

**REPORT ON
ANALYTIC STUDY ON AVAILABILITY OF FOREST DATA, GAP
ANALYSIS AND NATIONAL C&I SET FOR SFM IN MONGOLIA**

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Ulaanbaatar 2020

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1. INTRODUCTION

1.1. “Monitoring Progress towards SFM” project

Mongolia participate in the project “Monitoring Progress towards Sustainable Forest Management (SFM)” which aimed to support and assist selected countries¹ in developing a comprehensive and efficient system for monitoring progress towards SFM. Monitoring, assessment and reporting (MAR) and specifically criteria and indicators (C&I) has been a topic of discussion at the international, regional and national levels since the establishment of the United Nations Forum on Forests (UNFF). The Forum called upon Member States to develop adequate monitoring systems and also called on the international institutions and organizations, especially member organizations of the Collaborative Partnership on Forests (CPF) to share data and streamline reporting on forests. The UNFF Secretariat, in the UN Department of Economic and Social Affairs is charged with tracking progress in the implementation of the United Nations Forest Instrument (UNFI) and United Nations Strategic Plan for Forests (UNSPF) 2030. This work is carried out using *qualitative data* from national reports, and *quantitative data* from FAO, ITTO and other CPF members.

The UN Forum on Forests (UNFF) is composed of all Member States of the United Nations. Since its inception, the Forum has reached notable milestones including the adoption of the first UN Forest Instrument (UNFI) in 2007, the creation of the Global Forest Financing Facilitation Network (GFFFN) in 2015 and most recently, the adoption of the UN Strategic Plan for Forests (UNSPF 2017-2030) in 2017.

At the heart of the UNSPF are 6 Global Forest Goals (GFGs) and 26 associated targets to be achieved by 2030². The GFGs and targets are intended to stimulate and provide a framework for voluntary actions, contributions and enhanced cooperation by countries and international, regional, subregional and non-governmental partners and stakeholders³. They support the objectives of the international arrangement on forests and are aimed at contributing to progress on the Sustainable Development Goals (SDGs), the Aichi Biodiversity Targets, the Paris Agreement adopted under the United Nations Framework Convention on Climate Change and other international forest-related instruments, processes, commitments and goals. The vision, principles and commitments set out in the 2030 Agenda for Sustainable Development provide the context for the GFGs and targets, which are interconnected and integrate the economic, social and environmental dimensions of sustainable forest management (SFM) and sustainable development.

¹ Selected countries included: Ghana, Jamaica, Kenya, Mongolia, Peru and Philippines

²https://www.un.org/esa/forests/wp-content/uploads/2018/12/UNFI_brochure.pdf

³Global forest goals and targets of the UN strategic plan for forests 2030, UNDESA 2019

Mongolia participated in the project “Monitoring Progress towards Sustainable Forest Management (SFM)” which aimed to support and assist selected countries in developing a comprehensive and efficient system for monitoring progress towards SFM.

Many voluntary national reports submitted to the Forum have been largely descriptive, with little data and case studies on the reported progress towards achieving the GFGs. In addition, they have pointed out the need for the development of common methodologies for gathering information on the benefits from forests (other than timber) and coherent data on financing SFM. The absence of systematic socio-economic data on forest influences results in a situation where the contribution of forests to GDP/national economies is based mainly on timber, less so on non-wood products, while completely ignoring ecosystem services. Since the full scope of contribution of forests to society and the planet is undervalued, and the socioeconomic benefits difficult to measure, the contribution of SFM to achievement of the SDGs are thus also greatly undervalued. This has a number of consequences, among them that forests have a low priority on the political agenda, thus little financial resources are directed towards SFM, which occasions continued high deforestation rates as forests are converted to other land uses considered more profitable.

To improve assessment and monitoring on progress towards SFM, there is need to develop a comprehensive and efficient system for conducting inventories of existing forest-related data, mapping data gaps, identifying methodologies to address these gaps and selecting appropriate indicators for reporting. This particularly applies to socio-economic contributions of forests (e.g. livelihoods, food security, and poverty reduction), and financial flows for SFM.

1.2. Analytical study

The UNFF Secretariat appointed a national consultant to facilitate the development of a monitoring system in Mongolia to measure progress towards SFM, implementation of the UNFI and in particular the GFGs and targets as well as forest related SDGs. The specific responsibilities/tasks of the national consultant, as specified in the Terms of Reference, are to:

- Prepare an analytical study on:
 - Availability of forest data, beyond the bio-physical information, including socio-economic forest related data, mapping of existing gaps and identifying tools to address these gaps; and
 - The national and international reporting requirements on forests and forest related goals and targets.
- Liaise with the key stakeholders and assist in mobilizing the country team and coordinate national inputs in the project development and formulation;
- Assist in piloting of the reporting format to UNFF and submission of the national report to the Forum;
- Facilitate, with the assistance of the national UNFF focal point, organization of two national consultations/workshops on monitoring, assessment and reporting (MAR) of SFM in Mongolia; and

- Prepare the concept notes for and the summary reports from the national workshops.

In accordance with the Terms of Reference, this analytic study is aimed at evaluating data gaps to measure progress towards SFM, implementation of the UNFI and the GFGs and associated targets, as well as forest related SDGs. So far, Mongolia has not delivered any country report on assessing progress towards implementation of the UNSPF and the UNFI to the Forum.

1.3. Methodological approach

With respect to the study's objectives, the methodological approach is built on the following features.

- Literature review and consultations with stakeholders;
- Inventory of forest related consistent datasets;
- Gap analysis; and
- Proposal of numeric indicators.

2. FINDINGS

The findings of this analytic study are based on extensive literature analysis and consultation with representatives of stakeholders, playing a key role on data collection in the Mongolian forestry sector. The main body of literature was built on session notes of the Forum and COFO FAO, domestic legislations, which regulates existing forest monitoring system, as well as academic papers related to the objectives.

2.1. REQUIRED INFORMATION FOR ASSESSING PROGRESS TOWARDS GFGs

This section outlines the key points of the system of monitoring, assessment and reporting on progress towards implementing the UNSPF, which is presented in detail in the Secretary-General's report and notes of the latest UNFF sessions (12,13 and14).

Since its inception, the Forum has invited member states to submit voluntary national reports on progress made towards SFM implementation. In accordance with the strategic plan, the Forum will assess progress in implementing the strategic plan in the context of its midterm and final reviews of the effectiveness of the international arrangement on forests, to be held in 2024 and 2030. The assessment will be based on internationally agreed indicators, including relevant Sustainable Development Goal indicators, that are relevant to the GFGs and targets.

Moreover, the assessment will take into account voluntary national reporting on the implementation of the UNSPF, the UNFI and voluntary national contributions (VNCs) and the results of the most recent global forest resources assessment of FAO, together with input from the CPF and its member organizations and other partners.

In May 2018, the thirteenth session of the Forum (UNFF13) adopted format for voluntary national⁴ reporting. At the 13th session of the UN Forum on Forests (UNFF13) in May 2018, the Forum adopted the format for voluntary national reporting on progress towards implementation of the UNSPF and invited Members States of the Forum to submit their voluntary national reports by mid November 2019. f UNSPF. The voluntary national reports focus on action taken since 2015. The 2015 baseline is also consistent with the FAO Global Forest Resources Assessment (FRA) process, and the previous report to the Forum on progress towards SFM was also presented in 2015. Furthermore, the 2030 Agenda for Sustainable Development was adopted in 2015. They are the main source of information for assessing progress towards the achievement of the global forest goals. The Forum supplements information received from countries with quantitative FAO FRA data and information from other Collaborative Partnership Forum members and sources. Several global forest goals, especially GFG 4, GFG5 and GFG6 all refer to policy developments, some of which cannot be monitored through measurable outcomes; accordingly, it will not be possible to develop numerical indicators for every target.

⁴ (E/CN.18/2018/4, annex I)

The table below summarizes required information from voluntary national reports and other sources for assessing progress towards the achievement of the global forest goals and their targets.

Goal 1. Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation and contribute to the global effort of addressing climate change.		
<i>Target</i>	<i>Required information for assessing progress towards the achievement</i>	<i>Remarks</i>
1.1 Forest area is increased by 3 per cent worldwide.	FRA 2020 reporting tables 1a (Extent of forest and other wooded land), 1b (Forest characteristics) and 1c (Annual forest expansion, deforestation and net change)	FAO provide a global overview in quantitative terms
1.2 The world's forest carbon stocks are maintained or enhanced	FRA 2020 reporting tables 2d (forest carbon stock in tons per hectare) 1a (Extent of forest and other wooded land) any additional available information other on other stocks, such as harvested wood products from FAO and UNFCCC	FAO provide a global overview in quantitative terms for total forest carbon stocks and their changes in
1.3 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	Sub indicators of Sustainable Development Goal indicator 15.2.1, namely: - annual net rate of change in forest area; - above-ground biomass stock in forests; - proportion of forest area located within legally established protected areas; - proportion of forest area under a long-term forest management plan; and - forest area under an independently verified forest management certification scheme. FRA 2020 reporting tables 1a (Extent of forest and other wooded land), 1b (Forest characteristics) and 1c (Annual forest expansion, deforestation and net change) 5c (Degraded forest)	SDG indicator 15.2.1. will provide an overview on the implementation of sustainable management of all types of forests. FAO provide a global overview in quantitative terms for deforestation, afforestation and reforestation. It will not be possible to provide a global overview of progress on the restoration of degraded forests in quantitative terms, as there is no internationally agreed definition of degraded forest and no consensus on measurement methods. Although it does request information on any national definitions of “degraded forest” and any monitoring processes in place at the national level, including methodology and any results.
1.4 The resilience and adaptive capacity of all types of forests to natural disasters and the impact of climate change is	State policies, strategies and their targets to strengthen the resilience and adaptive capacity of all	

significantly strengthened worldwide	types of forests to natural disasters and the impact of climate change.	Provides a global overview in quantitative terms for number of countries that have policies and strategies to strengthen the resilience and adaptive capacity of all types of forests to natural disasters and the impact of climate change.
Goal 2. Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people		
2.1 Extreme poverty for all forest-dependent people is eradicated	Proportion of rural people living on less than USD 1.25 per day and residing in or around forests, by using data on rural poverty rates and information about the distribution of rural populations National definition of forest-dependent people	It quantifies the contribution of forests towards Sustainable Development Goal target 1.1 (By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day) There is still considerable academic debate about the meaning of the term “forest-dependent people”
2.2 Increase the access of small-scale forest enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets	Proportion of small-scale forest enterprises in total industry value added Proportion of small-scale forest enterprises with a loan or line of credit	It quantifies the contribution of forests towards Sustainable Development Goal 9.3 (by 2030, Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets)
2.3 The contribution of forests and trees to food security is significantly increased	At present, there are no robust data sources at the global level for metrics that provide quantitative information on the contribution of forests and trees to the various dimensions of food security, namely, food availability, economic and physical access to food, food utilization, stability and nutrition. Country reports will provide information on challenges and actions taken at the national and sub national levels to increase the contribution of forests and trees to food security.	
2.4 The contribution of forest industry, other forest-based enterprises and forest ecosystem services to social, economic and environmental development, among other things, is significantly increased	Social: FRA 2020 reporting table 7a (Employment in forestry and logging) and indirect employment (e.g., in enterprises that supply goods and services to forest enterprises or add value to forests products) Economic: changes in value added by the forest sector and its contribution to the global economy. Environmental: FRA 2020 reporting table 3a (Designated management objective) on the proportions of forests managed for soil and water conservation as a designated management objective and as a primary management objective.	It quantifies contribution of forest in social, economic and environmental dimensions.

<p>2.5 The contribution of all types of forests to biodiversity conservation and climate change mitigation and adaptation is enhanced, taking into account the mandates and ongoing work of relevant conventions and instruments</p>	<p>FRA 2020 reporting table 1e (Specific forest categories) on changes in area of primary forest 3a (Designated management objective) on the proportions of forests managed for conservation of biodiversity as a designated management objective and as a primary management objective.</p> <p>UNFCCC Net greenhouse gas emissions (source)/ removals (sink) of forests, and carbon balance of harvested wood products</p>	
<p>Goal 3. Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests</p>		
<p>3.1 The area of forests worldwide designated as protected areas or conserved through other effective area-based conservation measures is significantly increased</p>	<p>FRA 2020 reporting table 3a (Designated management objective) on the proportions of forests managed for conservation of biodiversity as a designated management objective and as a primary management objective. 3b (Forest area within legally established protected areas and forest area with long-term forest management plan) to provide a global overview</p>	
<p>3.2 The area of forests under long-term forest management plans is significantly increased</p>	<p>FRA 2020 reporting table 3b (Forest area within legally established protected areas and forest area with long-term forest management plan)</p>	
<p>3.3 The proportion of forest products from sustainably managed forests is significantly increased</p>	<p>Proportion of forest products from certified forests (including forests certified under internationally and/or nationally approved schemes).</p>	
<p>Goal 4. Mobilize significantly increased, new and additional financial resources from all sources for the implementation of sustainable forest management and strengthen scientific and technical cooperation and partnerships</p>		
<p>4.1 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</p>	<p>Official development assistance and public expenditure on conservation and sustainable use of forests</p>	<p>“mobilize” means securing financial resources and using them to finance sustainable forest management.</p>
<p>4.2 Forest-related financing from all sources at all levels, including public (national, bilateral, multilateral and</p>	<p>Official development assistance and public expenditure on conservation and sustainable use of forests</p>	

triangular), private and philanthropic financing is significantly increased		
4.3 North-South, South-South, North-North and triangular cooperation and public-private partnerships on science, technology and innovation in the forest sector are significantly enhanced and increased	Different types of international cooperation to promote sustainable forest management.	This target also relates to the second part of the goal, namely, strengthen scientific and technical cooperation and partnerships. The “North” means developed countries and the “South” means developing countries. For example, North-South cooperation refers to the exchange of expertise between one or more developed countries and one or more developing countries, and South-South cooperation means cooperation between two or more developing countries. Triangular cooperation involves Southern-driven partnerships between two or more developing countries supported by a developed country or countries or multilateral organization(s) to implement development cooperation programmes and projects.
4.4 The number of countries that have developed and implemented forest financing strategies and have access to financing from all sources is significantly increased	Developed or implemented forest financing strategies and their time frames.	
4.5 The collection, availability and accessibility of forest-related information is improved through, for example, multi-disciplinary scientific assessments	Actions to improve the collection, availability and accessibility of forest-related information.	This target also relates to the second part of the goal, namely, strengthen scientific and technical cooperation and partnerships.
Goal 5. Promote governance frameworks to implement sustainable forest management, including through the United Nations forest instrument, and enhance the contribution of forests to the 2030 Agenda for Sustainable Development		
5.1 The number of countries that have integrated forests into their national sustainable development plans and/or poverty reduction strategies is significantly increased	National sustainable development plans and/or poverty reduction strategies, which include forests	
5.2 Forest law enforcement and governance are enhanced, including through significantly strengthening national and subnational forest authorities, and illegal logging and associated trade are significantly reduced worldwide	Actions to prevent and reduce illegal international trafficking in forest products, wildlife and other biological resources FRA 2020 reporting table 6a (Policies, legislation and national platform for stakeholder participation in forest policy) Data from the Convention on International Trade in Endangered Species of Wild Flora and Fauna	FRA 2020 reporting table 6a provides information on the existence of a traceability system for wood products.
5.3 National and subnational forest-related policies and programmes are coherent, coordinated and	Mechanisms to ensure cross-sectoral coordination among government agencies. (For example, mechanisms to achieve coherence between national	

<p>complementary across ministries, departments and authorities, consistent with national laws, and engage relevant stakeholders, local communities and indigenous peoples, fully recognizing the United Nations Declaration on the Rights of Indigenous Peoples</p>	<p>and subnational policies and programmes as well across ministries, departments and authorities at the national level.)</p> <p>FRA 2020 reporting table 6a (Policies, legislation and national platform for stakeholder participation in forest policy)</p> <p>Mechanisms to involve stakeholders, including local communities and indigenous peoples, in sustainable forest management policy formulation, planning and implementation.</p>	<p>FRA 2020 reporting table 6a provides a global overview of the number of countries with a national platform for stakeholder participation in forest policy.</p>
<p>5.4 Forest-related issues and the forest sector are fully integrated into decision-making processes concerning land use planning and development</p>	<p>Mechanisms to involve the forest sector in cross-sectoral coordination among government agencies in charge of land use planning and development</p>	
<p>Goal 6. Enhance cooperation, coordination, coherence and synergies on forest-related issues at all levels, including within the United Nations system and across member organizations of the Collaborative Partnership on Forests, as well as across sectors and relevant stakeholders</p>		
<p>6.3 Cross-sectoral coordination and cooperation to promote sustainable forest management and halt deforestation and forest degradation are significantly enhanced at all levels</p>	<p>Actions taken at the national and subnational levels to enhance cross-sectoral coordination and cooperation to promote sustainable forest management and halt deforestation and forest degradation.</p>	
<p>6.4 A greater common understanding of the concept of sustainable forest management is achieved and an associated set of indicators is identified</p>	<p>Existing criteria and indicators for sustainable forest management</p>	
<p>6.5 The input and involvement of major groups and other relevant stakeholders in the implementation of the strategic plan and in the work of the Forum, including intersessional work, is strengthened</p>	<p>Action, taken by Government, to involve major groups and other relevant stakeholders in the implementation of the strategic plan and on the nature of such action, which may include, for example, strengthening of stakeholder engagement, capacity-building, partnerships and devolving public forest management rights</p>	<p>Agenda 21, adopted at the Earth Summit held in Rio de Janeiro, Brazil, in 1992, formalized nine sectors of society as the main channels through which broad participation would be facilitated in United Nations activities related to sustainable development. These are called “major groups” and are: women; children and youth; indigenous peoples; non-governmental organizations; local authorities; workers and trade unions; business and industry; scientific and technological community; and farmers.</p>

2.2. AVAILABILITY OF DATA

In accordance with distinguished classes of required data, a sound picture of the consistent national datasets for Mongolia was established through the assessment of their metadata features. The consistent datasets consist of comprehensive data, which share the following common metadata features:

- Definite source
- Standardized method of data collection and processing,
- Temporal resolution and
- Spatial resolution

The consistent datasets shall be later used to develop numerical indicators to measure achievements of GFGs and their quantitative targets.

The metadata descriptions of consistent data are presented in table 2, where each GFG and associated targets are assigned to distinguished consistent datasets, described below briefly.

Legal environment and institutional arrangement

With respect to Law on Environmental Protection, Law on Forest, Law on Land and Law on Statistics, the consistent datasets are generated through the following three main sources: the Ministry of Environment and Tourism (MET), the National Statistics Office of Mongolia (NSO), and the Agency for Land Administration and Management, Geodesy and Cartography (ALAMGC), Implementing Agency of the Government of Mongolia.

Environmental Information Center

The Environmental Information Center (EIC) is mandated⁵ to gather data and maintain the National Environmental information database (NEID), an online database in the MET. base.. NEID consists of 22 individual databases including the Forest Information database (https://eic.mn/index_forest.php)⁶. In 2013, MET approved guidance on accounting, forest information (FI) including table format, and instructions on how to fill in the forest information database.

Forestry officers and data specialists at the soum level submit annual forest activities to the MET according to the FI tables from the Soum⁷ and inter-soum forest units⁸ through online interface with EIC submit annual forestry activities to the MET according to FI tables.

The framework of FI table mechanism realizes the monitoring system for forestry activities in Mongolia.

There are 7 FI tables, (annex 1) including:

- FI-1 Area and changes with forest resource

⁵ Articles 33-35 of the Law on Environmental Protection

⁶ Article 6 of Law on Forest defines content and characteristics of Forest Information Database.

⁷The Constitution and the 1992 Law on Government Administration proclaims Mongolia as a unitary state with *three tiers of local Government*. Governance of the administrative and territorial units is based on the principle of centralized authority as well as a gradual transition toward a system of local Governments. The country is divided into administrative units known as “*Aimag*” (provinces) and the capital city. Each Aimag is further divided into smaller administrative units “*Soum*” (sub-provinces), accordingly each Soum is also divided into smaller groups known as “*Bag*” which the lowest administrative unit in the country is.

Administratively, Mongolia is divided into 21 Aimags and the capital city, Ulaanbaatar. Total Soums and Bags are accounted for 330 and 1615 respectively. The capital city Ulaanbaatar is subdivided into 9 *Duuregs*(District) which are comprised of 152 *Khoroos* (sub-district)

⁸ A unit or officer in charge of forest issues shall be set up in the environment department of Aimag and Capital City Administration, and forest units at inter-Soum or Soum level (here in after referred as “forest unit”) shall be set up in the Aimags and Soums.

- FI-2 Forest stock, and their changes
- FI-3 Forest fire information
- FI-4 Reports on forestry activities
- FI-5 Forest ownership report
- FI-6 Forest conflict report
- FI-7 Expenditure report on forestry activities

The Department of Forest Policy and Coordination in the MET makes decisions and prepares annual reports based on information provided in FI tables.

The figures of *annual harvested wood volume and expenditure on reforestation and forestry activities* are published in the environmental statistics chapter of Statistical Yearbook, compiled by the National Statistics Office (NSO).

The Forest Research and Development Center, (FRDC)

The

The FRDC is part of the MET and is responsible for conducting the national forest inventory (NFI) and providing technical and professional guidance to private logging companies and Forest User Groups. FRDC carries out reforestation, rehabilitation after forest fires, or disease or insect infestation. This work includes the development of model management plans⁹.

Since 1956, biophysical information of Mongolia's forests has been acquired. There are two main forest inventory systems with 10 years cycle in Mongolia they are:

- Stand Inventory (SI) for forest management planning, pest and fire disaster control; and
- Multipurpose National Forest Inventory (NFI) for national and aimag level reporting on forest resources.

SI is based on mapping of forest stand and visually estimating of summary variables for stands, while NFI is a sampling based statistical approach where single tally and sample trees are recorded in concentric sample plots.

- SI is based on standwise assessment, and it is carried out by authorised private forest inventory entities. SI is regulated by the Forest Resource, Forest Protection (Annex 2 to the 410th order issued on 24 December 2009 by MET), and the Guideline to Implement Forest Inventory (Annex 3 to the 88th order issued on 30 July 2009 by Head of the Forest Agency).

The inventory consists of three steps:

- 1) Production of satellite image-based polygon maps;
- 2) Field inventory; and
- 3) Data processing.

⁹ Article 13, Law on Forest

In order to manage forest, forest maps are always required. The current system is to create two levels of management polygons that include forest compartments and sub-compartments.

The upper level, delineation is based on geographic features of terrain (as watershed area, rivers, mountain ridges, roads, etc.) using topographic maps. Borders and numbers of forest compartments cannot to be changed during recurring forest inventory without permission from central state administration organization responsible for forestry issues. Images are printed on paper with the polygon borders, and these satellite images are then processed to enhance the differences between forest types.

In the field assessment polygons are first divided to sub-polygons (max. 50 ha). Borders are drawn according to colour differences in the printed image and visual assessment are done on a hill or slope where it is possible to get an overview over the whole main polygon. Gaps smaller than 1 hectare are not separated from forest land.

Estimation of stand parameters for each sub-polygon is done by visiting each sub-compartment. Stand parameters describing the site, soil, growing stock, status of the stand are assessed for each sub-compartment by following the SI Guidelines and field forms. All data are recorded on paper sheets. The field season typically starts at the end of May and is completed by the end of September. Data are entered in digital form in the main office after the field season.

NFI on the other hand is a sampling based statistical approach where single tally and sample trees are recorded in concentric sample plots.

The first NFI in Mongolia was implemented from 2014 to 2017, by FRDC, in collaboration with all of Mongolia's main forestry institutions, universities and research organisations, and with international expertise. The German Federal Ministry for Economic Cooperation and Development supported the Mongolian Government to implement the NFI project.

The main objective of the NFI was to generate unbiased statistics on the forest tree resources and their long-term changes on national and Aimag level. The NFI covers all boreal forest areas within Mongolian territory. The main results of the NFI are available at Environmental Information Center (EIC) portal¹⁰.

The NFI typically answers the following questions and demands:

- Forest coverage and their annual changes;
- Total volume, biomass and carbon sequestered into forest ecosystem;
- Impact of climate changes to growth;
- Natural regeneration of forests, tree species proportions and their annual changes (incl. possible losses in biodiversity);

¹⁰<http://www.eic.mn/>

- Cost efficient way to cover necessary information needs and fulfill international reporting requirements; and
- Support for strategic planning and utilization of forest resources, and climate change related policy decisions.

The NFI was based on a 2-phase sampling approach where a systematic grid was set on the top of boreal forest areas. In the first phase, area estimates were collected visually from remote sensing data using Open Foris (OF) Collect Earth (CE) tool. During the second phase, field inventory data from the permanent 4,367 sampling units (i.e. clusters) were collected.

Because the NFI is the first of its kind, at this stage it is not possible to generate estimates on changes in carbon stocks. However, the NFI is designed as a monitoring system with repeated measurements on permanent sample plots thus allowing the production of time series necessary to assess changes in the forest resources. The field sampling method was developed and endorsed by the MET in 2014.

Agency for Land Administration and Management, Geodesy and Cartography

Article 26 of Law on Land states “The cadastral register shall include all data such as the national register, referred to in Article 9 to 16; quantitative registration information; quality of land; fees; changes [of ownership, possession or use] and land protection measures, by each territorial unit.”

One component of NEID is Land database (<https://eic.mn/land/>), where area figures per classes of the unified land territory are present. The unified land territory of Mongolia shall be classified as follows¹¹:

1. agricultural land;
2. land of cities, villages and other settlements;
3. land under roads and networks;
4. land with forest resources;
5. land with water resources; and
6. land for special needs.

Any changes on classes of unified land territory is updated annually by Aimag level land managers according to specific Land report (LR) tables, approved by decree of the Head of ALAMGC in 2009.

Tables LR1 and LR5 are related to monitoring land-use and its change. These tables/reporting forms have no detailed spatial references.

Any quantitative and qualitative changes related to land with forest resources of unified land territory is derived from conducted national forest inventory and updated FI tables.

ALAMGC compiles annual report on unified land territory and shares with NSO. The area figures per each classes of unified land territory are presented on Aimag level in statistical yearbook of NSO. That means official forest area figure is provided by ALAMGC. But there is an obstacle related to forest area in annual report on unified land territory, where forests in land for special needs is clipped from total land with forest resources class. That leads to an underestimation of forest area.

¹¹Law on Land

National Statistical Office

The Law on Statistics of Mongolia describes the mandate, role, rights and obligations of the National Statistical Office of Mongolia (NSO) and to some extent other producers of official statistics. It is not only the main producer of official statistics in the country but also has de-jure Law on Statistics has a strong coordination role over all other producers of statistical information¹².

The Law regulates interactions among bodies of the Statistics Authority of Mongolia and also between the NSO and major stakeholders such as the Parliament, Government, administrations at all territorial levels, holders of administrative data and users. Presently, there are no clear criteria about which activities from other producers, and which other producers, are considered part of official statistics. In Mongolia the production of official statistics is, from a functional point of view, centralised within the NSO and territorial statistical bodies. NSO is not only the main producer of official statistics in the country but also has de-jure Law on Statistics has a strong coordination role over all other producers of statistical information¹³.

NSO provides the state, citizens and enterprises with economic, social and environmental statistical data on equal basis at national, regional, provincial and the capital city levels. The relevant ministries and agencies are responsible for the production of statistical data such as money, loan, finance, custom; tax, environment, art, culture, education, science and technology, health, social welfare, food security and justice statistics and for submitting them to the NSO.

In accordance with Article 7 of Law on Statistics, The NSO is responsible for conducting the following censuses and surveys related to socioeconomic indicators of forest sector:

- Household socio-economic survey every quarter;
- Business register every quarter
- Industrial statistics annually
- Establishment census every 5 years
- Agricultural census every 10 years and inter-census survey for every 5 years;

Endorsed methodological approaches for data collection and processing of statistical survey and census are well documented and accessible via <https://metadata.1212.mn/methodology.aspx?ln=Mn>

Household socio-economic survey:

The Statistics Office has conducted the a Household Income and Expenditure Survey (HIES) since 1966. In July 2007, NSO started carrying out a Household Socio-economic Survey starting from by combining the HIES and the Living Standards Measurement Survey. The survey sampled a number of households in Mongolia representing the regional and settlement and whole country to study and compile data on age,

¹²The Global Assessment of the National Statistical System of Mongolia, 2014, United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)

¹³The Global Assessment of the National Statistical System of Mongolia, 2014, United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)

sex, education and employment of the selected household members as well as on household income, expenditure and consumption.

Since 1998, the “minimum subsistence level of population” has been calculated at the capital and regional levels. It refers to a minimum consumption level expressed in monetary value and to a scientifically set quantity of consumption to meet basic needs as defined in the food and non-food consumption baskets. This indicator serves as a standard to determine the amount of social insurance, social welfare benefits, minimum wages, compensation and to provide monetary assistance by the government to the citizens.

The poverty head count index is the most widely used poverty index and demonstrates the share of the population whose consumption is below the poverty line. It is comparably easy to interpret and understand.

Statistical Business register (SBR):

The Business Register is regularly updated and complete structure of units engaged in the production of goods and services, which is maintained for statistical purposes.

The statistical business register records enterprises as well as their branches, which are active in all social and economic sectors. Initially, it was based on the result of the Establishment census 1998. Currently it is updated quarterly according to result of the Establishment census 2006 and 2011, quarterly survey of SBR, and the database of other administrative records.

Industrial statistics:

This section provides statistics on the economic state of the industrial sector by number, size, expenditures, volume of production (real and price), sales and the main indicators of fixed assets and financing of establishments. These statistics are compiled by using the monthly and annual reports of enterprise, census and surveys.

The production output refers to the products and services for the particular establishment market and the products and services for their final use. Selling of products is defined as the amount of the production sold and services executed out in current year.

The entities that produce different types of products and services are classified by the products and services which they produce mostly. As recommended from United Nations to its member countries, ISIC version 4.0 is used for the classification of products and services that industrial sector produce.

2.3. GAP ANALYSIS

The potential gaps are identified by those GFGs and targets, which cannot be assigned by any existing reliable datasets. The table 2 presents existing gaps.

Goal 1. Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation and contribute to the global effort of addressing climate change.					
TARGET	SOURCE	RELIABLE DATA	TEMPORAL RESOLUTION	SPATIAL RESOLUTION	REMARKS
1.1	FRDC	NFI	10 years	National	Sampling design, forest carbon stocks assessments and derived figures are consistent with UNFCCC communication requirements and FRA terms. Forest is defined as land spanning with minimum tree canopy coverage of 10%, a minimum height of the tree species of 2 m at the location site and minimum extent of 1 ha ¹⁴ . NFI supplies inputs to FI-1 and FI-2 tables.
1.2	FRDC	NFI	10 years	National	NFI report forest carbon stocks and their changes
1.3	FRDC	NFI	10 years	National	Definition of degraded forest: forest areas with a canopy cover equal to, or above, 10 % but in which canopy cover has been reduced due to fire, pest or logging activities ¹⁵ .
	EIC	FI-5	Annually	Soum and District	Forest Ownership information reported in FI-5 table
	EIC	FI-4	Annually	Soum and District	Afforestation and reforestations activities are reported in FI-4 tables
1.4					Qualitative indicator Environmental Legal framework database exists in EIC. https://eic.mn/legalinfo/
Goal 2. Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people					
TARGET	SOURCE	RELIABLE DATA	TEMPORAL RESOLUTION	SPATIAL RESOLUTION	REMARKS
2.1		No reliable data			The Household Socio Economic survey of NSO samples a number of households in Mongolia representing the regional and settlement and whole country to study and compile data on age, sex, education and employment of the selected household members as well as on household income, expenditure and consumption. From the survey derived Poverty main indicators are available at Aimag level. The poverty figures are updated quarterly. Due to lack of forest dependent people definition, the poverty indicators cannot be aggregated. https://1212.mn/

¹⁴Mongolian Multipurpose national forest inventory, 2019, Ministry of Environment and Tourism

¹⁵Mongolia's Forest Reference Level submission to the UNFCCC, 2018, Ministry of Environment and Tourism

2.2	NSO	Establishment census	5 years	Soum and District	NSO censuses and survey applies following classification system, developed by UN Statistics Division: Central Product Classification (CPC 2.1), constitutes a complete product classification covering all goods and services; International Standard Industrial Classification of All Economic Activities (ISIC 4.0)
		Agricultural census	10 years	Soum and District	
		Business register	Quarterly	Soum and District	
		Industrial sector statistics	Quarterly	Soum and District	
	MOFALI (Ministry of food, agriculture and light industry)	Financial Reports of Soum development and Small and Medium Enterprise Development foundations	Annually	Soum and District	Micro and Small-scale enterprise are defined as enterprises with employee less than 50 and annual turnover less than 1 Billion MNT (ca.350 000 USD) ¹⁶ . State central budget allocates annually funds for Soum development and Small and Medium Enterprise Development foundations. These foundations provide the access of small-scale forest enterprises, to affordable credit.
2.3	NSO	Agricultural census	10 years	Soum and District	Crop land, which protected by forest strip is reported in Record sheet of Agricultural census. As of 2011, total cropland area protected by forest strip amounted to 3,6 thousand ha ¹⁷ .
	EIC	FI-4	annually	Soum and District	Information on amount of harvested non-wood forest products is reported in FI-4 table.
2.4	NSO	Establishment census	5 years	Soum and District	figures on employment in forest enterprises (social benefit)
		Agricultural census	10 years	Soum and District	figures on employment in forest enterprises (social benefit)
		Business register	Quarterly	Soum and District	figures on employment in forest enterprises (social benefit)
		Industrial sector statistics	Quarterly	Soum and District	figures on products values from forest sector (economic benefit)
	FRDC	NFI	10 years	National	Figures on Forest occupying within radius of 1000 m around lake, mineral and other water springs, riverbanks and Forests occupying on slopes greater than 30 degrees ¹⁸ are accounted as protected forest.
2.5	FRDC	NFI	10 years	National	Figures on Temporary unstocked forests due to fire Figures on forests within protected areas
	FRDC	Forest reference level report	5-10 years	National	Mongolia has submitted first Forest Reference level to UNFCCC in 2018. The Emission Factors are derived from NFI and Activity Data is quantified from Land Use and Land Use change assessment using Open Foris Collect Earth application.
	EIC	FI-3 and FI-4			Burnt forest area and reforestation and afforestation activities.
Goal 3. Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests					
TARGET	SOURCE	RELIABLE DATA	TEMPORAL RESOLUTION	SPATIAL RESOLUTION	REMARKS

¹⁶Mongolian Law on Small and Medium Enterprises

¹⁷Agricultural census 2011, NSO

¹⁸Article 8,1 and 8,2 of Law on Forest

3.1	FRDC	NFI	10 years	National	Forests within protected areas
3.2	FRDC	NFI	10 years	National	Figures on forest areas designated as forest management unit
	EIC	FI-5	annually	Soum and district	Forest Ownership information reported in FI-5 table
3.3	MET	No reliable data			In the paragraph 3.3.7 of State Policy on Forest stated that <i>Establish a national standard for certification of forest organizations in line with international standards, so that by 2020, transferred into system in which only certified companies and organizations are authorized to use forest resources.</i>
Goal 4. Mobilize significantly increased, new and additional financial resources from all sources for the implementation of sustainable forest management and strengthen scientific and technical cooperation and partnerships					
TARGET	SOURCE	RELIABLE DATA	TEMPORAL RESOLUTION	SPATIAL RESOLUTION	REMARKS
4.1, 4.2 and 4.3	EIC	FI-7	annually	Soum and District	Reports financial inflows to sustainable forest management, afforestation and reforestation
	MOFALI (Ministry of food, agriculture and light industry)	Financial Reports of Soum development, Small and Medium Enterprise and rural Development foundations	annually	Soum and District	State central budget allocates annually funds for special foundations. These foundations provide the access of small-scale forest enterprises, to affordable credit.

3. NATIONAL CRITERIA AND INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT IN MONGOLIA

3.1. Mongolian forestry

National circumstances

Mongolia is the 19th largest country in the world with a surface area of 1,564,116 square kilometers and average altitude of 1,580 m above the sea level. Half of its territory lies over 1,400 m, 63% higher than 1,200 m, and 81% over 1,000 m above the sea level. It is also the world's second-largest landlocked country with mountains covering the northern and western regions and the Gobi Desert located in the south. Precipitation is low with annual average of about 230 mm, higher in mountainous areas in the North but less than 100 mm in desert regions in the South. Its continental climate is much harsher than that in other countries of the same latitudes, and is characterized by the extremes in both temperature and fluctuations¹⁹. Its six basic natural zones are high mountains, taiga forest, mountain forest steppe, steppe, desert steppe, and desert that are different in climate, landscape, soil, flora and fauna. They have a mixture of plant and animal species, many of which are endemic. So are almost 150 of the some 3,000 vascular plant species. Moreover, numerous globally threatened and endangered species occur²⁰. There are 4,000 lakes and almost all rivers flow northwards, including the inflow to Lake Baikal in Siberia that is the largest freshwater reservoir in the world.²¹

Mongolia is one of the most sparsely populated countries in the world, as of December 2018 with a population of 3,238,479 with an average growth rate of 1.91%. Approximately 68% (2,197,970) of the total population lives in cities, out of which about 67% (1,491,375) accounts for Ulaanbaatar only. Ulaanbaatar is the capital and the largest city of Mongolia. Mongolia's economic growth has been based on the production in mining and agricultural sectors. The Gross Domestic Product (GDP) in Mongolia was USD 10 billion in 2019²². The GDP value of Mongolia represents 0.02 percent of the world's economy. GDP in Mongolia averaged to USD 3.79 billion from 1981 until 2015, reaching an all-time high of USD 12.55 billion in 2013 and a record low of USD 0.77 billion in 1993 at the beginning of transition to the market economy²³.

Forest resources in Mongolia

The *boreal forests* of the world, also known as "*taiga*", is one of the largest biome on the earth, covering 12 million km² and constitute the northernmost forests of the globe, ranging from latitudes of 50 to 70° N. Taiga makes up 29% of the world's forest cover. Boreal forests exist on previously ice-covered

¹⁹ O. Byambasuren, B. Nyamjav, and B. Nachin, (2006) "Impact of fires and climate change on Northern Mongolian Forest," *Proc. Int. Northeast Asia For. Fire Conf. III Int. Meet. Northeast Asia Wildland Fire Netw.*,

²⁰ J. A. Priess, C. Schweitzer, F. Wimmer, O. Batkhishig, and M. Mimler, (2011). "The consequences of land-use change and water demands in Central Mongolia," *Land Use Policy*, vol.28, no.1,

²¹ N. Sharkhuu, "Trends of permafrost development in the Selenge River Basin, Mongolia," in *Proceedings of the Seventh International Conference on Permafrost*, 1998, pp.979-986.

²² National Statistical office, www.1212.mn

²³ Ministry of Environment and Tourism., 2017: Mongolia's initial biennial update report

or glaciated soils and are dominated by coniferous softwood species that are able to survive in the cold climate but contain some sites of broadleaf hardwood species.

The southern limit of the Siberian taiga falls in northern Mongolia. These boreal forests are part of the transitional zone between the Siberian taiga forest to the north and the grasslands to the south and typically grow on mountain slopes between 800-2,500 m above the sea level. The annual average precipitation in the boreal forest zone is about 300 mm. The boreal forests cover amounts to 9.1 million hectares with average growing stock of 114 m³ per hectare in northern Mongolia. In terms of tree species, Siberian Larch (*Larix sibirica*), Siberian Pine (*Pinus sibirica*) and White Birch (*Betula platyphylla*) stands contribute to 80%, 6,7% and 15% of total forest areas respectively²⁴.

Due to harsher continental climate, Mongolian boreal forests have low productivity and growth, and they are vulnerable to disturbance from drought, fire and pests.

Mongolia's average air temperature has increased by 2,3°C since the 1940s²⁵.

Current state and challenges of forestry sector in Mongolia

According to official records, the Mongolian forest sector was started in 1924 the with establishment of the Forest and Wood Division, in charge of Forest and Wildlife management related issues, under Ministry of Industry²⁶.

Since the 1970s, the government has payed more attention to protecting forest resources from both natural and man-made negative impacts including over cutting, illegal logging, forest fires, and harmful insect distribution in certain areas²⁷.

Before 1990s, approx. 2.2 million m³ of timber were produced annually, and forest products contributed to 6% of Mongolia's GDP. In 1990, Mongolia made a dramatic change in its political and economic system transitioning from a single-party political system to a democratic form of society and market economy. Since this transition, the country has experienced drastic socio-economic changes, leading to an increase in poverty and unemployment, and a social stratification within Mongolian society with disparities between rural and urban areas. The current situation puts increasing anthropogenic pressure on natural resources, seriously affecting the forests of northern Mongolia²⁸.

During economic and political transition years, Mongolia underwent economic crisis and large wood harvesting and processing centralized industries and factories collapsed. The majority of wood harvesting and processing private forest entities ceased manufacturing wood products and took to exporting round

²⁴ Ministry of Environment and Tourism, 2016: Mongolian Multipurpose National Forest Inventory (2014-2016)

²⁵ Information and research institute of meteorology, hydrology and environment <http://irimhe.namem.gov.mn/?cat=4&type=climate>,

²⁶ Ministry of Environment and Green development.,2014: 90th anniversary of Mongolian forest sector

²⁷ Tsogtbaatar, J.2004: Forest Policy Development in Mongolia

²⁸ Wyss, D. 2006: Waldmanagement in der Mongolei. Dissertation FU Berlin

wood and sawn timber to China. In 1999, environmental concerns led to the parliament passing legislation but halted export of round wood and sawn material. During the recent years, official timber harvesting rates have oscillated around approximately 800 thousand m³/year. Much of this harvest has been met through sanitation cutting or forest cleaning whereby timber is removed from forests affected by fire, pests and diseases. From the total, 9.1% were harvested through harvest cutting, 4.6% from thinning, and 86.3% from forest cleaning and sanitation cutting. There is an average 18.8% of total harvest for commercial wood and 81.2% for fuel wood; the latter is used for householder consumption, charcoal making and sale to urban areas²⁹.

Based on NSO data, the GDP of the forestry sector was estimated at MNT 141.8 billion, 0.5% of Mongolia's GDP in 2017. In 2017, total financial inflows into forest conservation and utilization was around MNT 440 billion (US\$ 220 million). Between 2013 and 2017, around 92% of financial inflows were from private sector investments, 5% from the Government of Mongolia and 3% from donors. The total revenue generated from forestry in 2017 was around MNT 157 billion (US\$ 78 million). The government captures around 26% of this total revenue, the rest is net profit to the private sector. In 2017 the total Government funding for SFM was around MNT 12,808 million (US\$6.4 million), compared to Government forest related revenues of MNT 51,289 million (US\$ 25.6 million) suggesting that increased Government funding for SFM is possible through better earmarking of forest generated revenues. The MET's budget allocations to its departments engaged in forestry and forest conservation in 2017 was MNT 9.6 billion (US\$ 4.8 million). Pest control received the largest proportion of the MET's budget for forests, averaging 43% between 2013 and 2017. Forest fires receive around 5% of the MET's budget in comparison despite being the main driver of deforestation and degradation in the country. Forest utilization activities accounted for only 9.1% of MET's forest budget, although this is showing an increasing trend³⁰.

Adoption of a first national forest law in 1995 paved the way for the development and implementation of medium- and long-term forestry sector development strategies with a clear preference for forest conservation, reforestation and sustainable forest management. A new system of forest management units (FMUs), consisting of either (private/commercial) forest concessions or (communally managed) forest user-groups (FUGs) emerged since around 1997 and has since been increasingly formalized.

Mongolia possesses a well-developed framework of policies and corresponding laws for the forest sector. These provide all the necessary guidance for the sustainable management of Mongolia's forest resources. Over the last 10 years, Mongolia's government adopted a long list of policy documents and laws that improve the environment for forest protection, and its use and restoration. Although the policy and legal framework is well developed, implementation is not fully undertaken. In many cases, institutions particularly at the local level are overwhelmed with managing the forest resources. Earlier work

²⁹ APFNET, (2017), Forest development and best practices of forest management Mongolia

³⁰ UN-REDD, 2018: Assessment of Financing Mechanisms and Options for Mongolia's REDD + Action Plan. Report for UN-REDD Program, Ulaanbaatar, Ministry of Environment and Tourism, Mongolia.

highlighted that in 2013, only 36 soum-level forestry units had been established, of which only 22 were operational. With a total forest area around 13 million ha, forest units are responsible for large forest areas well above 300,000 ha. According to the government resolution No. 255 of 2012 on “Approval of Norms, Normative, and Locations of Forested Areas”, the areas should be even larger. Average staffing levels are 3-5 only, with very limited technical capacities, and with severe constraints in equipment³¹. This situation is further exacerbated by weak coordination across the different sectors within the government, where earlier work has identified competing demands and responsibilities across sectors³². Chronically low harvest rates indirectly promote illegal logging and undermine forest sector policy and regulation targeted at forest protection. Harvest rates are set much lower than domestic demand and imports do not compensate for the gap. The FRDC estimated in 2013 that there was demand of approximately 3 million m³/year of commercial wood and fuelwood³³. Official harvesting rates, however, amount to well below 1 million m³/year. The supply gap has led to illegal logging. The low harvesting rates undermine much of the policy framework oriented towards conservation and protecting the forest resource.

In general, Mongolia’s forest resources have come under threat by a complex mixture of challenges, including non-sustainable (as well as non-regulated/illegal) use of wood and non-timber forest products, land use competition (e.g. overgrazing), frequent forest fires and pest infestations, and the cumulative effects of climate change³⁴.

Fire, pest outbreaks, logging and mining are the key drivers of deforestation and forest degradation in Mongolia. Forest areas where tree canopy cover has been reduced to below 10 % by the drivers are defined as *deforestation*. The forest areas converted for settlement and agricultural purposes are also considered as deforestation even if the minimum threshold of 10 % canopy cover is reached. Forest areas with a canopy cover equal to, or above, 10 % but in which canopy cover has been reduced due to fire, pest or logging activities were considered as *degraded forest*.

Greenhouse Gas emissions from deforestation and forest degradation are estimated, from 4 different drivers - fire/pest, grazing, soil erosion, logging, as well as GHG removals from enhancement through afforestation and/or reforestation activities. The annual average emission from deforestation and forest degradation is **3,477,384.2 tCO₂e**, without considering natural growth on forest land remaining forest land. And annual average removals from enhancement of forest carbon stocks are **-29,158,201.4 tCO₂e** when including natural growth on forest land remaining forest (table?)³⁵.

Table I: Carbon emissions and removals in Mongolia during the reference period: 2005-2015 from

³¹ Ministry of Environment and Green Development, 2014: Annual Report of Ulaanbaatar, Mongolia.

³² UNDP. 2013: Entry Points and Strategic Options for Mainstreaming Financing for Sustainable Forest Management into Sectoral Budgets. Ulaanbaatar, Mongolia:

³³ FRDC. 2013: Research Report on Prevention of Illegal Logging and Sustainable Use of Forest Resources.

³⁴ Stefann Mann and Werner Schindele, 2015, ECO Consulting group mission report on Development of Sustainable Forest Management Planning Concept in Mongolia, Ulaanbaatar, Mongolia

³⁵ MET, 2018: Mongolia’s Forest Reference Level submission to the UNFCCC

various change areas as a result of various drivers of change classes.

Reference period: 2005-2015	Mean Annual CO ₂ e	95% Confidence Interval		
		Lower 2.5%	Upper 97.5%	CI range (%)
Change		(tCO ₂ .yr ⁻¹)		
Emissions				
Intact forest > Non-forest	3,551,438.6	2,928,271.0	4,174,606.2	17.5
Intact forest > Degraded forest				
Removals				
Non-forest > Intact forest	-74,054.5	-133,302.6	-14,806.3	80.0
Non-forest > Degraded forest				
Net emissions	3,477,384.2	2,851,406.4	4,103,362.0	18.0

Recognizing the impending threat of forest degradation and deforestation, the Mongolian government in July 2015 adopted a revised forest policy (with a planning horizon until 2030), geared primarily towards forest protection, forest rehabilitation and sustainable forest management. IN 2019, the MET endorsed a midterm action plan (2019-2021) on reducing emission from forest degradation and deforestation..

No government agency is directly in charge of forest management; illegal activities often remain unchecked. Since 1996, provincial forestry land is privately owned, and government agencies only indirectly manage forests. Forest management activities are coordinated at four hierarchical levels of the administration and ultimately implemented by FUGs and PFEs (table?). The lack of a government agency directly mandated to manage forests is an important reason for widespread illegal activities in and around forests³⁶.

Table II Hierarchical levels of the forestry administration in Mongolia³⁷

<i>Ministry of Environment, Green Development and Tourism</i>
<ul style="list-style-type: none"> ▪ To coordinate the formulation and implementation of the state policy and legislation, and making and enforcing rules and regulations for forest protection, rational use, rehabilitation, breeding, providing an environmental fight; ▪ To ensure the formulation and implementation of forest legislation, making and enforcing rules and regulations for forest protection at national, provincial and soum levels. ▪ To ensure inter-sectoral and interregional coordination for forest protection, sustainable use and rehabilitation, breeding, obtain approvals on standards from relevant authorities, and approve with other relevant administrative bodies and ensure implementation; ▪ To set the maximum limits of Annual Allowable Cut (AAC) in accordance within the law and legislation ▪ To limit and prohibit the utilization of timer and non-timber forest products in certain regions for a specified period of time upon consideration of ecological requirements and existing forest reserves;
<i>Forest Research and Development Centre</i>
<ul style="list-style-type: none"> ▪ To reserve and store selective forest seed resources, examine seed of trees, shrubs for sowing at forest seed laboratories; ▪ To conduct an activity in the garden collections of woody plants that grow in Mongolia, to care and maintain the garden, to enrich the wood collection; ▪ To create and enlarge the forest database; ▪ To select areas of reforestation and design, and to ensure handed over the planted forest to the state forest; ▪ To determine the damage in forestland caused by forest fires and illegal logging; ▪ To test and introduce new technologies for reforestation and silvicultural measures; ▪ To be taken silvicultural measures oriented to improve the forest state;
<i>Environmental department at province and city / forest bureaus</i>
<ul style="list-style-type: none"> ▪ To be taken silvicultural measures oriented to improve the forest state;

³⁶ UNREDD Mongolia, 2016: Preliminary Assessment of the Drivers of Forest Change in Mongolia

³⁷ Ministry of Environment and Green Development, 2014: Annual Report of Ulaanbaatar, Mongolia.

<ul style="list-style-type: none"> ▪ To organize works to ensure the implementation of forest legislation within the territory, report to aimag and capital city governors, the public administration; ▪ To create aimag and capital city forest databanks, provide information to the central state administrative body and public administration; ▪ To provide by specialized supervision for their dependent soum, district forest units, oversee their activities; •To be conducted and ordered research of forest resources by professional organization; ▪ To impose and concentrate fees on forest resources utilization in accordance with applicable laws and regulations; ▪ To organize activities for forest protection and sustainable use, rehabilitation, breeding within the territory;
<p><i>Forest units at soum, inter-soum and district level</i></p>
<ul style="list-style-type: none"> ▪ To separate a timber harvest area from a forest; Issue certificates of origin to timber harvests and wooden materials ▪ To implement program on forest protection, sustainable use and breeding program and the management plan at soum and district level; ▪ To provide professional and methodological recommendations to the FUGs, PFEs and organizations possessing the parcel of forests; ▪ To impose fees on forest resources utilization and ensure compliance thereof; ▪ To implement and appraise results on forest protection, sustainable use, restoration, breeding at the aimag and soum level; ▪ To operate the national forest database; •To organize public trainings and education activities on forest protection, sustainable use, restoration, breeding.

3.2. Role of criteria and indicators (C&I) for SFM

Over the last few decades, the need for justification and legitimacy of political actions in objective and quantified terms has led to the increasing use of evaluation approaches in almost all fields of human activity to determine whether policies or programmes are working effectively and to demonstrate that their resources are used in a responsible manner. For example, trends towards new public management and evidence-based policy making indicate that the world of public management has become, first and foremost, a world of measurement. In such a performance-indicator culture, it comes as no surprise that the notion of evaluation becomes increasingly important³⁸. In the fields of environment and sustainable development policy, evaluation also plays an important role. One of the main issues associated with negotiating a sustainable future is to define sustainability and then determine progress towards this goal³⁹. This is the aim of Criteria and Indicator (C&I). A criterion has been defined as “a standard that a thing is judged by” while an indicator has been defined as “any variable...used to infer performance”⁴⁰.

C&I for SFM have taken a prominent role since the Rio Earth Summit in 1992, as Chapter 11 of the Agenda 21 called for the formulation of scientifically sound criteria and guidelines for the management and sustainable development of all types of forests:

...indicators of sustainable development need to be developed to provide solid bases for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems⁴¹.

³⁸ Pregnering, M., Hognl, K., Nordbeck, R., 2012: The politics of sustainability evaluation: analysis of three Austrian Strategies for Sustainable Development. In: Sedlacko, M., Martinuzzi, A. (Eds.) Governance by Evaluation for Sustainable Development. Edward Elgar Publishing.

³⁹ Hickey, G.M., Innes J.L., 2005: Scientific Review and Gap Analysis of Sustainable Forest Management Criteria and Indicators Initiatives. FORREX Forest Research Extension Partnership, Kamloops, British Columbia, FORREX Series 17. 55 p.

⁴⁰ Prabhu, R., Ruitenbeek, H.J., Boyle, T.J.B, Colfer, C.J.B., 2001: Between Voodoo Science and Adaptive Management: the Role and Research Needs for Indicators of Sustainable Forest Management. In: Raison, R.J., Brown, A.G., Flinn, D.W. (Eds.) Criteria and Indicators for Sustainable Forest Management. IUFRO Research Series 7. CABI Publishing, Wallingford, pp. 39–66.

⁴¹ Chapter 11, Agenda 21, UNCED, 1992b

As an operational follow-up, indicators were identified as the most appropriate tools for measuring, monitoring, assessing and reporting progress towards sustainability goals. Indicators make complex circumstances measurable and comprehensible to decision-makers and the public⁴².

In forestry, the guiding principles for sustainable development were derived and applied within the concept of SFM. Criteria for SFM and related indicators translated the largely philosophical ideals of SFM into specific factors that could be measured in practical terms and applied in the development of sound ecosystem based management. C&I thus provide a tacit definition of SFM as well as a means to measure progress towards that goal. This was a major step forward and contributed to the paradigm shift away from sustained yield to a far broader and more holistic view of SFM. Within the C&I processes, government representatives, often in partnership with civil society and international organisations (e.g., FAO) have created a co-operative framework for sectoral experts and policy-makers to develop, approve and implement specific sets of regional and international C&I to evaluate sustainability of forest management. This has led to C&I processes performing a pioneering role, creating an enabling environment for related activities such as forest certification. The activities and modalities of C&I processes are important in their leading role for SFM definition and promotion. Hence, the intergovernmental C&I processes are the very subject of this paper. Since UNCED, the different regional and international forest-related processes and organisations have defined SFM and C&I in slightly different ways. However, the following definitions for these terms are broadly supported:

The United Nations describe 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”. The United Nations Forum on Forests (UNFF) agreed in 2007 following seven thematic elements of SFM⁴³.

1. *Extent of forest resources*
2. *Forest biological diversity*
3. *Forest health and vitality*
4. *Productive functions of forest resources*
5. *Protective functions of forest resources*
6. *Socio-economic functions*
7. *Legal, policy and institutional framework*

“CRITERIA define the essential elements against which sustainability is assessed, with due consideration paid to the productive, protective and social roles of forests and forest ecosystems. Each criterion relates to a key element of sustainability and may be described by one or more indicators”

⁴² Wolfslehner, B.; Linser, S.; Pülzl, H.; Bastrup-Birk, A.; Camia, A.; Marchetti, M., 2016: Forest bioeconomy—A new scope for sustainability indicators. From Sci. Policy.

⁴³ General Assembly 2007: Non-Legally Binding Instrument on All types of Forests (A/RES/62/98); United Nations: Bali, Indonesia

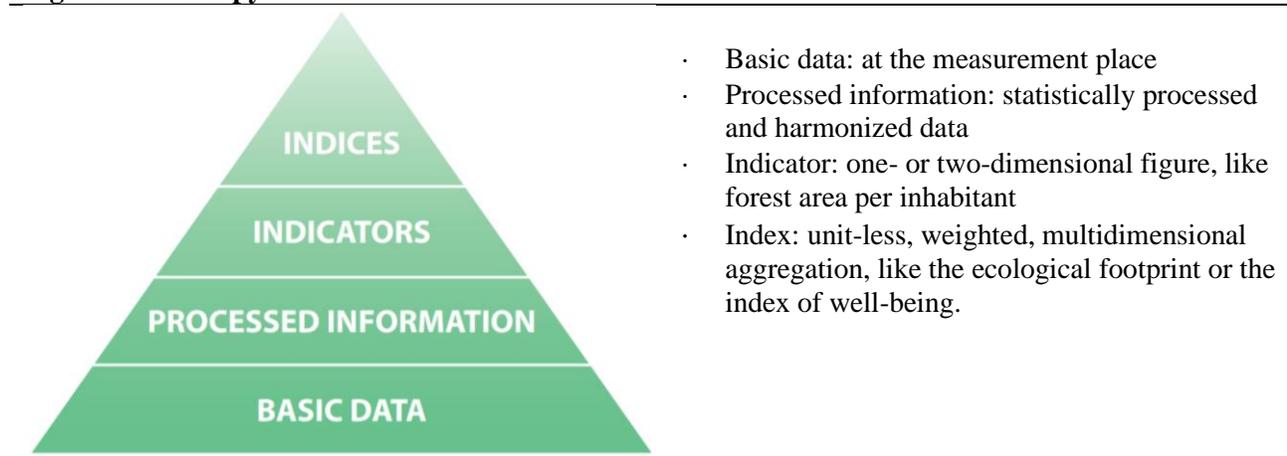
Criteria relate to WHAT is important to measure. Thus, a criterion is a condition that should be met to confirm that forests are managed sustainably. This could be e.g. maintenance, enhancement, protection or conservation of the essential elements of SFM.

“INDICATORS are parameters which can be measured and correspond to a particular criterion. They measure and help monitor the status and changes of forests in quantitative, qualitative and descriptive terms that reflect forest values as seen by those who defined each criterion”⁴⁴.

Indicators relate to HOW to measure SFM. They may be quantitative or qualitative.

An index or indicator reduces a large quantity of data to its simplest form, retaining essential meaning for the questions that are being asked of the data. In short, an index or indicator is designed to simplify⁴⁵. Thus, there is a graded information system (figure III):

Figure III: Data pyramid⁴⁶



Various international and regional processes and initiatives have led to the development C&I for SFM for use at international or regional level, national and sub-national, as well as forest management unit (FMU) levels (Table IV). Different stakeholder groups (e.g., forest owners/managers, policy makers, scientists and civil society) with different views and interests are involved in the development process, reflecting the increasing global demand for sustainable economic growth, social equality, environmental

⁴⁴ Criteria and Indicators for Sustainable Forest Management. Available online: <http://www.fao.org/forestry/ci/en/> (accessed on 15 February 2020).

⁴⁵ Ott, W., 1978: Environmental Indices: Theory and Practice. Ann Arbor Science. Ann Arbor. 371 p.

⁴⁶ Adriaanse, A., 1995: In Search of Balance. A Conceptual Framework for Sustainable Development Indicators. In MacGillivray, A. (ed.) 1994. Accounting for Change. Papers from an International Seminar. Toyne Hall. The New Economics Foundation. London. Pp. 3-10.

conservation and good governance. In broader terms, C&I have been considered as useful tools to promote improved forest management practices as an integral part of sustainable development by:

- Providing a conceptual framework that characterizes the essential components of SFM;
- Providing a measure of the state of forests and their management, and thus assessing progress towards the achievement of SFM;
- Identifying trends and changes as well as emerging gaps and threats in the conditions of forests and their management;
- Determining the effects of forest management interventions over time;
- Facilitating decision-making in national forest policy processes;
- Providing a reference framework for the formulation and evaluation of national forest policies and programmes;
- Identify enabling conditions and mechanisms, including financial and technical resources that affect national implementation of C&I;
- Clarifying issues related to forest certification and marketing of forest products even though C&I are not performance standards⁴⁷.

In that context, Rametsteiner (2001)⁴⁸ differentiates between two major areas of use of SFM indicators: (i) the collection of information; and (ii) the utilization of information for policies. The core user groups of information on SFM indicators collected in forest policy contexts are governmental organizations, such as forest policy institutions, environmental institutions or national accounting services, forest owner and forest owner interest groups, and environmental groups. These groups can use indicators for different purposes at a international and/or regional scale, national and sub-national as well as the FMU levels. Table? is a summary of the most prominent and various roles C&I for SFM can serve at the different levels.

Table VI Role of criteria and indicators	
International and/or regional scale	<ul style="list-style-type: none"> • Support international forest policy deliberations and negotiations on issues related to sustainable forest management • Provide a common understanding within and across countries of what is constituted by sustainable forest management • Provide a basis for collecting, categorizing, analyzing, reporting, and representing information the state of forests and their management • Provide an international reference for policy makers in the formulation of national policies and programmes • Serve as a basis for international cooperation and collaboration on SFM activities
National and sub-national level	<ul style="list-style-type: none"> • Describe, monitor, and report on the national forest trends and changes • Assess progress towards sustainable forest management and identify emerging threats and weaknesses

⁴⁷ European Forest Institute. 2013: Implementing Criteria and Indicators for Sustainable Forest Management in Europe.

⁴⁸ Rametsteiner, E., 2001: SFM Indicators as Tools in Political and Economic Contexts: Actual and Potential Roles. In: Raison, R.J., Brown, A.G. and Flinn, D.W. (Eds.) Criteria and Indicators for Sustainable Forest Management, IUFRO Research Series 7, CABI Publishing, Wallingford, pp. 107–130.

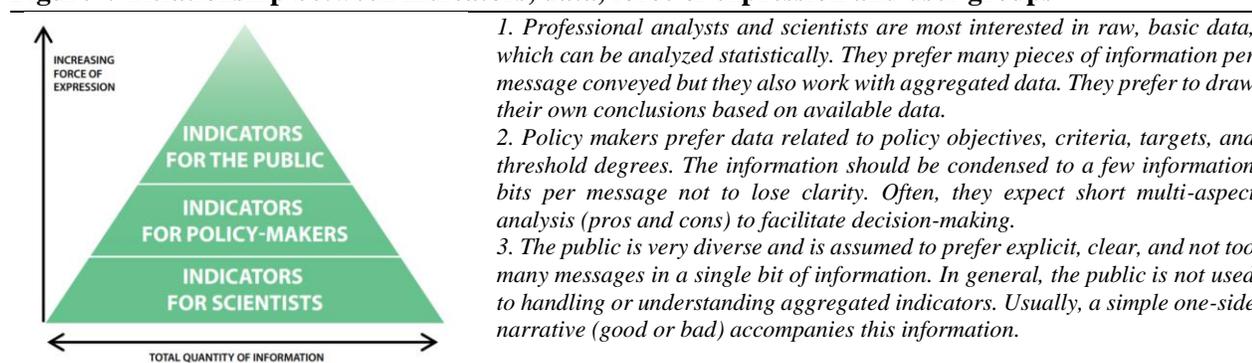
	<ul style="list-style-type: none"> · Assist in the development and evaluation of national and/or sub-national forest policies, strategies, plans and programmes · Serve as a basis for cross-sectoral forest related data collection · Focus research efforts where knowledge is still inadequate
Forest management unit level	<ul style="list-style-type: none"> · Evaluate management practices, control forest concessions and clarify issues related to certification. · A basis for developing forest certification systems (e.g. PEFC)

Source: FAO/ITTO, 1995; ISCI, 1996; IPF, 1997; FAO, 2001 and 2003

Indicators are strong tools to collect and report information and can be based on the following approaches⁴⁹: political, scientific, and market-oriented.

Indicators, respectively indicator sets, should be in a format that is designed with an explicit user group in mind. According to figure V, there are three types of user groups, based on the quantity of information incorporated in the indicator set:

Figure V Relationship between indicators, data, force of expression and user groups⁵⁰



3.3. Development process of national C&I for SFM

The measurement, identification and evaluation of C&I for SFM, is done using the top-down (TD) and bottom-up (BU) approaches. In the basic TD approach, a previously generated set of C&I is used initially and a team of experts adapts and modifies this set according to the local situation⁵¹. In the BU approach, local communities actively engage in the development process in a participatory manner by proposing C&I based on their perception of the individual situation⁵². Reed et al. (2006)⁵³ proposed a framework for

⁴⁹ UNECE and FAO., 2019: Guidelines for the Development of a Criteria and Indicator Set for Sustainable Forest Management

⁵⁰ Linser S., 2002: Critical Analysis of the Basics for the Assessment of Sustainable Development by Indicators. Freiburger Forstliche Forschung, Band 17. Freiburg, i.Br. 157 p.

⁵¹ Prabhu, R., Colfer, C.J.P. and Dudley, R.G. 1999: Guidelines for Developing, Testing and Selecting Criteria and Indicators for Sustainable Forest Management (Criteria and Indicators Toolbox Series No. 1.). CIFOR, Bogor, Indonesia.

⁵² McDougall, C., Pandit, B.H., Banjade, M.R., Paudel, K.P., Ojha, H., Maharjan, M. et al. 2009: Facilitating Forests of Learning: Enabling an Adaptive Collaborative Approach in Community Forestry User Groups. CIFOR, Bogor, Indonesia.

⁵³ Reed, M.S., Fraser, E.D.G. and Dougill, A.J. 2006: An adapting learning process for developing and applying sustainability indicators with local communities. Ecol. Econ. 59, 406–418.

expert-led (TD) and community-led (BU) approaches in C&I development. It has been noted that C&I are predisposed to ‘TD’ control and present ‘quick-fix’ solutions to complex problems⁵⁴. However, formulating sustainable forest policy requires a balance between the multiple socio-economic and environmental objectives of forest stakeholders and their conflicting issues⁵⁵. Efforts have been made to apply indicators developed on national and regional scales to the smaller scale of the forest management unit (FMU) as well. Recently, there has also been a shift to a more scientific point of view regarding the C&I-based assessment of SFM⁵⁶. The unique characteristics of community-managed forest operations, and of traditional and indigenous management practices, are often not sufficiently reflected in existing C&I sets. Limited efforts have been made to consider the local context in C&I development initiatives and even less has been done to encompass the unique management structure of community-owned or managed forest operations⁵⁷. Recent activities involve communities in TD and BU approaches in proposing and identifying sustainability indicators as the basis for improving monitoring and management as well as multi-stakeholder collaboration for SFM⁵⁸.

There, however, is no commonly agreed conceptual framework on how to develop national C&I. The focus should be to identify the smallest number of C&I needed to comprehensively and reliably monitor, report and assess forest management in a cost-effective manner⁵⁹.

An that has been used in this study, to indicator selection follows (figure VI) (Linser, 2002, adapted):

1. *Train the team to coordinate/facilitate the process of national C&I development on principles, process, methods and skills.*
2. *Review existing relevant national forest information and forest information systems.*
3. *Review relevant regional and international C&I processes and sets.*
4. *Undertake stakeholder mapping to identify relevant stakeholders to engage in the process*
5. *Facilitate stakeholder engagement, analysis, multistakeholder negotiation and prioritisation of the key priority areas for national level C&I to focus on.*
6. *Conduct a logical hierarchy process from national goals down to C&I. Drawing upon and adapting indicators relevant to national priorities from regional and national C&I sets and developing new indicators where gaps exist*
7. *Evaluate the potential indicators against the requirements*

⁵⁴ Bass, S. 2002 Application of criteria and indicators to support sustainable forest management: some key issues. In Criteria and Indicators for Sustainable Forest Management. IUFRO Research Series 7. R.J. Raison, A.G. Brown and D.W. Flinn (eds). CABI Publishing, Oxford, pp. 19–37.

⁵⁵ Ananda, J. 2007: Implementing participatory decision making in forest planning. *J. Environ. Manage.* 39, 534–544.

⁵⁶ Wolfslehner, B. and Vacik, H. 2011: Mapping indicator models: from intuitive problem structuring to quantified decision-making in sustainable forest management. *Ecol. Ind.* 11, 274–283.

⁵⁷ Pokharel, R. and Suvedi, M. 2007: Indicators for measuring the success of Nepal’s community forestry program: a local perspective. *Hum. Ecol. Rev.* 14, 68–75.

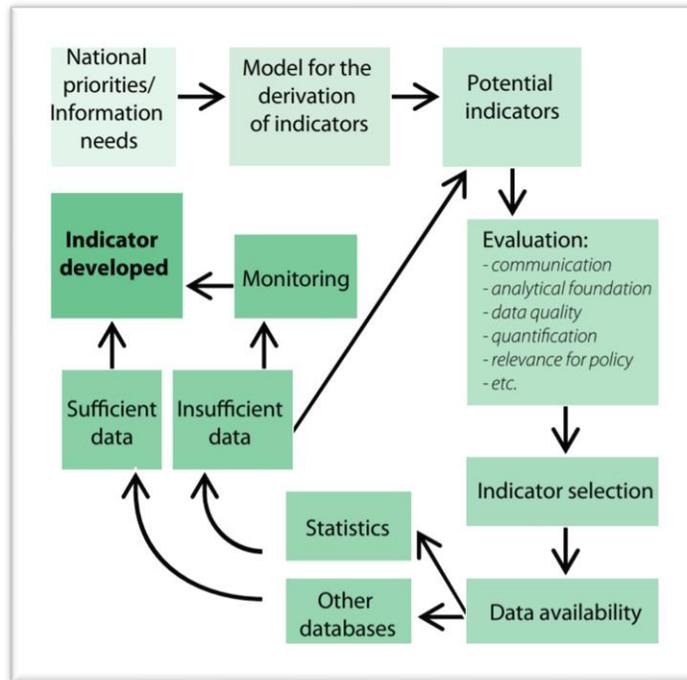
⁵⁸ Elbakidze, M., Angelstam, P.K., Sandstrom, C. and Axelsson, R. 2010: Multi-stakeholder collaboration in Russian and Swedish model forest initiatives: adaptive governance toward sustainable forest management? *Ecol. Soc.* 15, 1–13.

⁵⁹ UNECE and FAO., 2019: Guidelines for the Development of a Criteria and Indicator Set for Sustainable Forest Management

8. Examine existing national data collection systems for appropriate data to support the construction of the candidate indicators. If the desired data are not available, examine feasibility of collecting such data if the answer is positive, this should provide a new impulse for data acquisition.

9. Select indicators⁶⁰.

Figure VI: Process of national C&I indicator development, steps 6 to 9 (listed above)



Source: Linser, 2002, adapted

In practice, the national C&I process could be more complex and include a mixed BU/TD approach. The process and outcomes, particularly indicators, should be built strongly on national characteristics and priorities but aiming to align criteria with regional and international C&I sets, wherever possible. The process should be logical, clear, transparent, as inclusive as possible and combining technical aspects with stakeholder interests. An approach that has been used in this study is shown (figure ?).

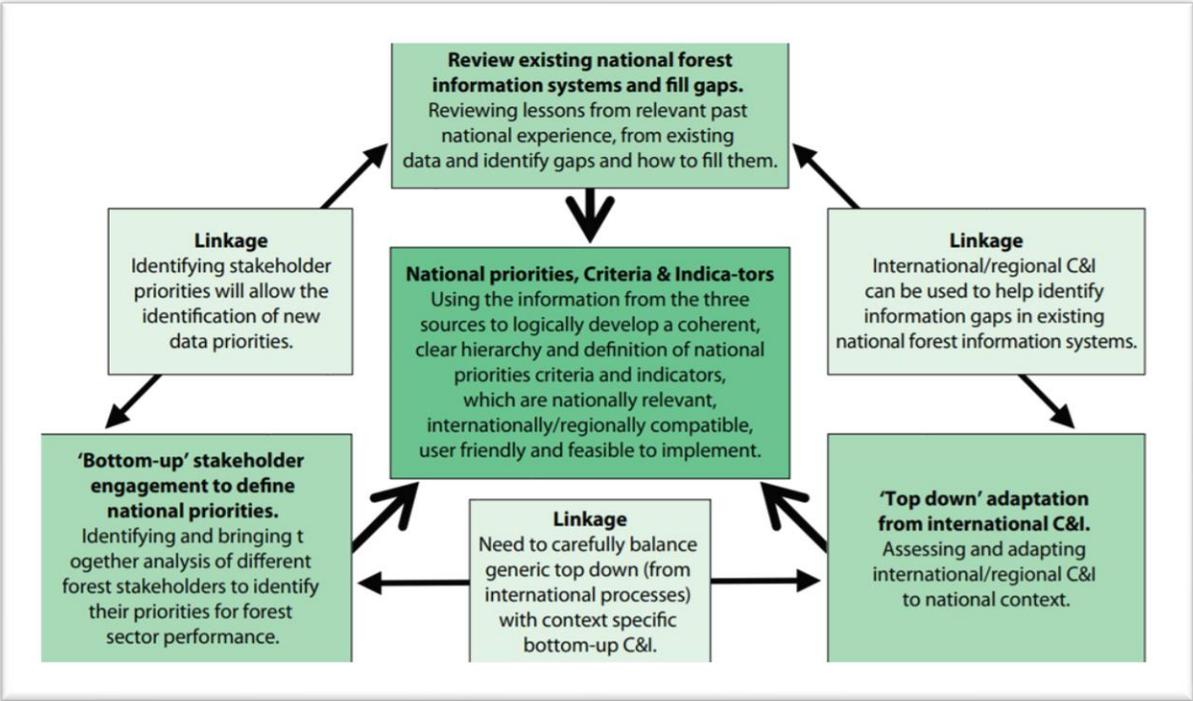
This conceptual framework builds on three sources to develop a coherent and clear hierarchy of national priorities, criteria and indicators which are nationally relevant, compatible with international systems, user-friendly and feasible to implement:

1. A review of existing and past national forest information systems and experiences.
2. ‘Bottom-up’ stakeholder engagement within the country.
3. ‘Top down’ adaptation of international C&I sets to national context and alignment of national sets to international C&I sets.

⁶⁰ Linser S., 2002: Critical Analysis of the Basics for the Assessment of Sustainable Development by Indicators. Freiburger Forstliche Forschung, Band 17. Freiburg, i.Br. 157 p.

The three inputs in figure VII must be conducted in a parallel and interconnected way as they influence each other.

Figure VII: Conceptual framework for C&I development.



Source: O’Hara, 2017.

3.4. Proposal of national C&I sets for SFM

National Criteria set aligns with globally agreed thematic elements of SFM defined by UNFF in 2007. Development process applied both BU and TP approaches,

Criteria	Description ⁶¹
1. Extent of forest resources	It expresses an overall desire to have adequate forest cover and stocking, including trees outside forests, to support the social, economic and environmental dimensions of forestry. For example, the existence and extent of specific forest types are important as a basis for conservation efforts. The theme encompasses ambitions to reduce deforestation and to restore and rehabilitate degraded forest landscapes. It also includes the important function of forests and trees outside forests to store carbon and thereby contribute to moderating the global climate.
2. Forest biological diversity	Forests are the terrestrial ecosystems with the highest degree of biodiversity. Conserving and managing biological diversity at ecosystem (landscape), species and genetic levels including protecting areas with fragile ecosystems, will maintain the diversity of life and provide opportunities to develop new products in the future, including medicines. Genetic

⁶¹ UNECE and FAO., 2019: Guidelines for the Development of a Criteria and Indicator Set for Sustainable Forest Management

	improvement is also a means of increasing forest productivity, e.g. by ensuring high levels of wood production in intensively managed forests.
<i>3. Forest health and vitality</i>	There are increasing concerns on the resilience of forests, also in the wake of climate change effects with increasing occurrence of damaging events like droughts, storms or forest fires. Managing forests helps to minimize the risks and impacts of unwanted disturbances, including also airborne pollution, storm felling, invasive species, pests, diseases and insects. Such disturbances may impact social and economic as well as environmental dimensions of forestry. Reliable, related data may facilitate active institution support for adaptation and restoration.
<i>4. Productive functions of forest resources</i>	Forests and trees outside forests provide a wide range of wood and non-wood forest products. This theme expresses the ambition to maintain an ample and valuable supply of primary forest products, while at the same time ensuring that production and harvesting are sustainable and do not compromise the management options of future generations.
<i>5. Protective functions of forest resources</i>	The theme addresses the role of forests and trees outside forests in moderating soil, hydrological and aquatic systems, maintaining clean water (including healthy fish populations) and reducing the risks and impacts of floods, avalanches, erosion and drought. Protective functions of forest resources also contribute to ecosystem conservation efforts and have strong cross-sectoral aspects, because the benefits to agriculture and rural livelihoods are high.
<i>6. Socio-economic functions</i>	The theme covers the contributions of forest resources to the overall economy and particularly also to a bioeconomy, supporting the shift from fossil-based towards a bio-based economy, both in wood consumption and energy use-related indicators, but also focussing on employment, values generated through processing and marketing of forest products or trade and investment in the forest sector. It also addresses the important forest function of hosting and protecting sites and landscapes of high cultural, spiritual or recreational value, and thus includes aspects of land tenure, indigenous and community management systems, and traditional knowledge.
<i>7. Legal, policy and institutional framework</i>	The theme includes the legal, policy and institutional arrangements necessary to support the above six thematic elements, including participatory decision-making, governance and law enforcement, and monitoring and assessment of progress. It also involves broader societal aspects, including fair and equitable use of forest resources, scientific research and education, infrastructure arrangements to support the forest sector, transfer of technology, capacity-building, and public information and communication. Some of the below indicators are of qualitative/descriptive nature.

The principal requirements for SFM indicators are that:

- they should measure progress towards sustainable forest management (including monitoring SDG 15.2); implementation of the UN Forest Instrument and the UN Strategic Plan for Forests, notably the Global Forest Goals, and their associated targets; SDG targets other than 15.1 and 15.2; and other internationally agreed goals on forests in other instruments, in particular forest-related commitments of the Rio conventions
- they should measure progress towards forest goals, stated in national policies: State policy on forest, green belt program
- they should reflect findings of Mongolian multipurpose national forest inventory, 2016
- they need to be practicable, that means a concise set of about 30 indicators, not hundreds of indicators. The high number of indicators could cause confusion and mixed messages.
- they need to be meaningful and communicative, easily comprehensible for decisionmakers.
- They should apply reliable data, derived from gap analysis findings

Indicator	Measurement unit	Rationale
Criteria 1. Extent of forest resources		
1.1. Forest area as a proportion of total land area	%	SDG 15.1 and GFG 1.
1.2. Forest area annual net change rate	%	SDG 15.2 and target 1.1 of GFG1. Sub-indicator of SDG 15.2.1.
1.3. Net GHG emissions (source)/removals (sink) of forests, and carbon balance of harvested wood products.	tCO ₂ e/ year	targets 1.2 and 2.5 of the UNSPF, SDG goal 13 and MRV requirements under UNFCCC. Target 4.5 of State policy on forest (SPF)
1.4. Re- and afforested area	ha	Target 4.6 of SPF, Green belt programm
Criteria 2. Forest biological diversity		
2.1. Proportion of forest area located within legally established protected areas	%	SDG 15.2 and targets 2.5 and 3.1 of the UNSPF and Aichi target 11. Sub-indicator of SDG 15.2.1.
2.2. Forest wildlife species composition	Index	GFG 2 and its target 2.5 of UNSPF Target 4.4 of SPF
2.3. Tree species composition	index	Target 4.4 of SPF
Criteria 3. Forest health and vitality		
3.1. Area of forest disturbed by drivers: <i>wildfire, pests, mining, grazing and soil erosion</i>	ha	target 1.3 and 1.4 of UNSPF. Linkages with SDG target 15.3 as well as Aichi target 15 and UNFCCC 4.2 and 4.3 of SPF
3.2. Mixed forest area as proportion of commercial forest area	%	resilience of forest resources in Mongolia
3.3. Dead wood amount in forest	m ³ /ha	Forest cleaning program (2013) to improve resilience of forest resources against fire and pests risks in Mongolia
Criteria 4. Productive functions of forest resources		
4.1. Above-ground biomass stock in forest	tonnes/ha	SDG 15.2 and targets 1.2 and 2.5 of the UNSPF as well as Aichi target 7. Sub-indicator of SDG 15.2.1
4.2. Volume of wood removals	m ³ /year	target 2.4 of UNSPF
4.3. Harvested nontimber forest products	tonnes/year	GFG 2 and its target 2.3 of UNSPF

4.4. Relative stock density in commercial forest zone	%	Due to unsustainable management, the stocking density is less than optimal (NFI, 2016)
Criteria 5. Protective functions of forest resources		
5.1. Forest area with a protection management (protection forest)	ha	target 1.4 of the UNSPF
5.2. Planted forest strips around crop land	ha and km	Contribution to food security
5.3. Planted green/tree strips	ha and km	Contribution to protect from sand migration and desertification
Criteria 6. Socio-economic functions		
6.1. Employment related to the forest sector	number	target 2.4 of the UNSPF
6.2. Financial resources from all sources for the implementation of sustainable forest management	MNT	GFG 4 and its targets 4.1 and 4.2 of UNSPF. Linkages with SDG target 15a and 15b
6.3. Wood based energy share of total final energy consumption	%	SDG 7.2
6.4. Graduates from forestry university and vocational school	Number	Mongolian forest sector needs at least 6000 professional forest workers.
6.5. Share of forest sector in GDP	%	Mongolian forest sector contribute less than 1% into GDP
Criteria 7. Legal, policy and institutional framework		
7.1. Existence of national or subnational policies, strategies, legislations, regulations and institutions which explicitly encourage SFM	References	GFG 5 of the UNSPF
7.2. Existence of national or sub-national forest assessment process	References	GFG 4.5 of the UNSPF
7.3. Existence of national or sub-national stakeholder platform for participation in forest policy development	References	GFG 4.5 of the UNSPF
7.4. Proportion of forest area under a longterm forest management plan	%	SDG 15.2 and targets 1.3 and 3.2 of UNSPF, Aichi target 7. Sub-indicator of SDG 15.2.1.
7.5. Existence of traceability system(s) for wood products	References	target 3.3 and 5.2 of UNSPF

ANNEX

the Order A-53,
issued on 19 February, 2013 by
Minister of Environment and Tourism

Appendix 1 to the “Regulations regarding accounting, forms of report, and their filling instructions of forest information database”

Area and corresponding changes with forest resource /FY-1/

aimag, capital city		soum, district		
№	Forest resource area type	Unit	Area	Changes occurred in that year
1	Natural forest area	thous.ha		
2	Plantation forest area	ha		
3	Area with shrubs and scrubland	thous.ha		
4	Open woodland	thous.ha		
5	Logged area	thous.ha		
6	Area to be re/afforested	thous.ha		
7	Area damaged by forest fire	thous.ha		
8	Forest area damaged by insect pest and disease	ha		
9	Forest area damaged by wind, storm, and snow	ha		
10	Tree nursery and sapling raising area	ha		
11	Forest glade	thous.ha		
12	Other**	ha		
TOTAL AREA WITH FOREST RESOURCE				

** degraded land in forest resource area due to anthropogenic activities

Appendix 2 to the “Regulations regarding accounting, forms of report, and their filling instructions of forest information database”

Forest stock, and their changes /FI-2/

aimag, capital city

soum, district

№	Tree species	Growing forest stock /thous.m ³ /	Changes occurred in that year	Snag stock /m ³ /	Coarse woody debris stock /m ³ /
1	Larch				
2	Scotch pine				
3	Siberian pine				
4	Spruce				
5	Fir				
6	Birch				
7	Poplar				
8	Aspen				
9	Elm				
10	Willow				
11	Saxaul				
12	Other				

Appendix 3 to the “Regulations regarding accounting, forms of report, and their filling instructions of forest information database”

Forest fire information /FI-3/

aimag, capital city		soum, district		
№	Parameters	Unit	Information	
1	Number of fire occurred	number		
2	Name of the place fire occurred	-		
3	Date of fire occurrence	-		
4	Coordinates and location of fire damaged forest /with image/	-		
5	Area damaged by forest fire /ha/	Forested	ha	
		Pasture	ha	
		Agriculture	ha	
		Hayfield	ha	
		Total		
6	Forest types damaged by fire /ha/	Larch	ha	
		Scotch pine	ha	
		Siberian pine, Spruce, Fir	ha	
		Other	ha	
7	Deployment for fire extinguishing	Persons	number	
		Vehicles	number	
		Tractors	number	
		Motorcycles	number	
		Horses, carts	number	
8	Loss to nature due to fire /thous.tug/	Forest	thous.tug	
		Pasture	thous.tug	
		Wildlife	thous.tug	
9	Material and property loss due to fire	Livestock	thous.tug	
		Ger	thous.tug	

	/thous.tug/	Houses, lodges	thous.tug	
		Barns, stables	thous.tug	
		Vehicles, equipment	thous.tug	
		Hay	thous.tug	
		Other materials	thous.tug	
10	Total loss due to forest fire, thous.tug		thous.tug	
11	Number of people affected by fire	Dead	number	
		Burnt	number	
		Injured	number	
12	Fire source	Anthropogenic	-	
		Natural causes	-	
		Across state border	-	
13	Expenditure spent on extinguishing fire /thous.tug/	Food		
		Fuel	thous.tug	
		Airplane, helicopter expense	thous.tug	
		Per diem, wage	thous.tug	
		Relocation	thous.tug	
		Other	thous.tug	
		Total		
14	Expenditures related to fire preventive measures /thous.tugrug/	Equipment, vehicles and techniques for fire extinguishing	number	
		Awareness raising, promoting	number/thous.tug	
		Patrolling	number/thous.tug	
		Training	number/thous.tug	

15	Expenditure related to the prevention of further distribution of fire /thous.tug/	Dirt belt without vegetation	km	
		Belt with prescribed burning method	km	
		Measures to remove inflammable and fuel materials by cleaning of site	ha	
16	Payment for forest fire damage compensation /thous.tug/	Demanded	thous.tug	
		Compensated	thous.tug	
17	Name and address of person caused fire			
18	Measures taken to those guilty of forest fire	Criminal case		
		Administrative case		
		Punishment, fine		
19	Other			

Appendix 4 to the “Regulations regarding accounting, forms of report, and their filling instructions of forest information database”

Reports on forestry activities /FI-4/

aimag, capital city		soum, district	
№	Parameters	Unit	Information
1. Preventive measures against forest insect pests, and diseases			
1.1	Extent of research and survey about the forest insect pest and disease distribution	ha	
1.2	Area where forest insect pest, and diseases distributed	ha	
1.3	Area damaged by forest insect pest, and diseases	ha	
1.4	Extent of combating measures against forest insect pest, and diseases	Airplane	frequency/number
		Portable sprayer	ha/number
		Mechanic methods	kg/ha
1.5	Result of combating measures against forest insect pest, and diseases	percentage	
1.6	Location of areas where combating measures were taken /accompanied with image /	-	
2. Forest restoration			
2.1	Amount of restoration area	Re/afforestation	ha
		Assisting natural regeneration	ha
		Tree shelterbelt	ha
2.2	Location of restored forest area /accompanied with image/	-	
2.3	Amount of planted forest transferred to state forest resource	ha	
2.4	Location of planted forest /accompanied with image /		
2.5	Quality, survival rate of re/afforestation	percentage	

2.6	Number of seedlings and saplings raised	1 year-old	number	
		2 year-old	number	
		3 year-old	number	
2.7	Number of seedlings and saplings planted for re/afforestation	Larch	number	
		Scotch pine	number	
		Other	-	
2.8	Amount of seed prepared	Larch	kg	
		Scotch pine	kg	
		Saxaul	kg	
		Other		
3. Forest utilization				
3.1	Amount of timber logged from forest	Timber	m ³	
		Fuelwood	m ³	
		Total		
3.2	Area prepared for timber logging		ha	
3.3	Timber logged area		ha	
3.4	Location of timber logged area /accompanied with image/			
3.5	Area where forest treatment activities are carried out		ha	
3.6	Amount logged during treatment cutting	Timber	m ³	
		Fuelwood	m ³	
		Total		
3.7	Area where cleaning activities are carried out		ha	
3.8	Amount logged during cleaning cutting	Timber	m ³	
		Fuelwood	m ³	
		Total		
3.9	Non-wood forest products use	Pine nuts	kg	
		Berries	kg	
		Other		

Appendix 5 to the “Regulations regarding accounting, forms of report, and their filling instructions of forest information database”

Forest ownership report /FI-5/

.....
 aimag, capital city

.....
 soum, district

№	Parameters	Unit	Information
1	Number of forest owners	Forest cooperative	number
		Enterprise	number
		Other	
		Total	
2	Forest area owned	Forest cooperative	ha
		Enterprise	ha
		Other	
		Total	
3	Location of forest owner		
4	Number of order issues for forest ownership		

Appendix 6 to the “Regulations regarding accounting, forms of report, and their filling instructions of forest information database”

Forest conflict report /FI-6/

aimag, capital city		soum, district	
№	Parameters	Unit	Information
1	Number of detected conflicts	number	
2	Amount of illegal timber logging	m ³	
3	Location of illegal timber preparation		
4	Confiscated properties, vehicles and techniques	number	
5	Penalty type	Fine	thous.tug
		Compensation	thous.tug
6	Amount of illegally prepared non-wood forest products	kg	

Appendix 7 to the “Regulations regarding accounting, forms of report, and their filling instructions of forest information database”

Expenditure report on forestry activities, thous.tugrug /FI-7/

aimag, capital city		soum, district			
№	Forest activity type	Funding			
		state	local	other	Total
1. Expenditure					
1.1	Forest restoration				
1.2	Forest treatment, and cleaning				
1.3	Research on forest insect pest, and diseases				
1.4	Combating forest insect pests, and diseases				
1.5	Forest seed preparation				
1.6	Organizing professional training				
1.7	Purchase of tools instrument, techniques and equipment				
1.8	Other expenditure				
2. Income					
2.1	Non-wood forest products				
2.2	Timber preparation fee				
2.3	Payment for the loss due to fire				
2.4	Payment for forest loss				
2.5	Income from selling seedlings, and saplings				