related employment. Gender roles.
Provision of ecosystem services, essential for agricultural production	<ul style="list-style-type: none"> Water regulation. Soil formation, protection and nutrient circulation. Agroecosystem stability, biodiversity protection and downstream resources. Pollination. Synergies and trade-offs.
Forests, health and well-being	Forests, tree-based agricultural systems and forestry impact human health in a diversity of ways, including provisioning of food, medicinal plants, fuelwood, clean water and income, as well as mediation of disease transmission and mental health improvements associated with time spent in nature-based recreation.

⁴⁶ Consult <http://www.fao.org/WFS/>

Contributions to the resilience of food systems	Forests and trees can play a crucial role to improve resilience of food systems, defined as the capacity to prevent, mitigate or cope with risk, and recover from shocks, at household, community and landscape level.
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Source: HLPE, 2017

Methodology

Inadequate

This indicator has not an internationally established methodology and standards available, and data are not regularly produced by countries.

Measuring the contribution of the forest and trees to FSN is paramount for designing and evaluating policies and programs. Nevertheless, due to the concept being multidimensional, finding an appropriate method for its measurement is challenging.

Different methods have been developed to measure FSN in the world. The Food Insecurity Experience Scale (FIES), developed by the initiative "Voices of the Hungry" of FAO can be considered as an example of how FSN has been measured in some countries.⁴⁷

According to FAO (2018a), the best option for using the FIES is by implementing it within a well-established, ongoing, government-administered survey. Embedding FIES measurement into an existing survey structure is preferable to creating an ad-hoc new survey, as adding a module is less costly and less time-consuming. Many types of surveys can be used as appropriate vehicles for the FIES survey module (FIES-SM), from censuses to National Household Income and Expenditure surveys; Labour surveys; Agriculture surveys and Health and nutrition surveys. Besides, several features of existing surveys must be analyzed to identify the most appropriate one for the FIES.

The choice of the methodology to be used to produce data that allows countries to report the FSN indicator deserves a thorough discussion during the EWS.

However, some insights will be provided around the utilization of FIES approach: (i) FIES method is an indicator based on a perception of food insecurity, as it is designed it cannot give indications on the objective contributions of forest and trees to FSN. (ii) The possible alternative to be implemented for collecting information through the FIES method (which has been implemented across several countries to measure the different dimensions of food insecurity and construct a metric to assess the number of food-insecure people in the world); could be -for example- by adding additional questions on the food that is provided directly from the forests and the frequency of consumption of those products. However, other contributions of forest to FSN would be out of the analysis.

Moreover, measuring the food that is provided directly from the forests is particularly complex for undertaking, due to the nature of the set of products that are provided by forests, such as wild nuts, berries, roots, fruits and bush meat, that are typically not or badly captured by using existing data collection instruments. Consequently, they are not or are badly reflected in food-balance sheets in terms of product availability, use and respective nutrition factors. Their contribution to FSN is therefore largely impractical to estimate from existing information on commodity or food balance sheets and often limited to context-specific academic studies focusing on certain areas, populations and forest-products.

⁴⁷ The FIES was developed to measure the prevalence of food insecurity. It is an experience-based metric of food insecurity severity that relies on people's direct responses to questions about their experiences facing constrained access to food. Voices of the Hungry developed the analytical protocols necessary to take experience-based food security measurement global, making it possible to compare prevalence rates across countries and even sub-national populations. The FIES-SM questions refer to the experiences of the individual respondent or of the respondent's household as a whole. The questions focused on self-reported food-related behaviors and experiences associated with increasing difficulties in accessing food due to resource constraints. During the last 12 months, was there a time when, because of lack of money or other resources: 1. You were worried you would not have enough food to eat?; 2. You were unable to eat healthy and nutritious food?; 3. You ate only a few kinds of foods?; 4. You had to skip a meal?; 5. You ate less than you thought you should?; 6. Your household ran out of food?; 7. You were hungry but did not eat?; 8. You went without eating for a whole day? More information can be consulted at <http://www.fao.org/in-action/voices-of-the-hungry/es/>

To address this data gap, the first solution would be recommending countries to design a specific survey or data collection instruments targeting forest-dependent people and collecting first-hand information on the direct dependence of food obtained from the forest. However, this type of specific surveys would be costly and the sample especially complicated to select. Indeed, people that depend on forests for their direct provision of food are typically located in remote areas uncovered by most surveys (such as household or agricultural surveys). Obtaining a representative sample of this population would be costly (population and agricultural sample frames coming from censuses may be used, but only to a certain extent) and the operational organization of such a survey like this would be complex and resource-intensive.

Appending a specific module to household surveys to collect information on the consumption of forest products may not be the solution given the differences in the target population and therefore in the sample and the fact that household surveys are already lengthy and their implementation represent a high burden for statistical offices across developing countries.

It is also important to conduct an assessment on the share of the population that is likely obtaining food directly from the forest to prioritize the efforts in the areas or countries where this is an important issue. At a national level, given the high urbanization rates in most of the developed and developing countries, this share will likely be small. Hence, the global contribution of these products to global FSN is also likely to be small. In certain areas and for specific populations, the contribution of these products may be disproportionately high. Having said this, the question remains if national or large-scale data collection systems should be designed and implemented to capture the direct provision of food to better measure food security/insecurity at country-level.

To group all contributions of forest to FSN in one indicator is challenging. For this indicator perhaps is needed to adopt a sub-indicators approach. In this case, the report on indicators 10 and 12 can be used as a proxy of the contributions of forest to employment and wood energy provision. It is needed to consider that the use of these indicators may increase the risk of overlapping.

Concerning the provision of food sub-indicator, some of the challenges associated with its measurement were mentioned previously.⁴⁸ Regarding the ecosystem services sub-indicator, measuring the indirect contribution of forests through the services that they provide in terms of water recycling, soil quality, wind barriers, creation of micro-climate, etc., that benefits agricultural yields and production makes theoretical sense and would greatly increase the contribution of forests to FSN. Nonetheless, the measurement of these effects at large scale is impractical, fraught by uncertainties and biases at multiple levels (e.g. spatial aggregation of effects), complex (and therefore difficult to implement) and costly.

Data sources

Inadequate

Data on contribution of forest to FSN is not collected systemically for all countries and territories.

Data availability

Inadequate

Data not available for all countries and territories.

Calendar

Inadequate

No systematic data collection for all countries and territories.

Data providers

⁴⁸ However, the option of reviewing in detail the data collected through the Food Balance Sheets should be explored to analyses the potential of this database in terms of the provision of figures on the production of fruits and nuts from dispersed trees and forest.

Inadequate

Data not available for all countries and territories.

Data compilers

Inadequate

Data not available for all countries and territories.

2.3.4. Indicator 15: Financial resources from all sources for implementation of Sustainable Forest Management (SFM)

Concepts and definitions

Adequate

For this indicator, the concept of SFM is clear and internationally accepted.⁴⁹ Indeed, SFM is a central concept for SDG Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss; and for the indicator 15.2.1: Progress towards sustainable forest management, which is already reported through the FRA.⁵⁰

Concerning GCS of forest indicator 15, this indicator has an equivalent SDG indicator that is the indicator 15.b: Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation.⁵¹

Despite the concept of Financial Resources for Sustainable Forest Management has a stand-alone SDG indicator, there is no internationally agreed definition. To make the concept operational for countries, it is suggested to use the definition provided by Singer (2016) as a starting point: "Financial resources for SFM also called "SFM financing" are the financial resources that contribute directly or indirectly, explicitly or implicitly, to the sustainable forest management of any type of forest or trees outside of forest" (p.97).

Financial flows from a wide range of sectors and policy areas (e.g. agriculture, mining, infrastructure, governance, rural development) can have an impact on forest. In existent studies, the use of terms to describe categories of finance are found. For example, the concepts of "SFM Financing" and "Forest Financing" are utilized; however, they are used indiscriminately, even when they come from different ideas.

"Forest financing can be defined as all financing sources that flow into forest sector activities, including conservation, community forestry, forestry training, policies and administration, and forest-related industries, notably timber. This may include financing flows for unsustainable practices such as over-logging. By contrast, SFM financing includes parts of, but is not limited to, forest sector financing: it can also include flows in other sectors that positively impact on SFM such as forest eco-tourism, agroforestry (often accounted as part of agriculture) and alternative energy sources (which impact on the use of fuelwood)" (Singer, 2016, p.97).

According to the author, in some circumstances, the so-called SFM financial flows could have negative impact on the forest and be the causes of deforestation by promoting the expansion of agricultural commodities areas. On the contrary, some financial flows that are not labelled as SFM may bring positive impacts in forest e.g., biodiversity finance or REDD+ initiatives. Thus, financial resources for SFM are difficult to register, given the

⁴⁹ Sustainable Forest Management is defined by UNFF as "a dynamic and evolving concept [that] aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations" (UN Forest Instrument, 2007). It therefore includes all types of forest management which are sustainable over time such as, inter alia, sustainable logging, community forestry, conservation and protection.

⁵⁰ Consult the methodological sheet for this indicator at: <https://unstats.un.org/sdgs/metadata/files/Metadata-15-02-01.pdf>

⁵¹ The methodological sheet for this indicator as it has been developed at the moment of finalizing this background document can be consulted at <https://unstats.un.org/sdgs/metadata/files/Metadata-15-0b-01.pdf>.

different definitions of sustainability used by countries and sectors (agriculture, forestry, energy, tourism) and especially due to the overlapping of activities and their impact between sectors. A holistic approach to conceptualize and register SFM financing based on the source of flows and cross-sectoral interactions is recommended when trying to assess the SFM financing.⁵²

Climate Focus (2017) mentioned two other terms are used when describing categories of finance: "Green Finance" that describes finance that is aligned with objectives for the conservation, protection or sustainable use of forest –or what is referred to as forest and climate goals. This includes finance provided with a clear and stated objective of climate mitigation in the forestry sector, REDD+, conservation and sustainable forest and land use; and "Grey Finance" that describes finance that has not stated objective to positively impact the forest but has the potential to have an impact on forest. Whether this impact is positive or negative depends on the policy context, as well as the design and implementation of these activities.

It is important to clarify that flows in the forest sector that lead degradation or deforestation are not included in the concept of SFM finance.

SFM financial flows may consist of any type of financial instrument, including grants, loans, subordinated or concessional loans, equity, guarantees, bonds and others.

When using the SFM financing based on the source of flows the following categories can be distinguished:

- Public International Financing, consisting in official development assistance (ODA) and other cross-border financial flows, from public entities, including AID agencies and multilateral institutions.
- Public Domestic Financing, consisting in national budget allocation to forest, which itself is sourced mainly from taxes.
- Private Financing includes all financial flows from private entities at all levels. Private financing may happen at any stage of the value chain of forest products or products with a potential impact on both sustainable and sustainable outcomes.

Methodology

Inadequate

This indicator has no internationally established methodology and standards available, and data are not regularly produced by countries. Consequently, there are data gaps at all levels, domestic and international, public and private. In particular, there is a lack of data on private financing. In addition, there are overlaps in finance flows between different tracking initiatives and there are different methods applied in the tracking and reporting of SFM financing, definitions between data sources vary and make it difficult to provide a systematic overview of SFM finance.

Public International financing are reported by donors to the OECD-DAC database by following the OECD methodology.⁵³ Public Domestic Financing in forest has been reported by countries to the FRA.⁵⁴

Data availability

Adequate

⁵² Find the complete analysis in <https://www.ingentaconnect.com/content/cfa/ifr/2016/00000018/00000001/art00008#>

⁵³ Methodology can be consulted at <http://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/>

⁵⁴ Statistics on Environmental Protection Expenditure (EPE) and Resources Management Expenditure developed in the System of Environmental-Economic Accounting-Central Framework (SEEA, 2012) can be considered as a methodological example. The problem with the EPE accounts might be that they do not give enough detail concerning the area of environmental protection; e.g. the European Union uses the Classification of Environmental Protection Activities (CEPA) under which CEPA 6 digit-level stands for "Protection of Biodiversity and Landscapes". At this level countries need to report for government expenditures – without providing further details on which proportion is dedicated to forests and which to other types of ecosystems.

In general, there is not systematic information available on domestic investment or private foreign investment in the forestry sector in developing countries.

At present, information available only on Public Domestic Financing, even those data are often inaccurate and incomplete. For Public International Financing category, the Development Assistant Committee of the OECD (OECD/DAC) has a database on forestry-related ODA which is systematically recorded in aggregate figures and on a project-by-project basis. However, the ODA sector figures need to be treated with caution. They are the best estimates available, but it is increasingly difficult to estimate ODA sector flows because of integrated programs (for example, climate change financing and sustainable landscape management) and budget support, or better say, OECD/DAC reflects figures for the forest sector rather than SFM (Singer, 2016).

Other limitations on data availability were mentioned by the Programme on Forest (PROFOR, 2014):

- Data are available for forest direct investment but not for domestic investments or portfolio investments;
- International public databases depend for the most part on national reporting organizations, and hence the available data is of varying quality;
- Data on processing are more widely available than data on forestry investments;
- Cross-country comparison suffers from different data collection methodologies and double counting of international flows;
- and multi-sectoral nature of forest investments makes classification of investments difficult and often inconsistent.

Data sources

Inadequate

This organization has been collecting data on official and private resource flows from 1960 at an aggregate level and since 1973 at activity level through the Creditor Reporting System (CRS data are considered complete from 1995 for commitments at an activity level and 2002 for disbursements).

Sources of SFM Public Domestic Financing data are included in the general government expenses are registered in the country's budget, accounting records, administrative records and economic surveys.

No source of data on SFM private financing currently exist.

Data providers

Inadequate

Data on SFM Public International Financing is provided to country donor to the OECD/DAC. At the national level, SFM Public Domestic Financing data come from the central bank or statistical reporters in national administrations (AID agencies, Ministries of Foreign Affairs or Finance, NSOs). In some cases, these institutions provide publicly available data, but generally, forest financing data are not disaggregated.

There is no coordinated effort to collect information on SFM private financing.

Data compilers

Adequate

The OECD/DAC has been collecting data on official and private resource flows from 1960 at an aggregate level and since 1973 at activity level through the Creditor Reporting System (CRS data are considered complete from 1995 for commitments at an activity level and 2002 for disbursements).

FRA collects information on SFM Public Domestic Financing.

Calendar

Inadequate

Data reported to OEDC/DAC have an annual calendar year basis. The recommendation is to produce this information every year, but data availability is not ensured.

3. Analysis of major potential sources of data for GCS Tier 2 and Tier 3 forest-related indicators

There is not any single standardized, complete and updated source of information for all countries, covering all domains of the GCS of forest-related indicators. Nevertheless, agriculture, forestry and fishing matters have been included as a central domain in most international recommendations of large-scale operations such as censuses and surveys, international classifications, and specialized studies.⁵⁵

This chapter presents the result of a review concerning forest statistics and indicators, produced especially for the countries with less developed statistical systems. Indicators are the focus of this document; however, it considers statistical data more widely as long as it can be used as support to produce the GCS of forest-related indicators. This assessment aims to evaluate the current statistics in the countries and thus determine their capability to produce forest statistics on a sustainable basis. The task begins with a review of the international recommendations for implementing statistical operations (censuses and surveys), based on the contrast of what is available in the survey questionnaires that are accessible to the public under the heading "forest".

This analysis cannot go beyond the international organizations' databases to understand the current and potential ability of statistics, the quality of statistics relevant for forest indicators, institutional settings and constraints that countries face while collecting, processing and disseminating data. However, from the analysis, it is possible to state that a basic set of agriculture, forestry and fishing statistics is produced almost everywhere. Some of the countries, apart from carrying out censuses, regularly produce basic data on the presence of forest/wooded area/communal forest, area of the forest/wooded area, the main purpose of the wooded area, different practices implemented such as logging, collection of forest products, agroforestry, among others. Countries collect basic data which can be (though not necessarily are) used for calculating forest-related indicators.

Besides the usual actors relevant for agricultural statistics – NSOs, Ministries of Agriculture, Forestry and Fisheries, there are stakeholders of growing importance for the forest domain as the Ministries of Environment or other institutions concerned with the environment. In most of the countries, agricultural statistics continue to be developed mainly by the Ministries of Agriculture, Forestry and Fisheries rather than by NSOs.

3.1. The World Population and Housing Census Programme and GCS Tier 2 and Tier 3 indicators

According to the 2020 World Population and Housing Census Programme, "the population and housing censuses are one of the primary data sources needed for formulating, implementing and monitoring policies and programmes aimed at inclusive socioeconomic development and environmental sustainability." Population and housing censuses are described as an important source for supplying disaggregated data needed for the progress measurement the 2030 Agenda, especially in the context of assessing the situation of people by income, sex, age, race, ethnicity, migratory status, disability and geographic location, or other characteristics (UNSD, 2019).

⁵⁵ According to the International Standard Industrial Classification of All Economic Activities (ISIC, Rev.4, 2008), as a response to continuing requests for more detail in the area of agriculture, mostly due to the fact that agriculture is an important part of the economic structure in many countries, the section has been expanded and the detail under this new ISIC, Rev.4 section A for Agriculture, forestry and fishing has been substantially increased. The section includes the exploitation of vegetal and animal natural resources, comprising the activities of growing of crops, raising and breeding of animals, harvesting of timber and other plants, animals or animal products from a farm or their natural habitats. More detail can be consulted at https://unstats.un.org/unsd/publication/seriesM/seriesm_4rev4e.pdf.

Population and housing censuses provide data useful to calculate GCS forest-related indicators, such as detailed statistics on small areas and small population groups, their composition, characteristics, spatial distribution and organization (families and households), without (or minimum) sampling errors.⁵⁶ Another possible contribution of the population and housing censuses is their support to the construction of the national statistical system, by providing the sampling frame for thematic censuses such as economic or agricultural censuses or special housing and related surveys during the intercensal years.

In countries where households are the main agricultural producers, population and housing censuses can be a possible source of information for constructing an agricultural census frame. On this topic, the previous population census guidelines (2010 round) did not cover agricultural data, except for some items that could be used as a proxy to measure agricultural labour.⁵⁷ Some countries used those proxy items to identify people in agricultural occupations and industries, based on their national occupation and international industry classifications. Nevertheless, data obtained present limitations for building a reliable frame for agricultural censuses. One limitation was the reference period used and the other was the relationship between the household and the agricultural holding.

Concerning the reference period, population and housing censuses generally have a short reference period, (such as the day or the seven preceding days of the interview). The measurement of agricultural activities requires long reference periods because of the seasonality of agricultural work.⁵⁸

Regarding the relation between the household and the agricultural holding, though there exists a one-to-one relationship between households with own-account agricultural production and agricultural holdings in some developing countries, this is not very common in general and hence very difficult to establish a one to one correspondence between households and agricultural holdings which hinders the use of population and housing census for agricultural related data analyses.

As it is known, during population and housing censuses' fieldwork, it is common to find several households located in the same holding (in many cases the administrator or the farm employees and their families living within the farm, and the producer's family).⁵⁹ In these cases, the relationship of households with agricultural holdings is not one-to-one. This fact restricts the possibility of constructing an agricultural sampling frame for population censuses.

The above limitations encouraged FAO and some UN divisions and agencies,⁶⁰ the GSARS and the Paris21 Initiative to consider the development and promotion of an integrated approach to link agriculture into population and housing censuses. As a result, the "Guidelines for Linking Population and Housing Censuses with Agricultural Censuses with selected country practices" were developed. The purpose of these guidelines is to provide information to census planners about practical ways of linking the two censuses. In this document, suitable agricultural data items to include in a population and housing census, and suggested questions to elicit those data are proposed.⁶¹

⁵⁶ Data can be presented for any geographic unit without following administrative units, and small-area data can be combined to approximate natural regions, for example, forest (UN, 2017, p.1).

⁵⁷ From the 2010 World Census Programme on Population and Housing Censuses guidelines (UNSD, 2008) it has been recommended the collection of items related to: main occupation, industry of main occupation and employment status in main occupation.

⁵⁸ However, to overcome this problem, UN, 2017 recommends that information should be collected on all people who carried out agricultural activities during the year preceding the population census day. The information to be collected should include the occupation and status of employment of all agricultural jobs and could be expanded to cover working time and whether the job was performed as a main or secondary activity.

⁵⁹ According to FAO (2015) there are two special cases where the agricultural holding and household concepts may diverge: If there are two or more units making up a household, such as where a married couple lives in the same dwelling as their parents, the two units may operate land independently but, as members of the same household, they make common arrangements for food and pool incomes. In addition to an individual household's agricultural production activities, a household may operate land or keep livestock jointly with another household or group of households. In this case, there are two agricultural holding units associated with the household and two sets of activities: (i) the agricultural production activities of the individual household itself; and (ii) the joint agricultural operations with the other household(s).

⁶⁰ UNSD, UNECE, UNFPA, UNECA, among others.

⁶¹ The guidelines provide an overview of data related to agriculture in past population and housing census rounds and their limitations; reviews recommendations made by FAO and other UN agencies for coordinating and linking the two censuses; looks at best practice from

In a complementary way, the Principles and Recommendations for Population and Housing Censuses, Revision 3 (UNSD, 2017), provides a recommended list of topics related to agriculture that can be collected through population and housing census questionnaires. The list includes core topics collected directly, derived core topics and additional topics (the list of population census topics, the core, derived and additional ones, is presented in Annex 2). The selection of the census topics is based on national data needs, international comparability and resources available for the census.⁶²

Based on the recommendations the topics for population and housing census are grouped into nine categories as follows:

1. Geographic and internal migration characteristics,
2. International migration characteristics,
3. Household and family characteristics,
4. Demographic and social characteristics,
5. Fertility and mortality,
6. Educational characteristics,
7. Economic characteristics,
8. Agriculture,
9. Housing characteristics.

Two additional agricultural topics: *own-account agriculture production* and *characteristics of all agricultural jobs during the last year* are suggested as non-core topics. Where possible, the information should be collected to identify whether the household is engaged in any form of own-account agricultural production, particularly in countries where subsistence agriculture is practiced by the population. Information may also be collected on forestry, fishery and aquaculture activities in case they are important for a country.⁶³

In addition, censuses of population and housing in developing countries frequently contain questions on the main fuels or source of energy used by households for cooking, lighting and heating, and on the type of kitchens and stoves.⁶⁴ UNSD, 2017 recommends the inclusion of the following core-topics into censuses questionnaires:

- Kitchen – availability of
- Fuel used for cooking
- Lighting and/or electricity – type of
- Heating – type and energy used for
- Hot water – availability of, and
- Durable household appliances – availability of.

around the world to see how the two censuses have been successfully linked; provides suitable agricultural data items and suggests standard questions to be collected in a population and housing census, according to a country's specific context, illustrates how to build an effective sampling frame for agricultural censuses and surveys; examines how to improve the efficiency of sampling design for agricultural censuses and surveys, using agricultural data collected during the population and housing census and provides example tables that can be compiled using agricultural data from the population and housing census" (FAO, UNFPA, 2012, p.3). The complete document can be consulted at <http://www.fao.org/3/i2680e/i2680e.pdf>.

⁶² Census implementers should evaluate national needs in the light of possible new topics and the needs for continued assessment of the topics covered in the past (UNSD, 2017).

⁶³ Agricultural production activities refer to groups 011, 012, 013, 014 and 015 of ISIC (Rev. 4.0), namely: Group 011: Growing of non-perennial crops Group 012: Growing of perennial crops Group 013: Plant propagation Group 014: Animal production Group 015: Mixed farming. Aquacultural production activities refer to group 032 of ISIC (Rev. 4.0), namely: Group 032: Aquaculture.

⁶⁴ Questions about woodfuel already included in population censuses are shown in Table 2.4. in the document "Developing a Woodfuel Survey Module for Incorporation into Existing Household Surveys and Censuses in Developing Countries" (GSARS, 2017), that can be consulted at: <http://gsars.org/wp-content/uploads/2017/02/TR-03.02.2017-Developing-a-Woodfuel-Survey-Module-for-Incorporation.pdf>

The censuses of population and housing can be a good source of data for establishing sampling frames for future surveys that collect data on woodfuel consumption and production as required for the construction of GCS of forest indicator 10.

After the 2010 round of population and housing censuses, UNSD analyzed the number of countries that included the agricultural items present in their recommendations. Out of the seventy-nine countries analyzed (those for which UNSD had the census questionnaires), only eighteen countries (23 per cent) had included the first non-core topic (own-account agriculture production) and as few as 3 countries (4 per cent) included the second topic (characteristics of all agricultural jobs during the last year) in the census questionnaire.

For the course of the 2020 population and housing censuses round, the inclusion of questions related to households dealing with agricultural activities does not seem to have gained greater interest. From 73 countries of which UNSD has the census questionnaires available, only in 15 (20 per cent) have included the variables activities on agriculture and labour force on agriculture. Those countries were Albania, Angola, Armenia, Australia, Bahrain, Bangladesh, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Bulgaria, Costa Rica, Equatorial Guinea, Estonia and Georgia.

It should be noted that in the Population and Housing Census of Georgia 2014, apart from the basic agricultural variables, detailed variables on forest activity were included such as: presence of forest at the holding, area of the forest, main purpose of the forest at the holding, presence of other wooded areas at the holding, area of other wooded areas, main purpose of other wooded land at the holding, and labour force status related to forest.

Population and housing censuses' data will provide the structure for the creation of sampling frames for specific statistical studies. Hence, agricultural topics should not be extended beyond the recommended ones. The inclusion of more detailed variables can lead to obtaining low-quality data, require additional resources and generate an increased burden on interviewers and respondents. Thus, it is advisable to include in the population and housing census the agricultural items that are strictly necessary for both the construction of the agricultural frame and the specific purpose of the investigation; without systematically integrating all the recommended frame items.

3.2. The agricultural census as a source of data for GCS Tier 2 and Tier 3 forest-related indicators

The census of agriculture is a fundamental element of the national statistical system, especially in the least developed countries where agriculture is a major economic activity and represents a significant share of the country's gross domestic product. It has been for many developing countries one of the essential statistical operations to generate information on the agricultural sector and to provide the evidence base for specific sectoral policies. This operation collects, processes and disseminates structural data of the country's agricultural sector, with wide territorial coverage.

According to the World Programme for the Census of Agriculture 2020 (FAO, 2015)⁶⁵, "the basic objectives of the census of agriculture are:

- To provide data on the structure of agriculture, especially for small administrative units, and to enable detailed cross-tabulations;
- To provide data to use as benchmarks for and reconciliation of current agricultural statistics;
- To provide frames for agricultural sample surveys" (p.4).

⁶⁵ The World Programme for the Census of Agriculture 2020 (WCA 2020) are the latest guidelines developed by the Statistics Division of FAO and have been elaborated based on the compilation of experiences from different countries. It has considered new data demands, such as those raised in the 2030 agenda. The volume 1 and 2 of the WCA 2020 programme can be consulted at <http://www.fao.org/world-census-agriculture/en/>.

Some of the relevant characteristics of the WCA 2020 concerning the production of the GCS forest-related indicators are described as follows:

First, the WCA 2020 maintains the recommendation on collecting agricultural data in the population and housing census. Additionally, the WCA 2020 makes a distinction of essential and frame items.⁶⁶ “The essential items are those that every country should collect, regardless of the methodological approach used for the agricultural censuses. They are needed for national purposes and international comparisons, whereas the frame items are used primarily for building the frame for supplementary modules or subsequent surveys and relate specifically to censuses using the modular approach” (FAO, 2015, p.51). While additional items can be added for creating sampling frames for the census supplementary modules or the programme of agricultural surveys according to the country needs.

Second, in past WCA editions, agriculture was perceived as an activity that only covered the production of crops and livestock. In the WCA 2020, the scope of agriculture is expanded to measure the structure of industrial agricultural production, also covering forestry and fisheries and other activities related to food and agriculture.

The WCA 2020 recommends nine basic land use classes, one of which makes specific reference to forestry:

- Land under temporary crops;
- Land under temporary meadows and pastures;
- Land temporarily fallow;
- Land under permanent crops;
- Land under permanent meadows and pastures;
- Land under farm buildings and farmyards;
- *Forest and other wooded land*;
- The area used for aquaculture (including inland and coastal waters if part of the holding); other areas not elsewhere classified.

Other improvements of relevance in the WCA 2020 for the GCS forest-related indicators are:

- The item “presence of forest and other wooded lands on the holding” was modified as “presence of woodland on the holding” and item “main purpose of forest and other wooded lands” as “purposes of woodland” (p.8);
- The item “area of forest and other wooded lands as primary/secondary land use” was modified as “area of woodland” in line with the SEEA agriculture;
- A clear distinction was made between “forest and other wooded land” and “land under permanent crops.” Perennial crops (e.g. palm, food tree crops) should not be considered as “forest and other wooded lands, whereas plantations of bamboo, cork oak, eucalyptus for oil, or any other cultivated non-food tree crops are considered to be “forest and other wooded lands.”
- In agroforestry systems, land that is predominantly used for agricultural purposes is excluded from “forest and other wooded lands”. However, some agroforestry systems, such as the “Taungya” system, where crops are grown only during the first years of forest rotation, should be classified as forest.
- For assessing food insecurity, WCA 2020 introduces an innovative approach to food security to access valid information on the severity of food insecurity as experienced by individuals in the population.⁶⁷

Although, as seen above, the agricultural censuses offer the possibility to collect useful information on forestry activities, this possibility does not seem to be exploited by most countries. Indeed, as illustrated in Table 4 and Table 10 (see Annex 5), across the globe slightly less than a quarter of the countries collect forestry data through

⁶⁶ WCA 2020 has a total of 128 items, of which 23 are essential items, 15 are frame items and 96 are additional items. Note that some of the items are both essential and frame. The items are grouped according to 15 themes. The lists of essential frame and additional items can be consulted at <http://www.fao.org/3/a-i4913e.pdf>, page 53.

⁶⁷ The agricultural census data complement the work data collected in some household-based surveys (labour force surveys, income and expenditure surveys, Living Standard Measurement Surveys) carried out by countries on a regular or ad hoc basis.

censuses of agriculture (42 out of 188 countries).⁶⁸ These global figures mask large discrepancies across regions. For instance, in Latin-America, almost all countries conduct censuses of agriculture (11 out of 12) and out of these countries, almost all collect information on forestry (10). At the other end of the spectrum, none of the European countries includes forestry-related questions in their censuses of agriculture. This is probably because in terms of the forestry sector "being more organized in this region", data on forestry can be gathered through other sources of information, such as registries or business surveys.

Table 4. Global assessment on the inclusion of forest-related data in agricultural censuses

Regions	Total number of countries	Number of countries with information available of the last agricultural census	Number of countries with forest variables within the agricultural census
Africa	55	25	15
North and Central America	26	18	8
South America	12	11	10
Asia	47	32	9
Europe	30	27	0
Oceania	18	11	0
Total	188	124	42

Source: Author's elaboration based on the countries' matrix on the inclusion of forest-related data in agricultural censuses

In relation to the inclusion of useful questions for the construction of the sampling frame for the forest employment, of the group of countries from which information on the agricultural census was available, only the 29 per cent had included this type of variables. When doing the analysis by regions, in Africa 27 per cent of the countries included employment variables in the agricultural census questionnaire; in North and Central America 27 per cent, in South America 66 per cent and in Asia 15 per cent.

The WCA 2020 recommended the inclusion of some items of the FIES methodology i.e. basic questions to investigate situations of food insecurity. On that regard, out of the 124 questionnaires analyzed, just 10 contained this type of variables: Burkina Faso, Namibia, Rwanda, The Kingdom of Eswatini, Tanzania and Uganda in Africa; Belize and Nicaragua in Central America and in Venezuela in South America (see Table 11 in Annex 4). The insights provided with the utilization of FIES questions in the agricultural census in the mentioned countries might be analyzed for the future design of questions that allow capturing the objective contributions of forest to FSN, as it is required in the GCS of forest indicator 14.

These global statistics reveal that while agricultural censuses may be one of the sources of information to construct indicators related to forestry, this channel is only relevant in certain situations and under certain conditions, such as the economic importance of agricultural and forestry activities. The sophistication of these activities and the level of organization of the sector determines: the existence of reliable data sources alternative to surveys or census; the connection between these activities; and the overall level of sophistication and integration of the national statistical systems, which determines to a large extent the possibility to use different information sources with sufficient reliability.

3.3. National Forest Monitoring Systems and socio-economic data

As it has been stated, national forestry data -viewed in a broader context, produced on time and with quality- are relevant to measure the contribution of forests to sustainable energy and FSN, employment and rural development issues.

⁶⁸ According to (Russo, 2014) "an internal review carried out by FAO in 2013 found that the forest-related variables contained in publicly available agricultural censuses were: area of forests and woodlands, number of trees as permanent crop, plantations of forest trees, area of forest tree nurseries, wood products, non-wood products, firewood/charcoal, forestry income and management. However, not all the information collected through the questionnaires was reported, and areas of forests, woodland and number of trees are the most commonly reported variables" (p.7).

In that respect, the National Forest Monitoring (NFM) is the first key process to meet multiple information needs related to the forest.⁶⁹ FAO has conceptualized multipurpose forest monitoring systems that provide data and information both for national needs and international reporting. Voluntary Guidelines on National Forest Monitoring (FAO, 2017) and its companion publication Strengthening National Forest Monitoring Systems for REDD+ (FAO, 2018c) register this approach and layout how an NFMS can provide data and information suitable for national forest monitoring.

As mentioned, FAO voluntary guidelines offer principles and a general framework, as well as tools for planning and implementing national forest monitoring. The Strengthening National Forest Monitoring Systems for REDD+ (FAO, 2018c) considers that monitoring systems have three pillars, in correspondence to the components of the IPCC approach to estimating emissions:

- A satellite land monitoring system (SLMS) to periodically collect spatial data on land cover and/or land use and its changes, including deforestation and forest degradation;
- A national forest inventory (NFI) to collect information on forest carbon stocks and changes – i.e., to provide emission factors;
- The GHG estimates themselves, notably the forest reference (emission) level (FREL) as a basis for calculating REDD+ results.

Numerous data sources are employed in the NFM. The most important of them are: (i) sample-based field observations; (ii) remote sensing; (iii) national statistics, if available, on land use and harvests; (iv) allometric models and (v) information from previous monitoring studies. Periodic monitoring (such as every 5 years) will allow for the development of more harmonized policies to ensure sustainable land management and its contributions to biodiversity conservation, improved food security, and livelihoods of rural populations. (FAO, 2012).

The voluntary guidelines stated the need of NFM to consider not only the forest biophysical dimensions but also economic and social dimensions. In this line, guidelines are based on the seven thematic elements of SFM. Having said this, the core set of attributes recommended to be surveyed, assessed and monitored in the NFM are: a. The extent of forest resources b. Forest biological diversity c. Forest health and vitality d. Productive functions of forest resources e. Protective functions of forest resources f. Socio-economic functions of forests g. Legal, policy and institutional framework.

Furthermore, the increasingly diversified uses of forests have led to NFM not to focus exclusively on lands defined as forests, but to include all other lands that have trees,⁷⁰ and not limited to measure biophysical stocks, it might analyse the use of forests and trees by collecting information from forest owners and those who use the forest or who benefit from forests.

In this sense, in the National Forest Monitoring and Assessment – Manual for Integrated Field Data Collection (FAO, 2012), clear recommendations are given regarding the collection of a great number of socio-economic variables that are required for calculating GCS of forest-related indicators classified in Tier2 and Tier 3. Thus, through interviews with key informants (external and internal), focus groups, individuals and randomly selected households it would be possible to compile data on:

- a. **General information on household**, household composition, household activities, livelihood, land area and land tenure, health, food security, fuel and energy, expenses for inputs including labour during the last one year and other general information on household, access to services, accessibility to water resources, conflicts human / wildlife / livestock, benefits from wildlife and tourism, cropping management, livestock management, aquaculture management.

⁶⁹ According to FAO (2017), the NFM is a “comprehensive process that includes the systematic collection, analysis and dissemination of forest-related data, and the derivation of information and knowledge at regular intervals to allow for the monitoring of changes over time. It focuses on national-level data and information on forests and trees outside forests, their condition, values and uses” (FAO, 2017, p1).

⁷⁰ Or trees outside the forest.

- b. Products harvested in the land-use class**, by product category, product category importance, species and varieties, species ranking, parts, commercial-end use, conflicts, demand trend, supply trend, harvest period and frequency, harvest trend and change reason, market prices and units, user groups, user ranking and rights, sales, organization level, gender balance, child participation, legislation, incentives.
- c. Services provided by the forest and trees**, service category, service importance and service legislation and incentives.

However, Ruso (2014) stated that the inclusion of socioeconomic data into the NFMSs has been based on information needs assessment and stakeholder consultation. That is how the "first-generation NFMA included only the collection of socio-economic data through focus group and key informant interviews. In 2005, household interviews were later introduced from the NFMA in Zambia and Kenya (both integrated land use assessments), in addition to the focus group and key informant interviews. Little use has been made so far of the socioeconomic information collected in country NFMA" (p. 7).

Establishing an NFMS requires established government policies, clear organizational set-up, long-term financial support and technical knowledge at a country level. Besides, its maintenance is a challenge for developing countries. FAO has been supporting for decades member countries in this purpose. Since the launch of the UN-REDD Programme in 2008 (which joined 64 countries), FAO has become more engaged in the capacity development for NFMS building, and in the development of open-source software Open-foris and the System for Earth Observation, Data Access, Processing and Analysis for Land Monitoring (SEPAL).

In 2018, FAO, UNDP, UN Environment and UN-REDD programme have published the results of an assessment carried out to the NFMSs of a group of sixteen countries that have received technical and financial support in the building of their systems in the last 10 years.⁷¹ The assessment was based on the use of a scorecard with twenty-eight indicators created to evaluate the three pillars considered in the NFMSs for REDD+.

The general result of this assessment suggested that countries have made progress in their NFM as reflected in the ratings obtained in the NFMSs capacity.⁷² However, the sustainability of capacities and systems requires that governments focus on systems maintenance, strengthened institutions and improvement on methodologies and data collection (FAO, UNDP, UN Environment and UN-RED, 2018). Despite data collection of socio-economic items has been recommended as part of the NFMSs, the mentioned assessment has not covered this area.

As mentioned before, FAO has been supporting for decades countries in the construction and strengthening of their NFMSs. The FAO-FIN was a partnership between Finnish government and FAO aimed at improving forest data collection and analysis as well as management skills in Ecuador, Brazil, Peru, Tanzania, Viet Nam and Zambia for SFM. The programme started in 2009 and finalized in 2017, having a strong methodological and tool development component. It covered designs and implementation of biophysical forest inventories, forest-related socioeconomic data collection (household, key informant, focus groups and institutions) and the development of the software Open Foris to provide country support to the implementation of national forest inventory processes.⁷³ An overview of socio-economic variables included in the NFMS surveys under the FAO-FIN project is in table 5.

⁷¹ Countries assessed were Cambodia, Colombia, Congo, the DR of the Congo, Côte d'Ivoire, Ecuador, Indonesia, Lao, Nigeria, Panama, Paraguay, Papua New Guinea, Sri Lanka, Tanzania, Viet Nam and Zambia.

⁷² The complete report can be consulted at <http://www.fao.org/3/CA1741EN/ca1741en.pdf>

⁷³ See <http://www.fao.org/forestry/fma/openforis/en/>

Table 5. Socio-economic variables found in the six national NFMS surveys

Question/Topic	Zambia	Tanzania	Peru	Ecuador	Vietnam
Household composition/ characteristics	X	X	X	X	X
Education	X	X	X		X
House construction	X		X		
Sources of livelihood (proportion of livelihood derived from forests)	X	X	X		X
Land (ownership, rent in/out)	X	X	X		X
Assets	X	X	X		
Household food security and risk	X	X	X	X	X
Crisis and unexpected expenditures	X	X	X		
Source of energy (firewood, charcoal)	X	X	X	X	X
Forests and health					X
Forests and construction				X	
Forest services					
Tree planting	X				X
Forest clearing/trends in availability of forest products	X	X			X
Forest resource base			X (KI)*	X	X
Household income	X	X	X		X
Most important forest products	X	X	X		X
Income from forest products	X	X	X		X
Marketing processes for forest products	X	X			X
Income from environmental services	X	X		X	X
Income from own business (not forest or agriculture)	X	X			
Income from crops	X	X	X	X	X
Income from livestock	X	X	X	X	X
Fishing and aquaculture	X				
Other income sources	X	X			X
Forest governance		X	X(KI)*		X
Enforcement and penalties		X	X(KI)*		X
Perceptions of climate change					X
Participation in organizations		X		X	X
Gender and ethnic disaggregation		X	X	X	X

Source: Assessment of lessons from collecting forest related socioeconomic data in national surveys (draft), 2019.

*(KI) Key informant

The five-country programmes had different implementation stages. From these, it is worth mentioning the National Forest Monitoring and Assessment project (NAFORMA) implemented in Tanzania as the first pilot country to engage in developing the methodology, fieldwork, mapping and data management. Some of the features and results of the project are summarized in Box 1.⁷⁴

National Forest Monitoring and Assessment project NAFORMA implemented in Tanzania

- It was conducted over a period of sixty-two months (April 2009 – June 2014) by the Tanzania Forest Services Agency (TFS)– National Forest Programme under the Tanzania Ministry of Natural Resources and Tourism.
- NAFORMA was planned to develop complete and sound baseline information on forest and tree resources and assist the TFS in setting up a specialized structure and put in place a long-term monitoring system of Tanzania's mainland forested ecosystems.
- It had collected three basic types of data namely biophysical, socio-economic and governance and Land Use and Land Cover (LULC) mapping.
- The biophysical component constituted measurement of tree variables and determination of soil carbon while socio-economic and governance data were collected through household and key informant interviews.
- The field data (biophysical and socio-economic) were entered in the Open Foris-Collect database application and later analyzed using Open ForisCalc.
- The socio-economic survey was linked to the biophysical survey design, which determined members of the population interviewed. In this case, the population of interest was people living in and/or near forests within a radius of up to ten kilometers from the cluster centre.
- Many NWFPS and services were recorded in the different vegetation types. Production forests clearly demonstrate their vital role in providing most of the assessed NWFPS and services. The aesthetic values and tourism potential of wildlife protected areas were also evident.

Results:

- The total forest area was estimated to be 48.1 million hectares, which is 55% of the total land area of Tanzania mainland.
- 3,348 households and 1,118 key informants primarily in forest adjacent communities, which tend to be poor and somewhat disadvantaged without easy access to services.

⁷⁴ The complete report of NAFORMA can be consulted on <http://www.fao.org/forestry/43612-09cf2f02c20b55c1c00569e679197dcde.pdf>

- Due to the small sample size, the socioeconomic results cannot be projected to the national level but can be taken as an indication of how forest adjacent communities use forests for their livelihoods.
- Many activities related to extraction and use of forest products may be underreported, especially those that are not legal.
- Less than 10% of the interviewed households depended on forests for their principal income. By far, the primary source of income is agriculture and in some regions of the northwest of the country, it is livestock.
- Forests play only a minor direct role in the food security of the forest adjacent communities.
- About a third of the forest adjacent households reported food shortage for some period during the year.
- Firewood is by far the most commonly used forest product and is reported to be used exclusively by 96% of the households. Most respondents reported that there are currently no affordable alternatives to woodfuel.
- The forest adjacent communities use wide ranges of other forest products.
- The common perception is that forest products are considered open access. There is some awareness of rules related to harvesting of firewood, poles, timber and charcoal, but the rules are only being enforced to a very limited extent.
- Participation in PFM activities among forest adjacent communities remains low (7%) and appear to be implemented only where there are financially supported programmes.
- Village governments and Non-Governmental Organizations (NGOs) are perceived to be more important than regional and national governments for involving communities in Participatory Forest Management (PFM) as they are geographically closer.
- It appears that Joint Forest Management (JFM) is more easily recognized by key informants and is rated to be more successful compared with Community Based Forest Management (CBFM) possibly due to more formality associated with JFM.
- During the last 12 months prior to the study on governance, about a quarter of the respondents had experienced problems relating to the use of land, water, forests and other local natural resources.
- Village councils play a key role in defining the rules on infractions and provide judgements on punishments.
- The household interviews show a high degree of awareness of the multiple environmental services and benefits associated with forests and trees. These included awareness on climate amelioration, water supply, windbreak, soil erosion control and ecotourism, among others.

Source: Tanzania Ministry of Natural Resources and Tourism (2015).

3.4. National Household Survey Statistics

Household surveys are an important source of socio-economic data for households and individuals. Essential indicators to inform and monitor development policies are derived from these surveys. Household surveys have become one of the most valuable channels for producing data and constitute a central component in the consolidation of National Statistical Systems. In developing countries, these surveys are a dominant form of data collection, supplementing or sometimes even replacing other data collection programmes and civil registration systems (UNSD, 2005).

UNSD has an active area of household surveys to support their development, particularly in developing countries. The last two manuals produced by UNSD (2005) are “Designing Household Survey Samples: Practical Guidelines” and “Household Surveys in Developing and Transition Countries”, which presents several important aspects about conducting household surveys.

According to UNSD (2005), household surveys conducted by NSOs are generally multi-purpose or integrated in terms of nature. They are designed to provide reliable data on a range of demographic and socio-economic characteristics of various populations. They also have been used for studying small and medium-sized enterprises and small agricultural holdings in developing and transition countries.

UNSD (2005) remarked that household surveys are financed with regular national budgets. Another important aspect is that household surveys are representative of the national population, as well for urban and rural strata, major and micro-regions, or in some cases lower administrative levels. Government agencies and other organisations could have different objectives when they decide to implement a household survey. These objectives can be devised to identify fundamental characteristics of the population, analyses the impact of government programmes, examine changes in household characteristics over time or understand the causes of household conditions.

A valuable type of household surveys for measuring the causes of population problems and the effectiveness of government policies are the Living Standards Measurement Study (LSMS) surveys. The LSMS is a multi-topic survey incept since the early 1980s. It has a standard package of modules (household demographics, housing conditions, education, health, wage employment, ownership, etc.). It can follow the modular approach as well, which means that the survey questionnaire can be adapted and have several modules, depending on national

circumstances (modules can contain anthropometric information, food security, vulnerability, credits, shocks and coping strategies, etc.).

3.4.1. Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA)

One example on how LSMS studies can be strongly focused on a precise objective (as it is the case of linking agriculture, livestock, tree crop plantations and poverty), is the implementation of the LSMS-ISA in eight countries (Ethiopia, Malawi, Mali, Niger, Nigeria, Tanzania, Uganda and Burkina Faso –the latter is in the design process) in the Sub-Saharan Africa region in 2008.

The LSMS-ISA surveys were designed to be used in different modules, with a core questionnaire and two auxiliary modules (one for agriculture and another community module). Topics contained in the core module are diverse and adapted to country conditions, even when some common topics are appreciated: household identification, household roster, education, health, time use and labour, housing and food consumption over past one week. Table 6 provides topics contained in the core questionnaires implemented in the last round of LSMS-ISA surveys.

Table 6. Topics included in the LSMS-ISA core questionnaires

Topics	Ethiopia	Malawi	Mali	Niger	Nigeria	Tanzania	Uganda
Household identification				✓			
Household roster	✓	✓	✓	✓	✓	✓	✓
Education	✓	✓	✓	✓	✓	✓	✓
Health	✓	✓	✓	✓			✓
Time use and labour	✓	✓	✓	✓	✓	✓	✓
Housing	✓	✓	✓	✓			✓
Food consumption over the past one week	✓	✓	✓	✓	✓	✓	✓
Food outside the home					✓	✓	
Food security	✓	✓	✓	✓			✓
Non-food expenditures – over past one week & one month	✓	✓	✓	✓			
Durable goods	✓	✓	✓	✓	✓		✓
Farm implements, machinery, and structures		✓					
Household enterprises		✓					
Non-farm enterprises	✓		✓	✓	✓		
Children living elsewhere		✓		✓			
Other income	✓	✓			✓		
Gifts given out		✓					
Social safety nets		✓					
Credit	✓			✓		✓	
Savings				✓			
Finance						✓	
Subjective assessment of well-being		✓			✓		✓
Shocks and coping strategies	✓	✓		✓		✓	✓
Child anthropometry		✓				✓	✓
Deaths in household		✓				✓	
Filter questions for agriculture & fisheries questionnaires		✓				✓	✓
Non-farm enterprises							
Assistance	✓					✓	
Transfers			✓				
Fisheries			✓				
Aspirations				✓			
Energy use							✓

Source: Author's elaboration based on LSMS-ISA questionnaires consulted in <http://surveys.worldbank.org/lms/programs/integrated-surveys-agriculture-isa/uganda#bootstrap-panel-3>

The core questionnaires are extensive and given the variety of topics contained in them, households are visited two or more times for its completion. It should be noted that variables employed for the food security

measurement follow the FIES approach. In addition, variables such as time use and labour could serve as a point for the employment measurement.

Concerning the agriculture module, it can be modified for covering country-specific aspects to address country-relevant policy matters. A core set of indicators is used by all countries to monitor trends and to understand, for example, factors hindering agricultural efficiency and productivity, the role of women in agriculture, and other productive activities. The community module has been designed to engage the community members in general discussions around common topics of interest such as local prices of products, communal lands administration, rights and rules, conflicts, etc.

A review of variables related to forests present in the core questionnaire and in the modules of agriculture and community indicated that there is a limited number of variables covered by the LSMS-ISA surveys useful for the GCS indicators production.

Table 7. Forest-related variables included in the LSMS-ISA core questionnaire, agriculture, and community modules

Country	Forest variables		
	In the core questionnaire	In the agricultural module	In the community module
Ethiopia	Time for collection of firewood, purchase of firewood in the household, income derived from selling firewood or charcoal, wood poles and timber.	Area of forestland before the agricultural season and number of trees present in the holding.	Share of land in the community which is cover with forest and which is not used in agriculture and conservation needs and actions.
Malawi	Place where firewood is collected, purchase of firewood and prices, time spend for collection of firewood, firewood use (cooking and lighting). At household enterprises level: selling of forest-based products and source of these products.	Presence of forest at plot level, access to extension services (if the household members receive any advice on forest).	Share of land in the community, which is cover with forest, community ownership of forested areas, restrictions regarding access and use of communal forest and number of households practising agroforestry.
Mali	None	None	None
Niger	Expenditure on firewood and charcoal.	None	None
Nigeria	Time of collection of woodfuel and expenditure on wood poles	Area of forestland and access to extension services (if the household members receive any advice on forest).	None
Tanzania	Time of collection of woodfuel, use of firewood (cooking and lighting) and expenditure on wood poles.	Area of forestland.	Share of land in the community, which is cover with forest, charcoal and firewood prices.
Uganda	Firewood and charcoal purchases, production, barter, quantities, prices of firewood and charcoal, time spend for collection of woodfuel, type of stoves, energy source for cooking, lighting and heating	Area of forestland.	Share of land in the community, which is in forest, access and rules for the use of community forest, rules and conflicts.

Author's elaboration based on LSMS-ISA questionnaires consulted in <http://surveys.worldbank.org/lsm/programs/integrated-surveys-agriculture-isa/uganda#bootstrap-panel--3>

3.4.1.1. National socioeconomic surveys in forestry

The need to fill current information gaps concerning the relationship between forest and wild products and household well-being motivated FAO in 2016 to work along with the Centre for International Forestry Research (CIFOR), the International Forestry Resources and Institutions (IFRI), the WB's LSMS group and PROFOR, with the objective of developing specialized modules on forest and wild products.

In the manual on “National socioeconomic surveys in forestry”, an established set of survey modules on forest and wild products is proposed and their relation to LSMS-type surveys and their applicability to a wide range of multi-topic household surveys are discussed.

The sourcebook is particularly relevant to:

- Provide an overview of how to measure contributions to the household and roles of both forests and wild products.
- Present definitions of forest and wild products and then discuss the several methods used in the forestry modules.
- Discuss issues concerning the measurement of forest and wild product data, such as difficult concepts, seasonality and recall periods, distinguishing the origin of products, measurement units and prices.
- Guide the reader to the fifteen thematic areas of the modules that represent the various contributions of forest and wild products to household welfare.
- Guide on the quantification of the production for self-consumption within the household unit and data collection on the welfare contribution of forest and wild products to rural households through their provision of goods and services.
- Provide additional questions that can be used as an appended to existing LSMS household and community surveys.
- Give details on the design of field-testing.
- Present the scope, focus and limitations of forestry modules, including enumerator training and quality control, and the use of tablet devices in fieldwork.

Early implementation of the forestry modules in Turkey

Over the past three decades, about eleven millions of people in Turkey have moved from villages or near forests to urban areas. However, some seven million still live in forest villages, accounting for 40 per cent of Turkey’s rural population and about 10 per cent of its total population (FAO, CIFOR, IFRI & WB, 2018).

In order to understand the socio-economic conditions of forest villagers and the impacts of government-supported programmes on household welfare and migration decisions, the General Directorate of Forestry, Ministry of Forestry and Water Affairs of Turkey along with the WB assistance, adapted and implemented the modules of the National socioeconomic surveys in forestry. One of the aims of this project was to collect evidence on the extent and nature of household reliance on forests, economic opportunities in forest villages and linkages with migration.

The survey was carried out in 2016, sampling 2,037 households across 203 villages and the results indicated that more than 60 per cent of surveyed households reported income derived from the sale or use of forest products. The poverty rate in the surveyed forest villages was high: about 80 per cent or more than twice the average rural poverty rate in Turkey. Substantial variation in poverty levels was found across forest villages, even when forest reliance was pervasive throughout these villages. Forest income represented the largest income share (28 per cent) of poor households, compared with 8 per cent of the income of non-poor households.

Liberia National Household Forest Survey

According to Hooda et al. (2018), the forest sector is an important contributor to income and employment for Liberia’s economy. Nevertheless, the Liberian Government identified a large data gap related to the quantification of the forest contribution and forest products to the livelihoods of rural communities. In supporting this deficiency, the WB and the Liberian Government through the Liberia Institute of Statistics and Geo-Information Services (LISGIS) and the Forestry Development Authority (FDA), undertaken the first National Household Forest Survey in this country.⁷⁵

⁷⁵ Funded by the WB through its Forest Carbon Partnership Facility REDD+ Readiness Support grant, implemented by the FDA. Fieldwork was implemented by LISGIS, with technical support provided by the WB’s Living Standards Measurement Study (LSMS) team, generously funded by the Program for Forests (PROFOR), and the Environment and Natural Resource Global Practice.

This survey was planned to provide a holistic understanding of the role that forest ecosystems and products play in providing pathways out of poverty and information for the design of policies to achieve a sustainable reduction in poverty and inequality. It aims to collect baseline socioeconomic data on households that live in or near forested areas, and on the forest products on which they rely for their welfare and livelihoods.

The survey questionnaires were designed to cover the following variables:

- Household questionnaire: household identification, non-farm enterprises, other forest income, household member roster, other non-forest income, forest resource base, assets, forest benefits, food security, forests and health section, shocks, forests and energy, housing, water and sanitation, income from forests (collected products), forests and construction, income from forests (processed products), forest clearance, labour, land parcels and crop disposition.
- Community questionnaire: roster of informants, forest roster, seasonal calendar, key forest and wild products, units and pricing, community benefits, gender (male respondents) and gender (female respondents).

The survey fieldwork started in May 2018, has extended until January 2019, with a coverage of 3,000 households from 300 enumeration areas in Liberia's fifteen counties. The survey was complemented by 300 community level questionnaires, one in each of the selected enumeration areas. Data collected is in the analysis process, but some preliminary results have been obtained. The final report is expected to be published by the end of 2019.

3.4.2. Centre of International Forestry Research - Poverty Environment Network (CIFOR-PEN)

According to CIFOR (2019), the Poverty Environment Network (PEN) was launched in September 2004 with the aim of collecting topics-wide uniform socio-economic and environmental data at household and village levels by about thirty PEN partners (mainly PhD students). The result were the generation of a global database with 8,301 households in 333 villages from 24 countries.

The data collection included a careful recording of all forest and environmental uses. All income data were collected through four quarterly surveys to shorten recall periods and increase accuracy. The data collection period varied from site to site but happened in the period 2006-2010.

PEN was a 13-year project (2004-2017). While the data collection period has long finished, as well as the data cleaning and validation (2011-13), the freely available dataset continues to contribute with analyses inside and outside the CIFOR. Some of the relevant variables useful to calculate the GCS of forest-related indicators included in CIFOR-PEN questionnaires are presented in Table 12 in Annex 5.

3.5. The 50x2030 initiative

The 50x2030 Initiative is an ambitious effort to conduct regular surveys of farming households in fifty low and lower-middle-income countries by 2030; and then make the data combined with other information sources widely available.

According to the Global Partnership for Sustainable Development Data (Data4Now, 2019), the 50x2030 initiative brings together the strongest partners in agricultural development to solve issues on agricultural data gaps. Led by a coordination centre within the WB's Development Data Group, 50x2030 joins the technical and operational capabilities of key multilateral implementers with the strategic influence, vision, and resources of development agencies together with the determination and hard work of committed partner countries, thus creating a powerful alliance that can perform the ambition of the initiative.⁷⁶

⁷⁶ In particular, the 50x2030 initiative focuses on SDG 2 (Zero Hunger) and 5 (Gender Equality), and data collection for the computation of four high priority SDG indicators: 2.3.1 – Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size; 2.3.2

The initiative will scale up and build upon the experiences of the AGRISurvey (see section 4.2.2.) and the WB's LSMS-ISA to empower and support fifty countries in the production and use of high-quality and timely agricultural and rural survey data. The 50x2030 Initiative offers two survey models: the agricultural survey program or the integrated agricultural and rural survey program. The Agricultural Survey Model is designed to provide complete, fully representative data on agriculture from both household and non-household (commercial) farms over a 10-year cycle. It has a modular approach that joins an annual core module and several periodic rotating modules that cover vital socioeconomic and environmental variables. Its flexible modular approach creates a survey system that can respond to emerging demands at regional, national, or international levels.

The Integrated Agricultural and Rural Survey Model will combine a farm-based agricultural survey program with a household-based rural socioeconomic survey program. Within a country's statistical system, an integrated approach is ideal since it produces more data, increased data interoperability, and greater cost efficiencies. As well as in the agricultural model, the integrated model collects data from a representative sample of all agricultural enterprises — household and non-household — on agricultural topics like production, revenues, and farm practices. The integrated model incorporates surveys of rural households that cover socioeconomic and demographic topics like income, poverty, employment, and food security.⁷⁷ The Agricultural and Rural Survey Model has more potential for countries keen to fill forest-related data gaps.

The content of different survey questionnaires proposed by 50x2030 initiative and other characteristics are presented in the following table:

Table 8. Tools of the 50x2030 Agricultural Program and Integrated Program

Survey Tool	Content	SDG Indicator	Recommended Frequency	Target population	50x2030 Survey Program
CORE-AG	Crop, livestock, aquaculture, fisheries, forestry production.	-	Annual	Agricultural households and agricultural holdings in the non-household sector.	Both Agricultural Program and Integrated Program.
ILP-AG	Agricultural income, agricultural labour, and productivity; land tenure, gender decision-making.	2.3.1 2.3.2 5.a.1 1.4.2*	Every 3 years	Agricultural households and agricultural holdings in the non-household sector.	Both Agricultural Program and Integrated Program.
ILS-HH	Household member socio-demographics, education, off-farm labour and time-use, housing, non-agricultural income, shocks and coping.	5.a.1 1.4.2*	Every 3 years	Agricultural and non-agricultural households.	ILS-HH only in Integrated Program.**
PME	Production Methods and Environment; Agricultural Sustainability.	2.4.1	Every 3 years***	Agricultural households and agricultural holdings in the non-household sector.	Both Agricultural Program and Integrated Program.
MEA	Assets, Machinery, Equipment.		Every 5 years	Agricultural households and agricultural holdings in the non-household sector.	Both the Agricultural Program and Integrated Program.

* The ILP-AG covers all items needed to measure SGD 1.4.2; however, in order to properly compute the indicator, a nationally representative sample of households would be needed, sample that the 50x2030 system does not require.
** SDG 1.4.2 and 5.a.1 are measured through the ILS-HH in the Integrated Agricultural and Rural Survey Model. They are measured through the ILP-AG in the Agricultural Model.
*** The PME tool includes data collection for SDG Indicator 2.4.1, which is recommended to be measured every three years. Questions that do not pertain to Indicator 2.4.1 may be administered every 6, allowing for a lighter PME implementation every other wave of implementation.

Source: Global Partnership for Sustainable Development Data, 2019.

– Average income of small-scale food producers, by sex and indigenous status; 2.4.1 – Proportion of agricultural area under productive and sustainable agriculture; 5.a.1 – (a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; (b) Share of women among owners or rights-bearers of agricultural land, by type of tenure.

⁷⁷ Detail information can be consulted at <http://www.data4sdgs.org/50by2030>.

4. Way forward on further developing and generating data on GCS Tier 2 and Tier 3 indicators

This background paper seeks to assist the Expert Workshop on Strengthening the Global Core Set of Forest Indicators to support the implementation of the 2030 Agenda and the UN Strategic Plan for Forests 2030.

To achieve this purpose, some steps were completed:

- i) Revision of the progress, current status, challenges and needs related to methodological specifications to measure contributions of forests and trees in relation to methodological specifications of selected Tier 3 and Tier 2 socio-economic indicators, particularly internationally agreed definitions and methodologies for data collection and analysis;
- ii) Assessment of the primary data availability, comparability and data gaps from nationally representative surveys (World Bank LSMS-ISA, FAO National Forest Monitoring and Assessments, FAO Agricultural Census and other sources.
- iii) Assessment of other methods and tools used to analyze existing data and assess the selected Tier 3 and Tier 2 socio-economic indicators at national level (estimation, computation, modelling, etc.).

From the frameworks and sources analyzed in this background paper, it seems that a multipurpose data system approach is adequate to fulfil data needs posed by the GCS indicators. The single-purpose data collection approach, used by organizations involved in data collection to answer only one policy question or one reporting need for years, has proven to be very costly. Instead, data required to produce the GCS of forest indicators will be the result of the interaction between diverse agencies within the NSS and of the utilization of existent data to reduce financial, logistical, technical and temporary burden that the launch of new statistical operations represents. In addition, the combination of other existing sources such as administrative records and tools e.g. modelling methods, remote sensing and geospatial technology will be essential for the population of the GCS of forest indicators.

4.1. Leveraging national censuses and NFMSs

Ideally, for all countries, the primary source of forestry statistics should be the NFMSs. However, based on this study, it seems that developing countries have young NFMSs, which could not respond adequately and timely with the data demand originated by the GCS indicators, especially socio-economic data. In this case, the need to continue with the consolidation of existing NFMSs is remarked, also highlighting as indispensable the inclusion of socio-economic data as a pillar within the systems. The CIFOR-PEN and the FAO-FIN projects constitute a good example that might be reproduced in more countries, on the implementation of national socio-economic surveys in forestry.

In countries where NFMSs are not operating adequately, both the Population and Household Census and the Agricultural Census may provide information on the forestry population. The Population Census is useful to provide lists of local administrative areas, households, farms, individuals and some of their characteristics even if these units are located in either small areas or small groups, as is the case of populations living in forests or near them.

This information might support the construction of the sampling frame for surveys in forestry or other ad-hoc housing surveys during the intercensal years. What is important to point out is that in the questionnaires of the Population Censuses, countries prioritize the inclusion of recommended topics depending on their data needs, highlighting that items should not be extended beyond the recommended ones.

Equally, the Agricultural Censuses offer the possibility to collect variables related to forestry for building sampling frames for national surveys in forestry and/or supplementary modules. Although this has not been the

most implemented approach by countries, it is recommended that in future agricultural censuses, countries consider the inclusion of forestry topics and take the advantage offered by these large field operations to study closely populations located in or near forests areas.

Additionally, in the construction of sampling frames for statistical operations in the agricultural sector, it is advisable to revise the recommendations given by the GSARS in the handbook on Master Sampling Frames for Agricultural Statistics, Frame Development, Sample Design and Estimation, published in 2015.⁷⁸

4.2. Leveraging national surveys

To collect socio-economic data of the household sector, existing surveys constitute the most direct, cost-efficient, robust and short-term approach. One advantage is that estimates based on data coming from existing surveys can be considered as statistically representative for the country and that the measure of statistical reliability can be provided (assuming the survey has been conducted appropriately). The initial challenge that arises is to verify if the samples have been selected to accurately reflect the distribution and characteristics of units that perceive benefits from the forest (due to its proximity or because they receive benefits of forest activities or products -whether consuming, selling or bartering forest products). Appropriate sample design and implementation are necessary to ensure representativeness. Sampling weights should always be provided to allow proper calculation of the variables.

The recommended approach when aiming at statistical representability corresponds to the use of methods based on sample surveys. Most countries conduct, in one form or another, regular surveys to capture some of the socio-economic variables contained in the GCS of forest-related indicators classified in Tier 2 and Tier 3. This study identified in some survey questionnaires the existence of variables that can be used to produce some of the GCS of forest indicators or that can help to cross-check estimates coming from other sources (e.g. for the CGS indicator on employment, indicator on wood energy consumption and indicator on FDP in extreme poverty).

4.2.1. Designing modules to be included in existing surveys

If surveys' topics are not enough to provide data in a specific topic (e.g. Contribution of forest to FSN) and sample coverage are not adequate, countries are recommended to study the inclusion of specific modules in existing surveys. A modular approach would allow the collection of information at an additional marginal cost, benefit from the large sample size of surveys and offer the possibility of carrying-out cross-validations and tabulations with other variables from the central survey. This is one of the suggested approaches for filling the gaps, in a medium-long term, found for the indicator 10 (lack of data on wood fuel consumption at household level), and the indicator 14 (lack of data on forest contributions to FSN).

The disadvantages of following this approach, in case that, for example, household surveys were the means that incorporates new modules, are associated to the extension of the questionnaires. Questionnaires should be restricted to those questions that are not present in other survey questionnaires. Lengthier surveys put a higher burden on respondents and interviewers and affect the quality of the collected data. Longer questionnaires also constitute additional costs in the data collecting and analysis.

While the guidelines for the Incorporation of a Woodfuel Supplementary Module into Existing Household Surveys in Developing Countries (GSARS, 2018) provide clear and tested recommendations; proposing a module to measure the forest contribution to FSN is challenging. In the document, the alternative of adding questions on food provided by forest, frequency of consumption or type of forest products to the FIES-SM has been analyzed without many expectations. For the GCS forest indicator 14, specific studies of the products provided by forests and their respective nutrition factors need to be done at the country level. These studies will help to

⁷⁸ The manual can be consulted at <http://gsars.org/wp-content/uploads/2016/02/MSF-010216-web.pdf>

dimension the relevance of incorporating a module on FSN within a specific survey. Still, the alternatives proposed will be useful to measure the provision of food from the forest; however, proposals to measure other forest contributions to FSN (e.g., ecosystem services) require further analysis.

4.2.2. The 50x2030 Initiative and the Agricultural Integrated Survey (AGRISurvey)

The inclusion and implementation of modules in agricultural or household surveys is the approach followed by the initiatives planned to be implemented in countries that aim to strengthen their NSS: the already mentioned 50x2030 Initiative and the Agricultural Integrated Survey (AGRISurvey). Both approaches should be explored when considering sources that allow, in the medium and long term, to produce the variables for the GCS of forest-related indicators.

AGRIS methodology - developed in the context of the GSARS (2018)- is a farm-based modular multi-year survey program designed as a cost-effective way for NSOs to accelerate the production of quality disaggregated data on the technical, economic, environmental and social dimensions of agricultural holdings.

AGRISurvey consists of a series of questions that can be classified in one of two main categories: a core section and a rotating section. The core section (also referred to as the core or core module) focuses on a range of different themes that remain largely the same in each survey round. The rotating section (rotating modules) is devoted to specific themes, the implementation frequency that will vary among countries with different agricultural systems and data demand priorities. The four recommended modules are economy, labour force, machinery and equipment, and production methods and environment. The flexible, modular nature of AGRIS makes it easy to modify this proposed setting and thus enhancing its national relevance and its cost-effectiveness. Additional rotating modules e.g., forestry modules, may also be added to respond to additional specific data needs.⁷⁹

Regarding the questions included in the AGRISurvey questionnaires that cover forestry topics, it was possible to observe:

- Core questionnaire: Includes questions related to the area of forest and wooded land present in the holding and if the holding is engaged in forest activities and forest products production, reporting the quantity and value of the sales.
- Economy module: Includes questions related to forestry production by the agricultural holding, specifically the gross value of forestry products sold.
- Environmental module: Refers to agroforestry activities implemented in the holding and main types of trees in the agroforestry system. In addition, the creation of forest or other wooded lands on the holding by planting trees, the existence of communal forest or other wooded lands in the holding's neighborhood and its use, practices of SFM implemented in the wooded land, burn practices in the forest or other wooded lands.
- Labour: Includes the report of non-agricultural activities (production of forestry products) carried out by any member of the family, workers and contractors of the holding.

4.3. Selection of concepts, definitions and methodologies

The first step when developing an indicator is the identification and precise definition of the phenomenon or concept to be measured or understood. In the body of literature on forestry, a large number of definitions on forest-dependent people have been proposed, pointing out different dimensions of dependency (geographic proximity to forest, types of dependence, degrees of dependence, etc.). In this regard, to progress on indicator 13, one acceptable definition of forest-dependent people needs to be validated.

Following the discussions in the UNFF background document (2018), is clear that the term of forest-dependent people has involved a series of analysis for understanding existent estimates, but currently there is not any universally accepted definition. However, countries need to use one agreed definition to evaluate the condition of their forest-dependent population groups. The suggestion is that participants to the EWS recommend one

⁷⁹ More information can be consulted at <http://gsars.org/es/tag/agris/>

definition to make the concept operational for countries. For this indicator, the framework choice for measuring extreme poverty is equally required.

In addition, concepts that will be used in the measurement of employment in the indicator 12 need to be decided in order to orient countries on which type of data is required for the calculation of the indicator.

The concepts and methodologies choice for indicators 12 and 13 will have implications in the immediate data availability for the calculation of the indicators or in the identification of additional methods/surveys/modules for data collection. Exploring ways in which the use of data from existing databases and possible crosses with other data sources e.g., administrative records of other sectors (education, health, etc.) can facilitate and expedite the indicators reporting.

General criteria can be applied for selecting concepts, definitions and methodologies: (i) feasibility and measurability, in order to identify population and variables that can be quantified easily and clearly; (ii) efficiency and efficacy, for having concise definitions that capture or can relate to a broader range of aspects; (iii) and acceptance, to have information that is widely accepted, easy to interpret and cost-effective.

4.4. Analytical work

4.4.1. Modelling

The type of data and how they are collected is, indeed important. Some data need to be collected at field level and other data are obtained analyzing satellite images, using administrative records, making calculations from existent information in databases, etc. Data for the population of the GCS of forest indicators can be obtained through an integration of on-site measurements, databases, spatial datasets and modelling.

For Indicator 10, it is recommended to review existing models for estimating woodfuel production and consumption where data are missing and provide an assessment of available methods. Prediction models should also be used, if no data are available. For indicator 13, in countries with suitable data sets already available on extreme poverty, can start with an exercise to model, test and define how best to measure extreme poverty in forest dependent people. This estimation approach could provide initial figures on forest population facing extreme poverty conditions and constitute a preliminary evidence base that could be used to prioritize more in-depth investigations and future surveys.

4.4.2. Use of remote sensing techniques

Recently, large geo-referenced datasets and software tools to access these data are being released for free public access. These data provide an entirely new set of variables that enriched all type of analyses. Combining geo-referenced surveys datasets with spatial data is a manner of speed up the GCS of forest indicators report. As long as forestry units (households, farms, factories, etc.) have been geo-referenced by existent surveys, the matching data from other data sets can be found and used.

If a country maintains a household register with geo-referenced information, then these additional variables from GIS-data sets can be added to that household register. These geo-referenced data could be used to validate responses from the household questionnaire. For example, spotting forest areas that are closer to communities. The distance from households to forests can be obtained from satellite photo analyses, and the number of individuals living around can be obtained from the household questionnaires.

When using geo-referenced data sets their quality also needs to be part of the overall evaluation. Several data sets and variables can be accessible nowadays. Due to the relatively recent developments in this area, no GCS of forest indicators classified as Tier 2 and Tier 3 have been analyzed based on these large geo-referenced data sets. At this time, GIS data is only being presented as adding additional analytical variables. However, with the fast-developing field with new software tools (e.g., Open-foris and the System for Earth Observation, Data Access, Processing and Analysis for Land Monitoring - SEPAL), in the future, there may be ways to report the GCS of indicators based solely on this type of data.

5. Next step: Follow-up action on developing and generating data and possible actions to enhance the use of GCS Tier 2 and Tier 3 Indicators

Describing the GCS of forest-related indicators classified in Tier 2 and Tier 3 and identifying the key aspects related to the status and needs, progress and gaps associated with their production was one of the objectives of this assignment. A review of international recommendations for implementing statistical operations (censuses and surveys) and contrast to what socio-economic information related to forest is available in surveys questionnaires was a second objective. A final objective is to present the results of this study to the EWS participants, for them to have in-depth discussions during the working groups where specific methodological proposals for each GCS of forest indicator classified as Tier 2 and Tier 3 will be presented.

The EWS' conclusions will guide decisions and actions associated with the indicators report or with the initiation of new researches on those GCS indicators that deserves further development.

Based on the results of this study, the follow-up actions on developing and generating data and possible actions to enhance the use of GCS Tier 2 and Tier 3 Indicators are:

- Indicator 10. Countries could report this indicator by using IRES methodology and the energy statistics available in global databases such as FAOSTAT, UNSD, IEA, IRENA and UNECE/FAO. For that, the assessment of data reliability and coherence across different agencies databases is recommended. As mentioned in the previous session, to fill the gaps on production and consumption of wood energy at household level, countries might revise the estimates available in FAOSTAT and complete this information with data produced in country studies. The decision to integrate the module on woodfuel consumption and production in households surveys is open to countries that prioritize the collection of this type information in their NSS.
- Indicator 12. The indicator report depends on the decision of continuing with the use of FTE concept or change to employment concept. Countries already produce information on employment by following ILO international standards through labour-force surveys or household surveys. If surveys samples cover the employment in the forest sector, the indicator might be reported, previously a review of the ILOSTAT data.
- Indicator 13. Activities for this indicator are related to the selection of one definition of forest-dependent people to make the concept operational for countries and evaluate which method is most adequate to measure extreme poverty in forest-dependent people. Based on a decision, a methodological assessment will need to be carried out to explore how best to integrate different data sources along the two dimensions, that specifically uses both household-level data and spatial datasets on populations and forest cover.
- Indicator 14. For this indicator, the methodology to be implemented should go beyond the perception of food insecurity measurement, and cover all contributions of forest to food security and nutrition. The approach of having sub-indicators for each type of contribution needs to be further analyzed. Establishing a research topic to develop a methodology on the measurement of contributions of forest to FSN is suggested.
- Indicator 15. The definition selection of SFM financing as the financial resources that contribute directly or indirectly, explicitly or implicitly, to the sustainable management of any type of forests or trees outside of forests is desirable to make the concept operational for countries. Is still challenging to track the financial flows that fall in the categories identified as SFM financing (Public International Financing, Public Domestic Financing and Private Financing). Therefore, the report of indicator 15 could start by using the OECD/DAC dataset to inform Public International Financing. Countries need to assess the

availability of data on the government expenses in the forest sector (country's budget, accounting records, administrative records, economic surveys, national accounts) that support the report of Public Domestic Financing. For Private Financing, a category is needed to further analyze how this information can be collected and compiled.

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Annexes

Annex 1

Table 9. Wood energy definitions and definitions for forest products used for energy conversion

International recommendation for energy statistics (Energy statistics)	JWEE definitions (Energy/Forest product statistics) ⁸⁰	FAOSTAT Forestry (Forest product statistics)
<p><i>Biofuels</i> - fuels derived directly or indirectly from biomass.</p> <p><i>Solid biofuels</i> - solid fuels derived from biomass. It includes Fuelwood, wood residues and by-products; bagasse; animal waste; black liquor; other vegetal material and residues; charcoal.</p> <p>Out of solid biofuels, wood-based are:</p> <p><i>Fuelwood</i> or firewood (in log, brushwood, pellet or chip form) obtained from natural or managed forests or isolated trees. Also included are wood residues used as fuel and in which the original composition of wood is retained (charcoal and black liquor are excluded).</p> <p><i>Wood pellets</i> - Wood pellets are a cylindrical product that has been agglomerated from wood residues by compression with or without the addition of a small quantity of binder. The pellets have a diameter not exceeding 25 mm and a length not exceeding 45 mm.</p> <p><i>Other Fuelwood, wood residues and by-products</i> include fuelwood, wood residues and by-products, except in the form of wood pellets.</p> <p><i>Charcoal</i> - the solid residue from the carbonization of wood or other vegetal matter through slow pyrolysis.</p> <p><i>Black liquor</i> - the alkaline-spent liquor obtained from the digesters during the production of sulphate or soda pulp required for paper manufacture.</p> <p>There are some wood-based products among liquid biofuels, biogases and waste, but there is no specification in IRES.</p>	<p><i>Industrial roundwood</i> - Coniferous and non-coniferous Industrial Roundwood: All roundwood except wood fuel. It is an aggregate comprising sawlogs and veneer logs; pulpwood, round and split; and other industrial roundwood. It is reported in cubic metres solid volume under bark (i.e. excluding bark). The customs classification systems used by most countries do not allow the division of Industrial Roundwood trade statistics into the different end-use categories that have long been recognized in production statistics (i.e. sawlogs and veneer logs, pulpwood and other industrial roundwood). (...) It excludes telephone poles.</p> <p><i>Fuelwood</i> - Coniferous and non-coniferous Fuelwood: Roundwood that will be used as fuel for purposes such as cooking, heating or power production. It includes wood harvested from main stems, branches and other parts of trees (where these are harvested for fuel) and wood that will be used for charcoal production (e.g. in pit kilns and portable ovens). The volume of roundwood used in charcoal production is estimated by using a factor of 6.0 to convert from the weight (t) of charcoal produced to the solid volume (m3) of roundwood used in production. It also includes wood chips to be used for fuel that are made directly (i.e. in the forest) from roundwood. It excludes wood charcoal. It is reported in cubic metres solid volume underbark (i.e. excluding bark). It includes wood fibres from above-ground woody biomass and below-</p>	<p><i>Wood fuel</i> - roundwood that will be used as fuel for purposes such as cooking, heating or power production. It includes wood harvested from main stems, branches and other parts of trees (where these are harvested for fuel) and wood that will be used for the production of charcoal, wood pellets and other agglomerates. It also includes wood chips to be used for fuel that are made directly (i.e. in the forest) from roundwood. It is reported in cubic metres solid volume underbark.</p> <p><i>Wood charcoal</i> - wood carbonised by partial combustion or the application of heat from external sources. It includes charcoal used as a fuel or for other uses⁸¹. It is reported in metric tonnes.</p> <p><i>Wood pellets</i> - agglomerates produced either directly by compression or by the addition of a binder in a proportion not exceeding 3% by weight. Such pellets are cylindrical, with a diameter not exceeding 25 mm and a length not exceeding 100 mm. It is reported in metric tonnes⁸².</p>

⁸⁰ Source: http://www.unece.org/fileadmin/DAM/timber/wood_energy/JWEE-2015-v6.21-ENG.xlsx

⁸¹ In theory, consumption of both wood charcoal and wood pellets can be for energy and non-energy purposes. When FAOSTAT data is used in wood- energy indicator computation, in theory non-energy use should be excluded.

International recommendation for energy statistics (Energy statistics)	JWEE definitions (Energy/Forest product statistics) ⁸⁰	FAOSTAT Forestry (Forest product statistics)
	<p>ground woody biomass (excluding bark).</p> <p><i>Chips and particles</i> - Wood that has been reduced to small pieces and is suitable for pulping, for particle board and/or fibreboard production, for use as a fuel, or for other purposes. It excludes wood chips made directly in the forest from roundwood (i.e. already counted as pulpwood, round and split). It is reported in cubic metres solid volume excluding bark.</p>	

Annex 2

List of population census topics

A. Geographic and internal migration characteristics (paras. 4.50-4.100)		
(1) Place of usual residence (paras. 4.52-4.57)		●
(2) Place where present at time of census (paras. 4.58-4.63)		●
(3) Place of birth (paras. 4.64-4.71)		●
(4) Duration of residence (paras. 4.72-4.74)		●
(5) Place of previous residence (paras. 4.75-4.76)		●
(6) Place of residence at a specified date in the past (paras. 4.77-4.81)		●
(7) Total population (paras. 4.82-4.88)		□
(8) Locality (paras. 4.89-4.91)		□
(9) Urban and rural (paras. 4.92-4.100)		□
B. International migration characteristics (paras. 4.101-4.120)		
(1) Country of birth (paras. 4.105-4.109)		●
(2) Country of citizenship (paras. 4.110-4.115)		●
(3) Acquisition of citizenship (paras. 4.116)		○
(4) Year or period of arrival (paras. 4.117-4.120)		●
C. Household and family characteristics (paras. 4.121-4.148)		
(1) Relationship to the reference person of household (paras. 4.129-4.139)		●
(2) Household and family composition (paras. 4.140-4.147)		□
(3) Household and family status (para. 4.148)		○
D. Demographic and social characteristics (paras. 4.149-4.213)		
(1) Sex (para. 4.150)		●
(2) Age (paras. 4.151-4.162)		●
(3) Marital status (paras. 4.163-4.171)		●
(4) Ethnocultural characteristics (paras. 4.172-4.173)		○
(5) Religion (paras. 4.174-4.178)		○
(6) Language (paras. 4.179-4.182)		○
(7) Ethnicity (paras. 4.183-4.187)		○
(8) Indigenous peoples (paras. 4.188-4.192)		○
(9) Disability status (paras. 4.193-4.213)		●
E. Fertility and mortality (paras. 4.214-4.257)		

(1) Children ever born alive (paras. 4.236-4.238)	◆
(2) Children living (paras. 4.234-4.236)	◆
(3) Date of birth of last child born alive (paras. 4.237-4.240)	◆
(4) Births in the past 12 months (paras. 4.241-4.243)	Δ
(5) Deaths among children born in the past 12 months (paras. 4.244-4.246)	Δ
(6) Age, date or duration of first marriage (para. 4.247-4.248)	○
(7) Age of mother at birth of (date or time when) first child born alive (para. 4.249)	○
(8) Household deaths in the past 12 months (paras. 4.250-4.254)	◆
(9) Maternal or paternal orphanhood (paras. 4.255-4.257)	○
E. Educational characteristics (paras. 4.258-4.288)	
(1) Literacy (paras. 4.258-4.264)	◆
(2) School attendance (paras. 4.265-4.271)	◆
(3) Educational attainment (paras. 4.272-4.280)	◆
(4) Field of education and training, and educational qualifications (paras. 4.281-4.288)	○
G. Economic characteristics (paras. 4.289-4.386)	
(5) Labour force status (paras. 4.307-4.338)	◆
(5) Status in employment (paras. 4.339-4.351)	◆
(6) Occupation (paras. 4.352-4.355)	◆
(7) Industry (paras. 4.356-4.358)	◆
(8) Place of work (paras. 4.360-4.365)	○
(9) Institutional sector of employment (paras. 4.366-4.368)	○
(10) Working time (paras. 4.369-4.375)	○
(11) Participation in own-use production of goods (paras. 4.376-4.381)	◆
(12) Income (paras. 4.382-4.386)	○
H. Agriculture (paras. 4.387-4.396)	
(2) Own account agriculture production (paras. 4.389-4.392)	○
(3) Characteristics of all agricultural jobs during the last year (paras. 4.393-4.396)	○

Legend: ◆ Core topic, collected directly (displayed in bold); □ Core topic, derived;

○ Additional topic; and Δ Additional topic, derived from a core topic.

Source: UN, 2017, p. 175.

Annex 3

Table 10. Countries that included forest-related data in their last agricultural censuses

SOURCE	Presence of forest at the holding	Area of the forest	Main purpose of the forest at the holding	Presence of other wooded areas at the holding	Area of other wooded areas	Main purpose of other wooded land at the holding	The household practices agroforestry	The household practices logging	The household practices collection of forestry products	Presence of communal forests	Labour force status related to forest
Africa											
Burkina Faso	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Burundi											
Cabo Verde	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Congo Rep.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cote d'Ivoire	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gambia				✓	✓	✓	✓				✓
Lesotho				✓	✓	✓	✓				✓
Liberia	✓	✓	✓	✓	✓	✓	✓	✓			✓
Mauritius	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Morocco											
Mozambique	✓	✓	✓	✓	✓	✓	✓		✓		✓
Namibia	✓	✓	✓	✓	✓	✓	✓		✓		✓
Niger				✓	✓	✓	✓		✓		✓
Rwanda	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Senegal											
Seychelles	✓	✓	✓	✓	✓	✓	✓		✓		✓
South Africa	✓	✓		✓	✓	✓	✓		✓		✓
The Kingdom of Eswatini	✓	✓		✓	✓	✓	✓				
Tanzania, Un. Rep. of	✓	✓		✓		✓			✓		✓
Uganda	✓	✓	✓	✓		✓	✓				✓
America, North and Central											
Antigua and Barbuda	✓	✓		✓	✓	✓	✓		✓		✓
Belize				✓	✓	✓	✓	✓	✓		
Canada											

SOURCE	Presence of forest at the holding	Area of the forest	Main purpose of the forest at the holding	Presence of other wooded areas at the holding	Area of other wooded areas	Main purpose of other wooded land at the holding	The household practices agroforestry	The household practices logging	The household practices collection of forestry products	Presence of communal forests	Labour force status related to forest
Costa Rica	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
El Salvador	✓	✓		✓	✓	✓	✓		✓		✓
Grenada											
Jamaica	✓	✓	✓	✓	✓	✓	✓				
Martinique (Fr)	✓	✓		✓	✓						✓
Mexico	✓	✓	✓	✓	✓	✓		✓			✓
Nicaragua	✓	✓	✓	✓			✓		✓		✓
Panama	✓	✓		✓	✓		✓		✓		✓
America, South											
Argentina	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Bolivia	✓	✓		✓	✓		✓	✓	✓	✓	✓
Brazil	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Colombia	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Ecuador	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Guyana											
Paraguay	✓	✓		✓	✓		✓				✓
Peru	✓	✓		✓	✓		✓				
Suriname	✓	✓	✓								✓
Uruguay	✓	✓	✓	✓	✓	✓	✓		✓		✓
Venezuela	✓	✓	✓					✓			✓
Asia											
Azerbaijan	✓	✓	✓	✓	✓	✓	✓				✓
Bangladesh											✓
Bhutan	✓	✓		✓	✓				✓		
Cambodia	✓	✓		✓	✓		✓				
China	✓	✓		✓	✓		✓				✓
Cyprus	✓	✓	✓		✓	✓	✓	✓			✓
India	✓	✓		✓	✓						✓
Japan 2015	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Thailand	✓	✓		✓	✓		✓				✓
Viet Nam	✓	✓		✓	✓		✓		✓	✓	✓

Source: Author's elaboration based in census of agriculture questionnaires consulted in <http://www.fao.org/world-census-agriculture/wcarounds/wca2010/countries2010/en/>

Annex 4

Table 11. Countries that included food insecurity related data in their last agricultural censuses

Source	Whether household members could not afford to eat what they normally eat at any time	Months in which food shortages occurred	Reasons for food shortages	How the household's eating patterns were affected by food shortage	Steps taken to alleviate food shortage	Frequency of normally eating selected food products	Height and Weight
Africa							
Burkina Faso	✓	✓	✓	✓	✓		✓
Namibia	✓	✓	✓		✓	✓	
Rwanda	✓	✓	✓			✓	
Sudan							
The Kingdom of Eswatini	✓		✓				
Tanzania, Un. Rep. of	✓					✓	
Uganda	✓	✓	✓	✓	✓		
America, North and Central							
Belize	✓		✓		✓		
Nicaragua	✓	✓	✓				
South America							
Venezuela	✓						

Source: Author's elaboration based on census of agriculture questionnaires consulted in <http://www.fao.org/world-census-agriculture/wcarounds/wca2010/countries2010/en/>

Annex 5

Table 12. Assessment of the inclusion of forest-related data in CIFOR-PEN questionnaires

SOURCE	Presence of Forest at the holding	Area of the forest	Main purpose of the forest at the holding	Presence of other wooded areas at the holding	Area of other wooded areas	Main Purpose of other wooded land at the holding	The household practices AGRF	The household practices logging	The household practices collection of forestry products	Presence of communal forests
Africa										
Burkina Faso	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Cameroon	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Congo Rep.	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Ethiopia	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Ghana	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Malawi	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Mozambique	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Niger	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Senegal	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Uganda	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Zambia	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
North and Central America										
Belize	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Guatemala	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
South America										
Brazil	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Ecuador	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Asia										
Bangladesh	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Cambodia	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
China	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
India	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Indonesia	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Japan 2015	✓	✓	✓	✓		✓	✓	X	✓	✓
Nepal	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Pakistan	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Viet Nam	✓	✓	✓	✓	✓	✓	✓	X	✓	✓

Source: Source: Author's elaboration based on PEN questionnaire consulted in <https://www.cifor.org/pen>