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

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Abbreviation

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ALAMGaC	Agency for Land Administration and Management, Geodesy and Cartography
BU	Bottom-up
C&I	Criteria and Indicator
CE	Open Foris Collect Earth
COFO FAO	FAO Committee on forest
CPC	Central Product Classification
CPF	Collaborative Partnership on Forests
EIC	Environmental information center
FAO	Food and agriculture organization
FI	Forest information
FMUs	Forest management units
FRDC	Forest research and development center
FUGs	Forest user-groups
GBNP	Green Belt National Programme
GDP	Gross domestic product
GFFFN	Global Forest Financing Facilitation Network
GFGs	Global Forest Goals
HIES	Household Income and Expenditure Survey
LR	Land report
MAR	Monitoring, assessment and reporting
MET	Ministry of Environment and Tourism
NAMEM	National Agency of Meteorology and Environmental Monitoring
NBP	National Biodiversity programme
NEMA	National Emergency Management Agency
NFI	National forest inventory
NGDP	National green development policy
NPFC	National Programme on Forest Cleaning
NSO	National Statistical Office
PFEs	Private forest enterprises
SBR	Statistical Business register
SDGs	Sustainable Development Goals
SDV 2030	Sustainable development vision 2030
SFM	Sustainable forest management
SI	Stand inventory
SPF	State Policy on Forest
TD	Top-down
UNFF	United Nations Forum on Forests
UNFI	United Nations Forest Instrument
UNSPF	UN Strategic Plan for Forests
VNCs	Voluntary national contributions

1. "MONITORING PROGRESS TOWARDS SFM" PROJECT

Mongolia is one of 6 countries[1] that participated in the project "Monitoring Progress towards Sustainable Forest Management (SFM)" which aimed to support and assist these selected countries in developing a   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.

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 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 first UN Strategic Plan for Forests (UNSPF 2017-2030) in 2017.

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.

At the heart of the UNSPF are 6 Global Forest Goals (GFGs) and 26 associated targets to be achieved by 2030. The GFGs and targets are intended to stimulate and provide a framework for voluntary actions,

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

contributions and enhanced cooperation by countries and international, regional, subregional and non-governmental partners and stakeholders. 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.

2. ANALYTICAL STUDY

As of 2019, Mongolia has not submitted any country report on assessing progress towards implementation of the UNSPF and the United Nations forest instrument to the Forum Secretariat as well as there is still lack of national set of Criteria and Indicators for SFM.

With this regard, the UNFF project "Monitoring Progress towards SFM" has conducted an analytic study to analyze the availability and potentials of existing national forest related dataset for monitoring, assessment and reporting (MAR) on national and global forest goals; and to prepare a national criteria and indicator (C&I) set for SFM, with following objectives:

- *Identification of national sources for forest related data;*
- *Evaluation of data potentials and mapping gaps.*

Thus, the overall goal of this study was to identify discrepancies between demand and supply condition of forest related data in Mongolia and the derived findings will contribute to enhance national accounting system in field of MAR on SFM.

2.1. Methodological approach

The applied methodological approach was built on features with respect to the study objectives and was designed to assess national monitoring and reporting capacities against the reporting requirements for nationally and internationally agreed forest related goals and targets, including SDGs.

The methodological framework consists of two phases to achieve study objectives. The first phase (see 2.1.1) intends to provide an overview of data sources and institutions, that are identified as relevant actors in desired national forest monitoring system. Within the first phase various literatures were analyzed and national experts were interviewed to select and allocate national institutions and data sources in stakeholder engagement map with respect to their roles in field of MAR on SFM.

The second phase (see 2.1.2) considers the assessments on national MAR of SFM capacity and mapping of data gaps through classifying data potentials per data sources, identified during first phase, in more detail. Approach for analyzing and classifying data availability and data potentials of sources was based on data potential classification scheme, appropriate for national data sources.

2.1.1. Identification of national sources for forest related data

The comprehensive overview and information on the institutional landscape for relevant forest data sources and forestry data collection and disseminating activities, that are ongoing in Mongolia and

relevant for monitoring progress towards national and global forest goals, is based on combination of on a broad review of literature, expert consultation and snowball approach.

The main body of literature was built on *data demand*: session notes of the UNFF, COFO FAO and state policies, that reflect national forest goals; and *data supply*: domestic legislation documents, which regulate existing forest monitoring system.

The core sample of data source and institutions were screened and identified through analyzing relevant national legislation documents, that regulates roles of mandatory institutions in data supply and demand scenarios. The interviews were conducted with experts, representing those institutions. The respondents were asked to recommend others who could expand upon or add to the information that emerged during their interview (*snowball sampling*)

Collecting full network data is often very expensive, time consuming or difficult. An alternative is the so called "*Snowball Approach*". Snowball approach is usually applied for limits of time and resources and it begins with one actor or a set of actors. Each of these actors is asked to list (a) only those actors that are explicitly relevant to the survey objective, or (b) all actors to which any kind of relation exist. Then, all the actors listed are tracked down and asked for some or all of their ties. The process continues until no new actors are identified, or until the analyst decides to stop[2].

Therefore, snowball approach has facilitated finding of further relevant sources to enhance the source list and to make sure that almost all relevant sources for forest related data are considered.

In the end of this phase relevant national institutions and data sources were structured as data suppliers according to data demands in context of MAR on SFM. The stakeholder map will provide opportunities to:

- find SFM relevant information more easily
- evaluate the national capacity to monitor, assess and report on SFM
- describe the different linkages between different data sources or data managing institutions, specifically considering the processes of data collection, data maintenance and data dissemination
- assist in harmonizing multiple data collection initiatives; and
- improve the communication between different organizations and stakeholders in the field of monitoring, assessment and reporting on SFM and GFGs.

2.1.2. Evaluation of data potentials and mapping gaps

Data availability and data potential are fundamental for deriving an overview on reporting ability and quality. The overview of institutional landscape for relevant forest related data sources shows the very basic data potential of selected data sources and institutions with respect to data demands. Thus, it does not differentiate current data potentials at each source.

Data potentials for each source are diverse and can be described by multiple levels of detail. The methodology of assessment on data potentials describes intricately in how far institutions and their sources have a potential to provide adequate datasets as required by reporting on *quantitative indicators* of nationally and internationally agreed forest goals.

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[2] Hanneman R. A., 2001: Introduction to Social Network Methods, Department of Sociology University of California, Riverside,

The national data potential was assessed against data demands in quantitative terms, reflected in *Required information for reporting on GFGs[3]* document.

An adapted version of data potential classification scheme, initially developed by *Requardt et.al.[4]*, was taken as a basis to evaluate and classify data availability and data potentials of the national data sources for reporting on *quantitative indicators* for nationally and internationally agreed forest goals and associated targets.

The data of each sources was classified according to its data potential. The basic elements of describing national data potential for reporting abilities are that either data – which could mean final *explicit figures* or also *raw data* – but also whether methodology of *data collection* and *data processing* are <u>available</u> or <u>not</u>. According to this assumption, the following basic cases (propositions) were distinguished:

Table 1: Basic elements of data potential classification scheme

Symbols	Propositions	Logic equation
C	Enabling framework (legal regulation, method) for data collection is available	$C + c = 1$
c	Enabling framework (legal regulation, method) for data collection is not available	
D	Data is collected.	$D + d = 1$
d	Data is not collected.	
P	Data processing method is available	$P + p = 1$
p	Data processing method is not available	
$c \leq d$	If enabling framework for data collection is not available, data will not be collected. *(c implies d)*	$cD = 0$ *or* $C + d = 1$

The propositional logic was applied in this study to classify and evaluate data potentials of national institutions and sources.

Propositional Logic is concerned with propositions and their interrelationships. A Proposition is a sentence which either affirms or denies[5], as, *Data is collected* and *Data is not collected*. Thus, the proposition D and not-D make the Universe. But the Universe is 1, and the proposition "*Data is collected*" is determined by the symbol D, therefore the proposition "*Data is not collected*" will be determined by the symbol (1-D) or d.

The equation system, presented in table, was applied to deduct data potential classification scheme, where distinguished data potential cases were assigned by index values accordingly.

Equating the multiplication of each logic equations to 1 (*universe*), implies below general equation of system.

$[(C + c = 1)(D + d = 1)(P + p = 1)(C + d = 1)] = 1,$ and writing it under the form,

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[3] UNFF 14th session note on Monitoring, assessment and reporting on progress towards implementing the United Nations strategic plan for forests 2017–2030, including the United Nations forest instrument and voluntary national contributions (E/CN.18/2019/3)

[4] Requardt A., Köhl M., and Näscher F., 2007: Reporting on Pan-European Criteria and Indicators for Sustainable Forest Management, Hamburg

[5] Boole. G, 1847: The mathematical analysis of logic, London: George bell.

$[(\mathbf{C} + \mathbf{c})(\mathbf{D} + \mathbf{d})(\mathbf{A} + \mathbf{a})(\mathbf{C} + \mathbf{d})] = \mathbf{1} \;\Rightarrow\; (\mathbf{CDP} + \mathbf{CDp} + \mathbf{CdP} + \mathbf{Cdp} + \mathbf{cdP} + \mathbf{cdp}) = \mathbf{1},$ which implies data potential scheme, which distinguishes three different levels of data potential – *no data potential, raw data potential and explicit figure (indicator) available* – that are divided into six categories (0-5).

Table 2: Data potential classification scheme

Class	Level	Description	Index
CDP (a)	*Indicator available*	Data gathering framework and methods of assessment are available; and data collection takes place. The available figures *match* data requirements *(reporting units, temporal resolution, spatial resolution and applied terms and definitions)*– data can be reported in required form	5a
CDP (b)		Data gathering framework and methods of assessment are available and data collection takes place. But available figures *partially match* data requirements (*reporting units, temporal resolution, spatial resolution and applied terms and definitions*)– data can only be reported in another form	5b
CDp	*raw data potential*	Data is updated under available gathering framework. but there is no knowledge on how to process raw data to derive required information (e.g. explicit functions or algorithms are not available). Hence raw data is available.	4
CdP		Data gathering framework and methods of assessment are available. Due to limited resources/capacities, data is not updated regularly.	3
Cdp		Only data gathering framework is available. But data is neither updated nor processed.	2
cdP	*no data potential*	Only data processing methodology is available. But neither data gathering framework is available nor data collection takes place.	1
cdp		describes the situation where absolutely no data potential	0

Except for the level of no data potential **(cdP and cdp)**, all other classifications reflect a certain data potential. Thus, data gaps are identified by those GFGs and targets, which are assigned to index of **1** and **0**.

A metadata was assigned to each quantitative GFGs and associated targets to describe explicitly data consistency and data format. The following metadata information was provided:

- *Source*
- *Reliable data*
- *Temporal resolution of data*
- *Spatial resolution of data*

According to data potential classification schema and the metadata description, national data potential was evaluated and gaps were mapped as required by reporting on *quantitative indicators* of nationally and internationally agreed forest goals.

2.2. Findings

2.2.1. *Quantitative data demand 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, presented in detail in the Secretary-General's report and notes of the latest UNFF sessions (12,13 and14).

Since its inception, the UNFF 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 national[6] 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. These 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 sources 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.

The voluntary national reports will be analysed by the Forum. Country reports will be the main source of information for assessing progress towards the achievement of the global forest goals. The Forum will supplement information received from countries with quantitative FAO Global Forest Resources Assessment data and information from other CPF members and sources.

Table 3 summarizes required information from voluntary national reports and other sources for assessing progress towards the achievement of the global forest goals and their targets.

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[6] (E/CN.18/2018/4,)

Table 3: Data demand for monitoring towards GFGs

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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[7].		
Target	*Indicator*	*Remarks*
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) Total forest carbon stocks and their changes; and 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 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.

[7] Global forest goal 1 and its targets support and contribute to the achievement of, among others, Sustainable Development Goal targets 6.6, 12.2, 13.1, 13.3, 14.2, 15.1- 15.4 and 15.8, as well as Aichi Biodiversity Targets 5, 7, 9, 11, 14 and 15.

significantly strengthened worldwide		
Goal 2. Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people[8]		
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	Harvested nontimber forest products Direct and indirect contributions of forests and trees to agricultural land productivity	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.
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: changes in employment in the forestry and logging sector 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. Contribution of forest industry, other forest-based enterprises and forest ecosystem services to social, economic (including the informal sector) and environmental development, among other things. To consider "other things" that may be relevant in this context, country correspondents may wish to refer to the list of national policies and measures contained in paragraph 6 of the United Nations forest instrument (General Assembly resolution 62/98, annex).
2.5 The contribution of all types of forests to biodiversity	FRA 2020 reporting table 1e (Specific forest categories) on changes in area of	

	primary forest	
conservation and climate change mitigation and adaptation is enhanced, taking into account the mandates and ongoing work of relevant conventions and instruments	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 Net greenhouse gas emissions (source)/ removals (sink) of forests, and carbon balance of harvested wood products Nationally determined contributions, national communications, national adaptation programmes of action and national adaptation plans.	
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[9]		
3.1 The area of forests worldwide designated as protected areas or conserved through other effective area-based conservation measures is significantly increased	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	
3.2 The area of forests under long-term forest management plans is significantly increased	FRA 2020 reporting table 3b (Forest area within legally established protected areas and forest area with long-term forest management plan)	
3.3 The proportion of forest products from sustainably managed forests is significantly increased	Proportion of forest products from certified forests (including forests certified under internationally and/or nationally approved schemes).	
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[10]		
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	Official development assistance and public expenditure on conservation and sustainable use of forests	"mobilize" means securing financial resources and using them to finance sustainable forest management.

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[9] Global forest goal 3 and its targets support and contribute to the achievement of, among others, Sustainable Development Goal targets 7.2, 12.2, 12.6, 12.7, 14.2, 14.5, 15.2 and 15.4, as well as Aichi Biodiversity Targets 7, 11, 12 and 16.

[10] Global forest goal 4 and its targets support and contribute to the achievement of, among others, Sustainable Development Goal targets 12.a, 15.7, 15.a, 15.b, 17.1–17.3, 17.6, 17.7 and 17.16– 17.19, as well Aichi Biodiversity Target 19.

management, including for conservation and reforestation		
4.2 Forest-related financing from all sources at all levels, including public (national, bilateral, multilateral and triangular), private and philanthropic financing is significantly increased	The sources of information are the same as for target 4.1.	
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[11]		
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	Actions to prevent and reduce illegal international trafficking in forest products, wildlife and other biological resources	

[11] Global forest goal 5 and its targets support and contribute to the achievement of, among others, Sustainable Development Goal targets 1.4, 2.4, 5.a, 15.c, 15.9, 16.3, 16.5, 16.6, 16.7, 16.10 and 17.14, as well as Aichi Biodiversity Targets 2 and 3.

subnational forest authorities, and illegal logging and associated trade are significantly reduced worldwide	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 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	Mechanisms to ensure cross-sectoral coordination among government agencies. (For example, mechanisms to achieve coherence between national and subnational policies and programmes as well across ministries, departments and authorities at the national level.) FRA 2020 reporting table 6a (Policies, legislation and national platform for stakeholder participation in forest policy) Mechanisms to involve stakeholders, including local communities and indigenous peoples, in sustainable forest management policy formulation, planning and implementation.	FRA 2020 reporting table 6a provides a global overview of the number of countries with a national platform for stakeholder participation in forest policy.
5.4 Forest-related issues and the forest sector are fully integrated into decision-making processes concerning land use planning and development	Mechanisms to involve the forest sector in cross-sectoral coordination among government agencies in charge of land use planning and development	
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[12]		
6.3 Cross-sectoral coordination and cooperation to promote sustainable forest management and halt deforestation and forest degradation are significantly enhanced at all levels	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.	
6.4 A greater common understanding of the concept of sustainable forest management is achieved and an associated set of indicators is identified	Existing criteria and indicators for sustainable forest management	
6.5 The input and involvement of major groups and other	Action, taken by Government, to involve major groups and other relevant stakeholders in the	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

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[12] Global forest goal 6 and its targets support and contribute to the achievement of, among others, Sustainable Development Goal target 17.14

relevant stakeholders in the implementation of the strategic plan and in the work of the Forum, including intersessional work, is strengthened	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	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.

2.2.2. *Forest related objectives in national policies (national data demand)*

2.2.2.1.State Policy on Forest (SPF)

In May 2015, the State Great Khural adopted the new State Policy on Forests (2015 Resolution of the State Great Khural No. 49), designed for the period until 2030. The new policy takes a comprehensive approach in integrating the country's socioeconomic and environmental issues consistent with the national policies on green development. The State Policy on Forests provides guidance for decision-making on the conservation, use and restoration of forest resources. The 2015 State Policy on Forests reinforced approaches such as ensuring multi-stakeholder participation in forest management, creating good forest governance and promoting science/evidence based forest management. Among the objectives of the policy implementation are some new elements. In particular, the document states that the number of permits for logging will be gradually decreased and the State will favour wood-substitution products. Furthermore, the Policy states that the country will follow the strategy to meet demand for timber products for industrial purposes from imported sources, while the demand for domestic consumption of wood for individual citizens will be supplied from wood harvested from thinning, cleaning and selective cutting. The 2015 State Policy on Forests further promotes the creation of agroforestry, expansion of forest infrastructure, establishment of forest plantations with fast-growing species, production of biofuels and pellets, establishment of a national standard for certification of forest organizations by 2020 in line with international standards and enforcement of a system of payment for ecosystem services[13].

The goal of the policy is to promote sustainable forest management nationwide in a way, that maintains forest ecosystem balance, halts deforestation and forest degradation, increases forest area through regeneration and afforestation; and ensures proper and sustainable use of forest resources.

3. Objectives[14]

3.1. Prevent deforestation and forest degradation through establishing management and capacity to protect the forest from fires, pests and diseases and halt illegal logging.

3.2. Increase significantly forest area through reforestation and afforestation; build substantial capacity to increase elite tree seed reserve and improve technology.

3.2.3. Increase proportion of forest area in total territory to 8.3 by 2020 and to 9 per cent by 2030.

3.3. Increase range of goods from sustainably managed forest and enhance the economic, social and environmental values of forests.

3.4. increase sources to finance sustainable forest management.

3.5. Enhance good forest governance and legal environment; and strengthen science, education, training, communication and advocacy of forest sector

4. Policy implementation and targets

4.1. The Policy will be implemented in two phases; the first phase shall be implemented from 2015 until 2020 and the second phase shall be implemented from 2020 until 2030.

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[13] UNECE, 2018, Environmental Performance Reviews-Mongolia.
[14] State policy on forest 2015

4.2. The average forest area disturbed by fire shall be decreased by 30% in 2020 and 70% in 2030.

4.3. Forest pests, threat of disease spreads and epicenters shall be decreased up to 60% by 2020 and in 2030 shall be fully controlled.

4.4. Conservation and protection of forest ecosystem and biodiversity shall be ensured.

4.5. Greenhouse gas emissions from deforestation and forest degradation shall be reduced by 2% in 2020 and by 5% in 2030

4.6. Forest area shall be increased through natural regeneration and afforestation by 310 thousand ha by 2020 and 1500 thousand ha by 2030.

4.7. Usage effectiveness of raw wooden materials shall be reached at 80% and domestic demands on wood shall be met.

4.8. Food security and household income shall be increased through improved utilization of non-timber forest products.

4.9. Resilient, healthy and ecologically valuable forest shall be stocked through promotion of sustainable management into forest sector of Mongolia and enhancement of quality on forest protection, proper use and restoration activities.

2.2.2.2. Green Belt National Programme (GBNP)

In 2005, the Government approved the Green Belt National Programme (2005 Government Resolution No. 44), which is still being implemented. The main goal of the Programme is to establish a green belt/forest strip along the Gobi Desert and steppe region in the southern part of the country to slow down the desertification and sand movement. The programme has three stages (2005–2015, 2016–2025 and 2025–2035). The Government has evaluated the results of the first stage. The Ministry and the local governments allocate budget to support the implementation of the Programme. At the moment, the Forest Policy Coordination Department is responsible for the Programme's implementation.

The following quantitative objectives[15] were set up in the document:

1. Greenbelt, established through afforestation, shall occupy over territory of more than 150 thousand ha, which will increase of total forest area by 1,6%.
2. 20 thousand seasonal local jobs shall be created.

2.2.2.3. National Programme on Forest Cleaning (NPFC)

The 2014 National Programme on Forest Tending (2014 Government Resolution No. 30) aims to ensure the supply of part of the demand for fuelwood and timber for household purposes by carrying out silvicultural operations. These operations include forest cleaning (removal of dead trees and trees affected by fire and insects) and thinning. In addition, these silvicultural activities are expected to help to protect forests from forest fire and forest infestation. The National Programme does not include the concept of the rational use of residues from forest thinning and tending activities. The programme will be implemented in two phases; 2014 - 2016 and 2016 - 2020. The following quantitative targets will be achieved until 2020[16].

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[15] Green Belt National Programme
[16] National Programme on Forest Cleaning

6.1.1. 315 thousand ha of forests shall be cleaned.

6.1.2. 1.4 million m^3 of dead trees and trees affected by fire/insects shall be removed from forest annually

6.1.3. more than 294 ha will be reforested over cleaned area.

2.2.2.4. Sustainable development vision 2030 (SDV 2030)

SDV 2030[17] was adopted in February 2016 and incorporates Mongolia's ambition to be a stable, multi-sectoral and leading middle-income economy which both preserves an ecological balance and participative governance. It provides a planned guidance for future pathways, bringing Mongolia's national context into consideration with planning the achievement of the SDGs. The plan contains ten key targets which address the three pillars of sustainable development and align with a number of the SDGs. In addition to these ten targets, the Vision 2030 also defines the vision for each of the three pillars of sustainable development, and identifies key objectives to guide future sustainable development planning.

The SDV 2030 and the SDGs overlap significantly. Only SDG 14 (life below water) is not part of the SDV 2030, as Mongolia is a landlocked country. The SDV 2030 directly targets seven SDGs and the remaining nine are contextually consistent or part of the SDV's core principles. The National Development Agency, which is responsible for overseeing and reporting on the SDV 2030 to the Prime Minister and to Parliament, is undertaking an exercise to strengthen the link between the SDV 2030 and the SDGs. The goal is to link existing policies to the SDV 2030 and to establish baselines and set targets for its delivery. The SDV 2030 is due for review on a biannual basis. The NSO is the agency responsible for compiling indicators and providing guidance to on methodologies to line ministries, which are responsible for gathering the data required to compile indicators.

The objective of environmental sustainability of SDV 2030 is to ascertain inclusive economic growth and sustainable social development, and provide the fundamentals of improving the quality of people's lives by efficiently using natural resources, preserving the sustainability of the ecosystem, and creating opportunities to benefit from natural resources in the long-run.

The principles of environmental sustainability:

- Promote participation of local residents and people at large to ensure environmental sustainability;
- Use resource efficiently and effectively;
- Support clean technology and encourage low-waste and sustainable production and consumption;
- Develop and enforce environmental rehabilitation at international standard level;
- Encourage environment-friendly attitude and appropriate behavior

The environmental sustainability objective of SDV 2030 includes the forest targets (2.3.3.) of increasing proportion of forest area in total territory to

- 8.5 % by 2020,
- 8.7 % by 2025 and

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[17] Sustainable development vision 2030

- 9.0 % by 2030.

2.2.2.5. *National green development policy (NGDP)*

Mongolia committed itself to green growth and defined its development imperatives by adopting the NGDP in 2014. The purpose of NGDP is to ensure that Mongolia evolves as a developed nation that has built conditions for environmental sustainability, and for long-term, participatory and inclusive economic growth based on the green development concept. The NGDP is developed in accordance with other national programmes being implemented, which impact the environmental sector, such as national programmes on climate change, renewable energy, water, combating desertification, etc. Considering this, the policy makes for a landmark initiative that integrates environmental aspects and policy objectives into other sectoral policies, such as industry and agricultural policy. The policy highlights six strategic objectives, building upon the principles of resource use efficiency; consistency with sectoral policies and plans; synergy between economic growth, social inclusiveness, and environmental sustainability. Each of the six objectives is further divided into specific implementation measures, with a total of 14 outcome-level indicators to measure the results of the policy's first (2014-2020) and second (2021-2030) phase.

The forest-related objectives of the 2014 Green Development Policy are:

3.1.5. …. establish forest strip to reduce land degradation induced by arable farming

3.2.7. Enhance the carbon sequestration in forests by intensifying reforestation efforts and expanding forest cover areas to 9% of the country's territory by 2030;

3.2.8. Advance community-based natural resource management for the protection and rational use of forests, NTFPs, wildlife and plant resources, and create sustainable financing systems.

2.2.2.6. *National Biodiversity programme (NBP)*

The 2015 National Biodiversity Programme for the period 2015–2025, largely based on and inspired by the CBD Strategic Plan for Biodiversity 2011–2020 and its Aichi Biodiversity Targets (adopted in 2010 at the CBD COP 10), determines 14 goals under four strategies:

Goal 7 aims at increasing forest cover to 9 per cent by 2025 through the improvement of forest management, "thereby protecting forest biodiversity". Also following indicators were set up to monitor progress towards this goal.

7.1. Forest area as a proportion of total land area.

7.2. Forest area under protection status

7.3. Proportion of forest area under community management

7.4. Forest area, disturbed by fire, insects and pests

7.5. Forest strips around crop land.

2.2.3. *Mapping of GFGs against other forest related goals*

A mapping exercise of the nationally and internationally agreed forest goals, objectives and associated targets was carried out against the GFGs. The results of mapping are summarized in the table 4.

Table 4: Mapping results

Global forest policy dialogue			National forest policy dialogue					
GFGs	**SDG**	**Aichi**	**SPF**	**GBNP**	**NPFC**	**SDV 2030**	**NGDP**	**NBP**
1.	6.6, 12.2, 13.1, 13.3, 14.2, 15.1-15.4 and 15.8	5, 7, 9, 11, 14 and 15	3.1, 3.2, 3.2.3, 4.2, 4.3, 4.5 and 4.6 4.9	1	6.1.1, 6.1.2 and 6.1.3.	2.3.3	3.2.7. and 3.1.5	7, 7.1 and 7.4
2.	1.1, 1.4, 2.4, 4.4, 5.a, 6.6, 8.3, 9.3, 12.2, 12.5, 15.6 and 15.c	4, 14 and 18	3.3, 4.4 and 4.8	2	6.1.1 and 6.1.2		3.1.5 and 3.2.8	7.2 and 7.5.
3.	7.2, 12.2, 12.6, 12.7, 14.2, 14.5, 15.2 and 15.4	7, 11, 12 and 16	3.3					7.3.
4.	12.a, 15.7, 15.a, 15.b, 17.1–17.3, 7.6, 17.7 and 17.16–17.19	19	3.4.					
5.	1.4, 2.4, 5.a, 15.c, 15.9, 16.3, 16.5, 16.6, 16.7, 16.10 and 17.14	2 and 3	3.5					
6.	17.14		3.5					

The GFGs support the objectives of international arrangement on forests and are aimed at contributing to progress on SDGs, the Aichi Biodiversity targets, the Paris Agreement under the United Nations Framework Convention on Climate Change and other international forest related instruments, processes, commitments and goals[18].

The mapping exercise shows that the SPF contributes to achievement of all GFGs. In case of the GBNP, NPFC, SDV 2030, NGDP and NBP, there are matching policy objectives and associated targets against 1-3 GFGs.

2.2.4. *Availability of forest related data*

2.2.4.1. *Legal framework and institutional arrangement*

The Forest Policy Coordination Department is one of the nine departments in the Ministry of Environment and Tourism. The main responsibilities of the Forest Policy Coordination Department include the formulation and implementation of forest policy, programme and legislation, coordination of

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[18] UN DESA.2019: Global Forest Goals and Targets of the UN Strategic Plan for Forests 2030, New York.

the implementation work, provision of technical and methodological guidance and advisory services and development of proposals to improve forest management. More specifically, the Department is in charge of coordination of the forest inventory and research, reforestation and afforestation, forest insect and pest control, combating illegal logging, forest maintenance, sustainable forest management, forest products and strengthening "forest governance".

Mongolia has four laws which concern needs of information systems and each information systems contain forest related data in it.
These are:
1) Environmental Information database - Law on Environmental Protection and it's regulations
2) Forest database and inventory system – Law on Forest and it's regulations
3) Unified land inventory system – Law on Land and it's regulations
4) National statistical database – Law on Statistics and it's regulations

Environmental Information database
The 1995 Law on Environmental Protection defines environmental monitoring and provides the mandate for the central state administrative body, Ministry of Environment and Tourism (MET), to establish and maintain an environmental monitoring network. The activities to be conducted through the environmental monitoring network include:
- Regular observations, measurements and surveys on the level of physical, chemical and biological changes to the environment and the level of pollution;
- Provision of information on the environment to the public and business entities and organizations;
- Development of proposals for the prevention of adverse effects on human health and the environment as a result of natural disasters[19].

The Law on Environmental Protection requires the MET to establish an environmental information database or system comprising three components: Soum[20] and district databases; Aimag and capital city databases; and the central state database. It defines the roles and responsibilities of different actors (Soum governors, Aimag governors, MET) regarding submission of information as well as the schedule for submission of information.
Ministry of Environment and Tourism is responsible for monitoring and the production of environmental information, including forest monitoring. In these tasks, the Ministry of Environment and Tourism is supported by National Agency of Meteorology and Environmental Monitoring (NAMEM), which is responsible for data storage and receives the data on paper from the monitoring sites. The standards for monitoring are set out in technical documents. The Information and Research Institute of Meteorology, Hydrology and Environment is a subordinated organization of NAMEM. The Environmental information center (EIC) is part of the Institute.

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[19] UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE, 2018, Environmental Performance Reviews-Mongolia.

[20]The 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)

Articles 33-35 Law on Environmental Protection defines structure and maintenance of online operational National Environmental information database. The EIC is mandatory institution for maintenance, gather data into the system and supports stability of the web portals.

EIC currently maintains 29 core environmental databases that are publicly accessible through a dedicated website (http://www.eic.mn). These include databases on: land; soil; minerals; water; forests; flora; fauna; air pollution; environmental radiation; climate; natural disasters; hazardous and toxic chemicals; protected areas; legal information; environmental impact assessment; environmental project and policy; environmental statistics; environmental finance; organization and human resources; metadata; livelihood compensation; compensation for environmental damage; geodatabase; desertification; environmental degradation and pollution; environmentally friendly technology; contaminated site registration; a link to the WWF password-protected portal (animal and vegetation monitoring); and community-based management and conservation.

Forest database
Article 6 of Law on Forest defines content and characteristics of Forest Information Database, which is one component of EIC.
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 Soum[21] and inter-soum forest units[22] through online interface with EIC submit annual forestry activities to the MET according to FI tables.
Hence, the FI sheets framework enables regular monitoring of forest areas and their changes, forest reserve and its changes, forest harvest, forest fires, forest rehabilitation, forest ownership and forest expenditure are undertaken with the help of using checklists and supported by periodic forest inventories at Soum level in Mongolia.
There are 7 FI sheets, namely:

> FI-1 Forest areas and their changes
> FI-2 Forest stock, and their changes
> FI-3 Information on forest fire
> FI-4 Reports on silvicultural activities
> FI-5 Forest ownership report
> FI-6 Forest violation report
> FI-7 Expenditure report on forestry activities

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).

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[21]The 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)
[22] 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.

However, it is evident that due to weak capacity of designated specialist (forest unit), lack of terms/ definition and quality control framework, this forest monitoring mechanism is not working effectively as the template is generally not filled out properly (*main challenge*).

Forest resources inventory system

The Forest research and development center (FRDC) under MET is responsible for organizing activities for reforestation, rehabilitation after forest fires, or disease or insect infestation, conducting the national forest inventory (NFI), and providing technical and professional guidance to private logging companies and Forest User Groups. This includes the development of model management plans[23].

There are two stages in the development of forest research in Mongolia: the first stage, which is from 1800 to the 1950s, and the second stage, which is 1950s up to date. During the first stage or basic research stage, general investigations were conducted on the plant kingdom and vegetation including species composition of main forest types and detailed investigation on certain areas in Mongolia. In the second stage or the applied research stage, significant research was conducted in the forestry field including all aspects of distribution, vegetation dynamics, forest ecology, forest typology and forest soil, inventory of forest resources, forest mapping, and appropriate use of forest resources. Based on the information collected, the second stage formulated the scientific basis for the development of forestry and forest industries in Mongolia. The first nationwide forest inventory was conducted by the Russian Forest Research Organization known as "Forest Project Cooperation" in 1956–1957. In 1958, the first Mongolian forest inventory expedition was established with the main responsibilities of surveying forest resources in the different regions of Mongolia, estimating forest stocks by tree species and age classes for the purpose of forest exploitation, and preparing the 10-yr forest management plan for certain regions. In the 1970s, the Mongolian-Russian Biological Complex Expedition was established and the establishment of long-term permanent field studies in several areas in Mongolia was coordinated. Such long-term operations opened the possibility to investigate and describe peculiarities of forest distribution of various vegetation zones in high mountain areas of Mongolia and to study the forest regeneration process after different disturbances such as logging and forest fires in the different forest types. Also under this undertaking, several studies were conducted in the field of forest vegetation dynamics, forest soil classification, forest insects and pests, forest regeneration trend after forest fire and felling, forest silviculture practice in different forest areas, genetic structure and tree breeding, seedling production of main forest species, and some other applied research[24].

Since 1956, biophysical information of Mongolia forests has been acquired. There are two main forest inventory systems with 10 years cycle in Mongolia: Stand Inventory (SI) at Soum level and Multipurpose National Forest Inventory (NFI).

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.

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[23] Article 13, Law on Forest

[24] N.Batkhuu, D.K. LEE, and J. Tsogtbaatar, 2011, Forest and Forestry Research and Education in Mongolia, Journal of Sustainable Forestry

SI is based on standwise assessment and it is carried out by authorised private forest inventory entities. Organization and implementation of SI is regulated by the orders: "Forest Resource, Forest Protection", Annex 2 to the 410th order issued on 24 December 2009 by MET and "Guideline to Implement Forest Inventory", Annex 3 to the 88th order issued on 30 July 2009 by Head of the Forest Agency (former). The SI consists of three steps: 1) Production of satellite image-based polygon maps, 2) Field inventory, and 3) Data processing. In order manage forest, forest maps are always required. Current system is to create two levels of management polygons: 1) forest compartments and 2) sub-compartments.

For the upper level, delineation is based on geographic features of terrain (as watershed area, rivers, mountain ridges, roads, etc.) using topographic maps and these borders and numbers of forest compartments are prohibited to be changed during recurring forest inventory without permission from central state administration organization overlooking forestry issues. Images are printed on paper with the polygon borders, and these satellite images have been processed to enhance differences between forest types. In the field assessment polygons are first divided to sub-polygons (max. 50 ha). Borders are drawn according to the color differences in the printed image and visual assessment 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 at 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. Field season starts typically at the end of May and is finished by the end of September. Data are entered in digital form at the main office after the field season.

The first NFI in Mongolia was implemented during 2014–2017, 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 NFI is to generate unbiased statistics on the forest tree resources and their long-term changes on national level. NFI covers all boreal forest areas within Mongolian territory. The main results of NFI are available at EIC portal.

NFI typically can answer to these 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);
- Cost efficient way to cover necessary information needs and fulfill international reporting requirements;
- Supports for strategic planning and utilization of forest resources, and climate change related policy decisions.

NFI was based 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 Collect Earth (CE) tool, and then in the second phase field inventory data from the permanent 4,367 sampling units (i.e. clusters) were collected.

Because NFI is the first of its kind, so 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 MET in 2014.

The FI 1 and 2 are updated with latest forest inventory by local forest unit and submitted to EIC.

Forest fire monitoring[25]

SI and NFI gather information on forest fire during the field assessment.

Furthermore, under the Law on Forest, National Emergency Management Agency (NEMA) is also responsible for fire prevention and suppression and for evaluating the damages caused by wildfire. Hence, NEMA is leading the fire prevention and suppression efforts in Mongolia. NEMA currently has three main responsibilities:

1) to provide training to fire fighters;
2) to dispatch fire fighters to current incidents; and
3) to provide suppression efforts and tactics for fighting fires.

Currently there are 56 fire suppression units located across the forest and steppe lands. These units provide a limited presence and response time in relation to the size of Mongolia. Therefore, the Fire Safety Law of 2015 allows local citizens to voluntarily fight fire. Funds for these volunteers to obtain equipment and tools come from the state budget, and the local governors are responsible for their training. These volunteers are often the first to detect fire starts, and they are regularly responsible for initial attack. If the volunteers are not able to contain/control the fire, NEMA is contacted and the nearest Fire Suppression Unit is dispatched to assist with the fire. Due to difficult terrain and the vast distance that must be traveled, it can take up to an hour, if not longer, for the responding unit to arrive at an incident.

NEMA is the official holder of fire related information, which is being shared with the EIC and NSO with respect to the data provision guidelines.

Forest biodiversity monitoring[26]

The Ministry of Environment and Tourism is responsible for the monitoring of biodiversity and protected areas. In particular, the Institute of Biology of the Mongolian Academy of Sciences has an agreement with the Ministry to provide information on protected areas and endangered, rare and ecologically important species. Between 1987 and 2010, regular studies of ecologically and economically important species were carried out every four years; however, due to *a lack of funding, this ceased in 2014 and no further species inventories have been undertaken since 2010*. In 2010, species assessments of three different biomes were carried out by the Academy of Sciences, comprising steppe and desert species, mountain species and forest species. These regular species inventories were primarily used to inform quotas for hunting and to inform the national state of the environment report.

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[25] Bobette Rowe, Morganne Lehr and Jennifer Smith, 2018: Rapid Assessment of Forest Fire Control and Prevention Strategies in Mongolia

[26] UNECE, 2018, Environmental Performance Reviews-Mongolia

Typically, rangers at the Aimag and Soum levels support the field work and observations by completing questionnaires and working with the scientists in the field.

The Academy of Sciences is the primary supplier of data to the Ministry of Environment and Tourism with a focus on science. Further data and information are provided by various national and international institutions and research and conservation organizations, the latter groups usually on a project basis. There is also evidence that well-funded projects deliver sound data and information (e.g. on conservation of the Gobi bear), thus allowing informed decision-making on specific issues of national and international interest. Despite the methodological and technical capacities of the Academy of Sciences to monitor biodiversity and produce assessment reports with recommendations, a lack of funding has resulted in the cessation of regular monitoring and reporting. In general, 2010 data are too outdated to inform evidence-based policymaking.

While the relevant organizations contributing to biodiversity monitoring maintain their own databases, the EIC environmental database makes publicly available databases covering natural flora, fauna and state and local protected areas and provides a link to a password-protected database managed by WWF on wild animal and vegetation monitoring.

The NSO, through its website and the Mongolian Statistical Yearbooks, provides limited information on forest land and harvest volumes, the number of rare animals allowed to be hunted and caught for "special purpose hunting" and sport fishing and the maximum limit of wild hunting for domestic purposes.

Unified land inventory system

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."

The Agency for Land Administration and Management, Geodesy and Cartography (ALAMGaC) under the Ministry of Construction and Urban Development is responsible for dealing with land related matters. Under the revised 2002 Law on Land and within the land reform, ALAMGaC was established in 2002 by merging three governmental agencies, i.e. the Land Management Authority, the State Administration of Geodesy and Cartography and the Real Property Registration Agency.

ALAMGaC is the regulatory agency of the Government for land issues. ALAMGaC is in charge of implementing government policies on land-related issues, land management planning, conducting cadastral surveying and mapping, establishing a national land information system and national spatial data infrastructure, and providing land-related data and information to the public.

However, land planning and management issues are also regulated by and require close cooperation and coordination with several other ministries or agencies. The Ministry of Food, Agriculture and Light Industry is responsible for the management of agricultural land, including rangeland and cropland. The Ministry of Environment and Tourism is responsible for managing protected areas, forest and water resources. The Ministry of Mining and Heavy Industry is responsible for the mining licensing process and mining cadastre. The Ministry of Roads and Transport is responsible for roads, in particular for increasing the number and length of paved roads. There is a lack of overall cooperation and coordination mechanisms for land management among the relevant bodies[27].

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[27] UNECE, 2018, Environmental Performance Reviews-Mongolia

One component of EIC 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 follows[28]:

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;
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 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. Data sharing agreement between MET and ALAMGC has been done in June 17, 2014.

Any quantitative and qualitative changes related to land with forest resources of unified land territory is updated with findings of recently conducted national forest inventory and 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 year book of NSO. That means official forest area figure is provided by ALAMGC.

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. The Law regulates interactions among bodies of the Statistics Authority of Mongolia and also between 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, centralized 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 and a strong coordination role over all other producers of statistical information[29].
The NSO is responsible for the production of official statistics. For environmental statistics, the NSO uses the information supplied by the Ministry of Environment and Tourism. Regarding the coordination between the Ministry of Environment and Tourism and the NSO, current legislation mandates the Ministry of Environment and Tourism to supply the NSO with environmental statistics.
Other organizations and institutions involved in environmental data collection and statistics include: the Ministry of Mining and Heavy Industry; the Ministry of Construction and Urban Development; the Agency for Land Administration and Management, Geodesy and Cartography (ALAMGaC); NEMA;

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[28]Law on Land

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

water basin administrations; PAAs; local administrative authorities at Aimag, capital city, Soum and district levels; rangers; and research institutions.

In accordance with Article 7 of Law on Statistics, The NSO is responsible for conducting the following censuses and surveys, which are 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 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, 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, and 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 regularity 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.

2.2.4.2.Data potential and gap analysis

Global forest goals 4, 5 and 6, 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. Hence assessment on data potential and gap analysis covered all 12 quantitative targets of GFGs. The potential of each reliable data was quantified according to the data potential classification scheme.

This study focused on not only the evaluation of sources as well as on the temporal and spatial resolution of reliable data, required to monitor progress on the quantitative targets of GFGs, but also on the identification of data gaps and weakness using scheme (see 2.1). The existing data gaps and weakness were identified by those GFGs targets, which are assigned by index 0 and 3 respectively. Detailed classification of existing data potential in Mongolia is summarized in table 5.

Conclusion: The existing reliable dataset has potential to monitor progress towards on 84% of quantitative GFGs targets. But FI of EIC and Biodiversity monitoring of MET were assigned by data potential index 3, which considered as weakness. This means that due to lack of funding and weak human capacity, the FI and Biodiversity monitoring data are not updated regularly, although the data gathering framework and methods of assessment are available.

In addition, 16% of quantitative GFGs targets, namely the targets 2.1 and 3.3, were assigned by data potential index 0. Hence, they are considered as existing data gap.

Recommendation*:*

addressing data gaps:

- *Country specific definition on forest dependent people should be developed.*
- *Despite progress in developing a national standard for certification of forest organizations in line with international standards, full establishment is still pending. Therefore, this process should be accelerated.*

addressing weakness:

- *MET should allocate sufficient fund to carry out Biodiversity monitoring permanently.*
- *The quality control/assurance guidelines and terms/definition of FI framework should be elaborated and incorporated to existing FI instruction to ensure the transparency and consistency of their data with desired quality over time.*
- *Capacitate forest unit officer, in charge of updating FI tables, to assure regular updates.*

Table 5: Data potentials and 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/ DATA POTENTIAL INDEX	TEMPORAL RESOLUTION	SPATIAL RESOLUTION	REMARKS
1.1	FRDC	NFI / 5a	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[30]. NFI supplies inputs to FI-1 and FI-2 tables.
1.2	FRDC	NFI / 5a	10 years	National	NFI report forest carbon stocks and their changes
1.3	FRDC	NFI / 5a	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[31].
	EIC	FI-5 / 3	Annually	Soum and District	Forest Ownership information reported in FI-5 table
	EIC	FI-4 / 3	Annually	Soum and District	Afforestation and reforestations activities are reported in FI-4 tables
Goal 2. Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people					
TARGET	SOURCE	RELIABLE DATA/ DATA POTENTIAL INDEX	TEMPORAL RESOLUTION	SPATIAL RESOLUTION	REMARKS
2.1		No reliable data/ 0			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 thesurvey 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/
2.2.	MOFALI (Ministry of food, agricultur	Financial Reports of Soum development; and Small and	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)[32]. State central budget allocates annually funds for Soum development and Small and

[30]Mongolian Multipurpose national forest inventory, 2019, Ministry of Environment and Tourism

[31]Mongolia'sForest Reference Level submission to the UNFCCC, 2018, Ministry of Environment and Tourism

[32]Mongolian Law on Small and Medium Enterprises

TARGET	SOURCE	RELIABLE DATA	TEMPORAL RESOLUTION	SPATIAL RESOLUTION	REMARKS
	e and light industry)	Medium Enterprise Development foundations /5a			Medium Enterprise (SME) Development foundations. These foundations provide the access of small-scale forest enterprises, to affordable credit. Annual report on SME, which received affordable credit, is available at https://www.smefund.gov.mn/
2.3	NSO	Agricultural census /5a	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[33].
	EIC	FI-4 / 3	annually	Soum and District	Information on amount of harvested non-timber forest products is reported in FI-4 table.
2.4	NSO	Establishment census / 5a	5 years	Soum and District	figures on employment in forest enterprises (social benefit) 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 /5a	10 years	Soum and District	figures on employment in forest enterprises (social benefit)
		Business register/ 5a	Quarterly	Soum and District	figures on employment in forest enterprises (social benefit)
		Industrial sector statistics /5a	Quarterly	Soum and District	figures on products values from forest sector (economic benefit)
	FRDC	NFI /5a	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[34] are accounted as protected forest.
2.5	FRDC	NFI /5a	10 years	National	Figures on forest area within protected areas
	FRDC	Forest reference level report / 5a	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 CE application.
	MET	Biodiversity monitoring / 3	4 years	Soum	Steppe and desert species, mountain species and forest species are inventoried by academy of science. These regular species inventories were primarily used to inform quotas for hunting and to inform the national state of the environment report.

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
3.1	FRDC	NFI /5a	10 years	National	Forests within protected areas
3.2	FRDC	NFI /5a	10 years	National	Figures on forest areas designated as forest management unit
	EIC	FI-5 / 3	annually	Soum and district	Forest Ownership information reported in FI-5 table

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[33]Agricultural census 2011, NSO

[34]Article 8,1 and 8,2 of Law on Forest

TARGET	SOURCE	RELIABLE DATA	TEMPORAL RESOLUTION	SPATIAL RESOLUTION	REMARKS
3.3		No reliable data/ 0			In the paragraph 3.3.7 of State Policy on Forest stated that *Establish a national standard for certification of forest organizations in line with international standards, so that by 2020, transferred in to system in which only certified companies and organizations are authorized to use forest resources.*
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, and 4.2	EIC	FI-7/ 3	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 /5a	annually	Soum and District	State central budget allocates annally 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 sector

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 fluctuations[35]. 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 3,000 vascular plant species. Moreover, numerous globally threatened and endangered species occur[36]. 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.[37]

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 2019[38]. 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 economy[39].

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 km^2 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 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.

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[35] 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.,*

[36] 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,

[37] 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.

[38] National Statistical office, www.1212.mn

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

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 m^3 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 respectively[40].

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 1940s[41].

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 Industry[42].

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 areas[43].

Before 1990s, approx. 2.2 million m^3 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 Mongolia[44].

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 wood and sawn timber to China. In 1999, environmental concerns led to the parliament passing legislation and halted export of round wood and sawn material. During the recent years, official timber harvesting rates have oscillated around approximately 800 thousand m^3/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%

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

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

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

[43] Tsogtbaatar, J.2004: Forest Policy Development in Mongolia

[44] Wyss, D. 2006: Waldmanagement in der Mongolei. Dissertation FU Berlin

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 areas[45].

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 trend[46].

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 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 equipment[47]. 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

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[45] APFNET, (2017), Forest development and best practices of forest management Mongolia

[46] 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.

[47] Ministry of Environment and Green Development, 2014: Annual Report of Ulaanbaatar, Mongolia.

sectors[48]. 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 m^3/year of commercial wood and fuelwood[49]. Official harvesting rates, however, amount to well below 1million m^3/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 change[50].

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 6)[51].

Table 6: Carbon emissions and removals in Mongolia during the reference period: 2005-2015 from various change areas as a result of various drivers of change classes.

Reference period: 2005-2015	Mean Annual CO$_2$e	95% Confidence Interval		CI range (%)
		Lower 2.5%	Upper 97.5%	
Change	(tCO$_2$.yr^{-1})			
Emissions Intact forest > Non-forest Intact forest > Degraded forest	3,551,438.6	2,928,271.0	4,174,606.2	17.5
Removals Non-forest > Intact forest Non-forest > Degraded forest	-74,054.5	-133,302.6	-14,806.3	80.0
Net emissions	3,477,384.2	2,851,406.4	4,103,362.0	18.0

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

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

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

[51] MET, 2018: Mongolia's Forest Reference Level submission to the UNFCCC

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 7). The lack of a government agency directly mandated to manage forests is an important reason for widespread illegal activities in and around forests[52].

Table 7: Institutional framework for forest management in Mongolia

Level	Government institution	Responsibilities
National	Ministry of Environment and Tourism	Provide strategic direction, policies and principles and develop regulations for forest resource management; Establish technical limits of annual allowable cut based on proposals from aimags; Allocate fund for reforestation to the Aimags' environment and tourism departments, and fund for seed and seedlings preparation, forest research activities, forest fire and insect control, control of illegal logging, capacity-building for forest user groups and intersoum forest units and monitoring activities through the Forest Research and Development Centre; Approve Aimags and capital city forest management plans; Define the size of area and allocate fund for thinning work to the inter-Soum forestry units.
	Forest Research and Development Centre	Carry out national forest inventory; Conduct forestry research; Identify seed trees and shrubs to develop a seed bank; Maintain forest information database; Designate forest areas for logging, tending and thinning; Develop and revise norms and standards for reforestation; Provide professional guidance and methodological support to forestry units, forest user groups and forest enterprises; Monitor pest management (prevention and control measures).
Aimag	Citizen representative khural	Approve programme, action plan and budget for forest protection, sustainable use, rehabilitation, tree nurseries and forest fire prevention.
	Governor's Office	Organize tenders to select private entities to undertake reforestation and rehabilitation work; Distribute annual harvesting quotas to soums; Report to the Ministry of Environment and Tourism on the status of the forest land; Submit proposals from the aimag on the volume of annual harvesting to the Ministry of Environment and Tourism; Approve soum forest management plans.
	Environment and tourism departments (forest units)	Collect proposals for annual cut from Soums and present them to the Aimag governor; Provide technical and methodological support to intersoum forest units; Make agreements with intersoum forest units;

[52] UNREDD Mongolia, 2016: Preliminary Assessment of the Drivers of Forest Change in Mongolia

		Report to the Ministry of Environment and Tourism and Aimag governor.
Soum	Citizen representative khural and governor	Approve budget for forest protection, sustainable use, rehabilitation, tree nurseries and forest fire prevention at Soum level; Estimate volume for annual cut
	Intersoum/Soum forest unit	Designate areas for logging and thinning; Monitor implementation of forest management plans developed by forest user groups and forest enterprises; Undertake forest fire prevention measures and mobilize local population in forest fire suppression.

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 important[53]. 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 goal[54]. 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"[55].

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 systems[56].

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 public[57].

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

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[53] Pregerning, M., Hogl, 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.

[54] 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.

[55] 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.

[56] Chapter 11, Agenda 21, UNCED, 1992b

[57] 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.

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 SFM[58].

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"

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"[59].

Indicators relate to HOW to measure SFM. They may be quantitative or qualitative.
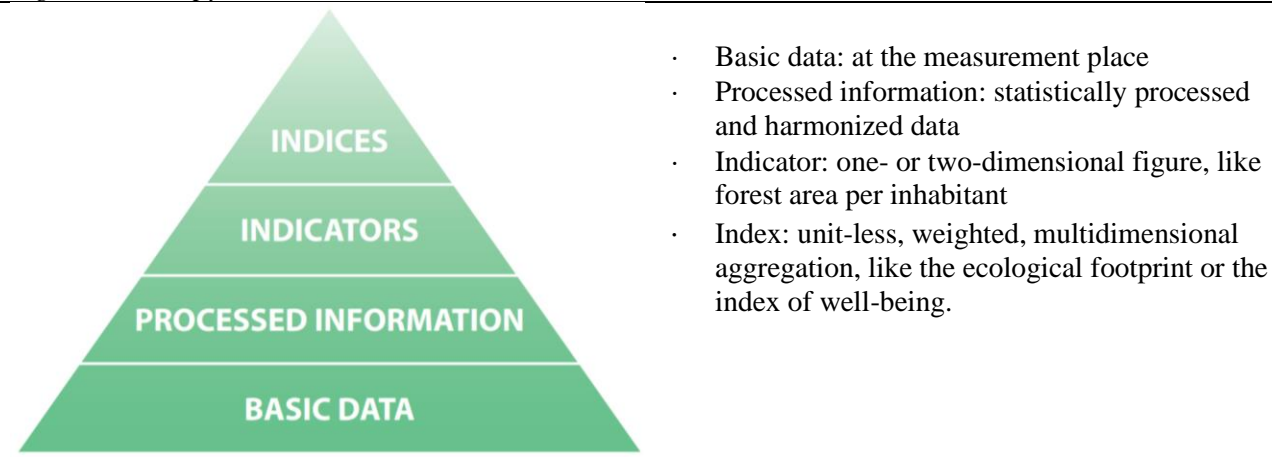
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[58] General Assembly 2007: Non-Legally Binding Instrument on All types of Forests (A/RES/62/98); United Nations: Bali, Indonesia

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

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 simplify[60]. Thus, there is a graded information system (figure 1):

Figure 1: Data pyramid[61]

· Basic data: at the measurement place
· Processed information: statistically processed and harmonized data
· Indicator: one- or two-dimensional figure, like forest area per inhabitant
· Index: unit-less, weighted, multidimensional aggregation, like the ecological footprint or the index of well-being.

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 8). 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 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 standards[62].

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[60] Ott, W.,1978: Environmental Indices: Theory and Practice. Ann Arbour Science. Ann Arbour. 371 p.

[61] 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. Toynbee Hall. The New Economics Foundation. London. Pp. 3-10.

In that context, Rametsteiner (2001)[63] 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 8 is a summary of the most prominent and various roles C&I for SFM can serve at the different levels.

Table 8: Role of criteria and indicators

International and/or regional scale	· 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	· Describe, monitor, and report on the national forest trends and changes · Assess progress towards sustainable forest management and identify emerging threats and weaknesses · 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	· 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 approaches[64]:
– political
– scientific and

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[62] European Forest Institute. 2013: Implementing Criteria and Indicators for Sustainable Forest Management in Europe.
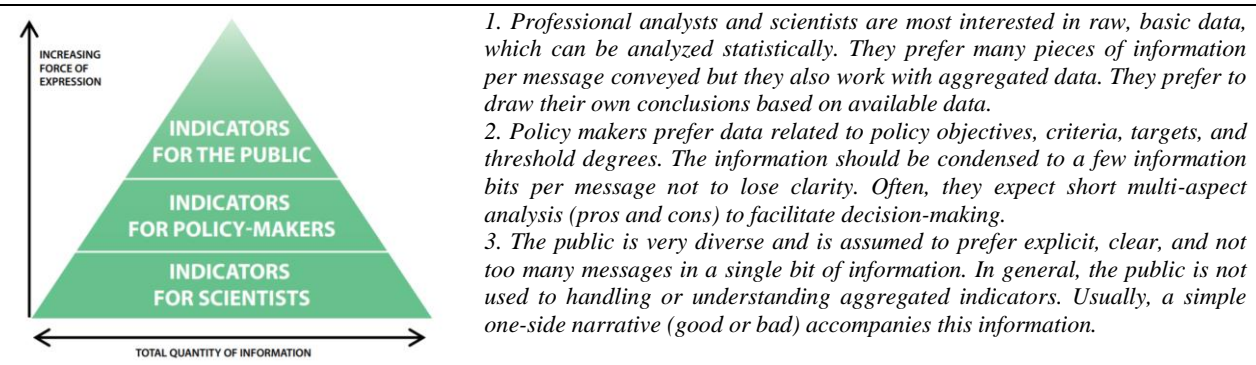
[63] Rametsteiner, E., 2001: SFM Indicators as Tools in Political and Economic Contexts: Actual and Potential Roles. In: Raison, R.J., Brown, A.G. and Flinn, D.W. (Eds.) Criteria and Indicators for Sustainable Forest Management, IUFRO Research Series 7, CABI Publishing, Wallingford, pp. 107–130.

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

– market-oriented

Indicators, respectively indicator sets, should be in a format that is designed with an explicit user group in mind. According to figure 2, there are three types of user groups, based on the quantity of information incorporated in the indicator set:

Figure 2: Relationship between indicators, data, force of expression and user groups[65]

1. *Professional analysts and scientists are most interested in raw, basic data, which can be analyzed statistically. They prefer many pieces of information per message conveyed but they also work with aggregated data. They prefer to draw their own conclusions based on available data.*
2. *Policy makers prefer data related to policy objectives, criteria, targets, and threshold degrees. The information should be condensed to a few information bits per message not to lose clarity. Often, they expect short multi-aspect analysis (pros and cons) to facilitate decision-making.*
3. *The public is very diverse and is assumed to prefer explicit, clear, and not too many messages in a single bit of information. In general, the public is not used to handling or understanding aggregated indicators. Usually, a simple one-side narrative (good or bad) accompanies this information.*

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 situation[66].

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 situation[67]. Reed et al. (2006)[68] proposed a framework for 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 problems[69]. However, formulating sustainable forest policy requires a balance between the multiple socio-economic and environmental objectives of forest stakeholders and their conflicting issues[70]. 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

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[65] 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.

[66] 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.

[67] 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.

[68] 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.

[69] 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.

[70] Ananda, J. 2007: Implementing participatory decision making in forest planning. J. Environ. Manage. 39, 534–544.

scientific point of view regarding the C&I-based assessment of SFM[71]. 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 operations[72]. 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 SFM[73].

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 manner[74].

An approach with steps has been used in this study to select indicator (figure 3) (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

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 indicators[75].

Figure 3: Process of national C&I indicator development, steps 6 to 9 (listed above)

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[71] 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.

[72] 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.

[73] 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.

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

[75] 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.
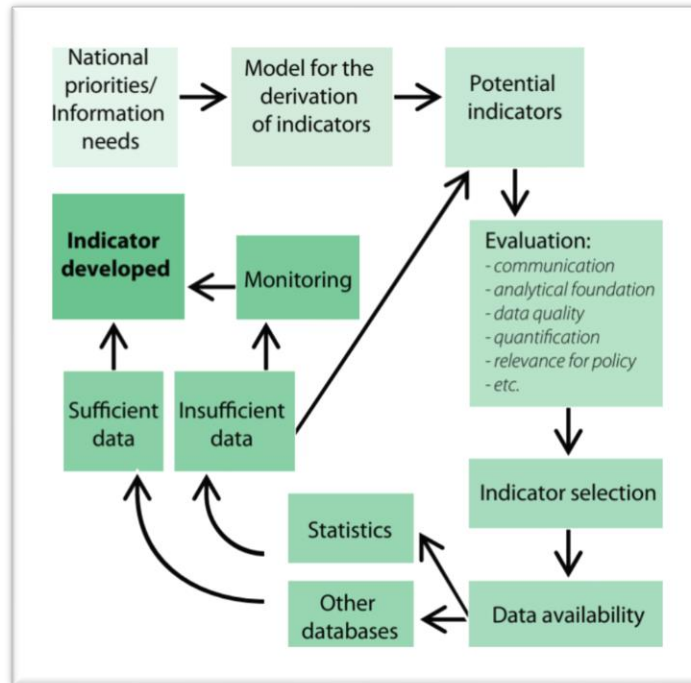
In practice, the national C&I process could be more complex and include a mixed BU/TD approach. The process and outcomes, particularly indicators, should be built strongly on national characteristics and priorities but aiming to align criteria with regional and international C&I sets, wherever possible. 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.

The three inputs in figure 4 must be conducted in a parallel and interconnected way as they influence each other.

Figure 4: Conceptual framework for C&I development.
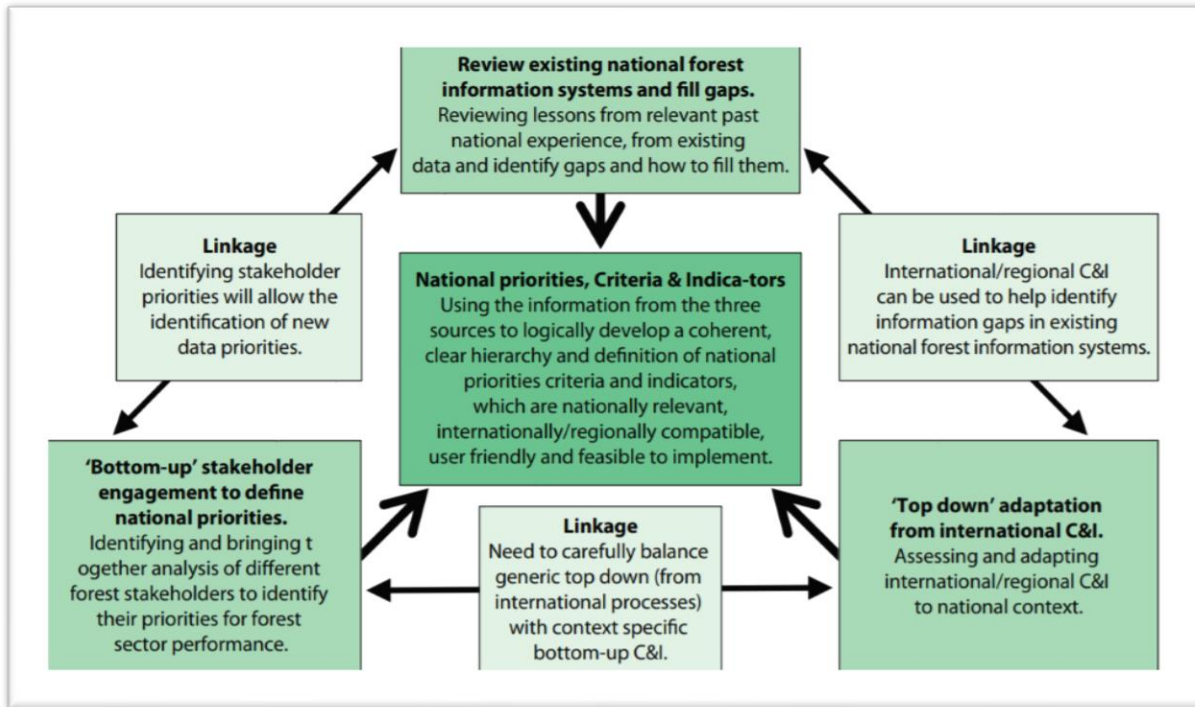
Source: O'Hara, 2017.

3.4. Proposal of national C&I sets for SFM

Development process applied both BU and TP approaches taking into consideration data availability/gap analysis study and the feedback and recommendations received during the national workshop.

National Criteria set aligns with globally agreed thematic elements of SFM defined by UNFF in 2007. Hence, it is structured according to the seven thematic areas of sustainable forest management.

Table 9: Thematic elements of SFM

Criteria	Description[76]
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 improvement is also a means of increasing forest productivity, e.g. by ensuring high levels of wood production in intensively managed forests.
3. Forest health	There are increasing concerns on the resilience of forests, also in the wake of climate

and vitality	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.
4. Productive functions of forest resources	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.
5. Protective functions of forest resources	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.
6. Socio-economic functions	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.
7. Legal, policy and institutional framework	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 indicator set should be seen as an evolving instrument and can be expanded in accordance with new circumstances, information needs and policy goals. The aim of this set is not to generate another set of indicators to compete with the existing national forest related goals and targets, each of which has its own objectives, institutional framework. Rather, elements of the set of indicators are derived from those national and international reporting processes, which in turn will benefit from the existence of information in a common platform. The aim is to articulate a core set with a limited number of indicators that address efficiently the topics identified by the various high-level forums and thus focus data collection efforts on the questions of the highest policy importance and avoid duplicate reporting. It is expected that the global core set will be used for and support the measurement of progress in implementing the national and global forest goals and their associated targets and the monitoring of objectives of other processes.

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: green development policy (2014), state policy on forest (2015), green belt program (2015), national programme on biodiversity (2015) and sustainable development vision 2030 (2016)
- they should reflect evidences and interpretations, derived from Mongolian multipurpose national forest inventory, 2016[77]
- they need to be practicable, that means a concise set of about 30 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, identified in study on data availability and gap analysis.

Table 10: Proposed national C&I set for SFM

SFM Indicator	Measurement unit	Relation to forest goals/ rationale
Criteria 1. Extent of forest resources		
1.1. Forest area as a proportion of total land area	%	SDG 15.1 and GFG 1. SPF 3.2.3, GBNP 1, SDV 2.3.3, NGDP 3.2.7. and NBP 7.1
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. SPF 4.5 and NGDP 3.2.7.
1.4. Re- and afforested area	ha	SPF 3.2. and 4.6, GBNP 1, NPFC 6.1.3 and NGDP 3.2.7.
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. SPF 4.4, NGDP 3.2.8 and NBP 7.2
2.2. Forest wildlife species composition	Index	GFG 2 and its target 2.5 of UNSPF SPF 4.4
2.3. Tree species composition	index	SPF 4.4
Criteria 3. Forest health and vitality		
3.1. Area of forest disturbed by drivers: *wildfire, pests, mining, grazing and soil erosion*	ha	target 1.3 and 1.4 of UNSPF. Linkages with SDG target 15.3 as well as Aichi target 15 and UNFCCC SPF 3.1, 4.2, 4.3 and 4.9, and NBP 7.4
3.2. Mixed forest area as proportion of commercial	%	Measures resilience of forest resources in

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[77] This was proposed by stakeholders during the national workshop

forest area		Mongolia SPF 4.9
3.3. Dead wood amount in forest	m^3/ha	Measures progress towards on NPFC 6.1.1-6.1.3
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 NGDP 3.2.7
4.2. Volume of wood removals	m^3/year	target 2.4 of UNSPF NPFC 6.1.1 and 6.1.2
4.3. Harvested nontimber forest products	tonnes/year	GFG 2 and its target 2.3 of UNSPF SPF 3.3 and 4.8
4.4. Relative stock density in commercial forest zone	%	Due to unsustainable management, the stocking density is less than it should be (NFI, 2016). Hence this indicator measures productivity of Mongolian boreal forests.
Criteria 5. Protective functions of forest resources		
5.1. Forest area with a protection management (protection forest)	ha	target 1.4 of the UNSPF SPF 4.4, NGDP 3.2.8. and NBP 7.2
5.2. Planted forest strips in desert region and around crop land	ha and km	Measures Contribution to mitigate desertification and food security. GBNP 1, NGDP 3.1.5 and NBP 7.5
Criteria 6. Socio-economic functions		
6.1. Employment related to the forest sector	Number	target 2.4 of the UNSPF SPF 3.3 and NGNP 2
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 SPF 3.4 and NGDP 3.2.8
6.3. Wood based energy share of total final energy consumption	%	SDG 7.2
6.4. Graduates from forestry university and vocational schools	Number	Mongolian forest sector needs at least 6000 professional forest workers. SPF 3.3.
6.5. Share of forest sector in GDP	%	SPF 3.3
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 SPF 3.5
7.2. Existence of national or sub-national forest	References	GFG 4.5 of the UNSPF

assessment process		SPF 3.5
7.3. Existence of national or sub-national stakeholder platform for participation in forest policy development	References	GFG 4.5 of the UNSPF SPF 3.5
7.4. Proportion of forest area under a long term 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. SPF 4.9, NGDP 3.2.8 and NBP 7.3
7.5. Existence of traceability system(s) for wood products	References	target 3.3 and 5.2 of UNSPF SPF 3.5

3.5. National Workshop

The analytic study has assessed national monitoring and reporting capacity against the national needs and international requirements, including reporting to UNFF and on forest related SDGs. The study findings were served as background documentation for the national workshop. This workshop would gather forest authorities but also other sectors, that collects forest related data. The rather high fragmentation of forest issues means that data is scattered across many institutions, which often do not cooperate on forest related socio-economic data sharing.

The national workshop on "Monitoring, Assessment and Reporting of SFM in Mongolia" was held on 06-07 November 2018 at conference hall of Holiday Inn Hotel Ulaanbaatar. The workshop was attended by 38 experts, representing relevant national stakeholders, and 2 delegations from UNFF headquarter. Out of the forty participants, twenty one were men, a 52% male representation, and nineteen were women, a 48% female representation.

The two days national workshop has provided an opportunity to discuss and review the study findings, that identified source of information on forests also on socio-economic aspects, data potentials with gaps and C&I framework for SFM in Mongolia. The workshop was cordially organized by MET and UNFF; and moderated by national consultant. The workshop agenda and list of participants are presented in annex 2.

The structure of workshop was built on 2 interlinked sessions that cover the following issues:
- *Information sharing*: Relevant national stakeholders hold presentation to explain their individual roles in gathering forest related data and data sharing framework.
- *Discussion and feedback:* Participants provided the feedbacks and recommendations for improving analytic study findings on availability of forest data, mapped data gaps for MAR and national C&I set for SFM in Mongolia.

The workshop opening speeches were given by Dr. B. Oyunsanaa, (Director of Department for Forest Policy and Coordination, Ministry of Environment and Tourism, UNFF national focal point) and Afsa Kemitale (Senior Programme Officer, UNFF).

The presentations
During the first session of "*Information sharing*", nine presentations were given.

The first presentation was held by Ms. Njeri Kariuki (Sustainable Development Officer, UNFF). The presentation covered the Project on Monitoring Progress towards Sustainable Forest Management (SFM), Key Features of the UN Strategic Plan for Forests 2030 and GFGs and associated targets. The participants were familiarized with the processes carried out within the framework of the project implementation. In addition, the workshop participants were acquainted with forest related international commitments including SDGs and the UN forest instrument.

Mr. J. Altangadas (Forest research and development center, MET) held second presentation, which familiarized the participants with data availability and challenges for preparing Global Forest resources assessment Country Report (FRA 2020). He highlighted that the socio-economic information on forest sector is identified as a key challenge for compiling FRA 2020 report.

Ms. G. Batkhishig (Head of division for environment information center, IRIHME) presented Environmental Information Center. Her presentation gave background information on legal environment, data provision, sharing framework, data sources, sub data bases and their technical specifications. The following presentation, held by Ms. Z. Narangerel (Forest database specialist, Environmental Information Center, IRIHME), has familiarized participants with legal and enabling framework, content, sources of forest database in EIC. But she addressed regular update of forest database as main challenge.

Mr. B. Khosbayar (Specialist, Forest research and development center, MET) presented on Forest resource inventory system in Mongolia. The presentation included information on enabling framework, annual budget for field inventory, sampling design, data collection method, quality control/assurance approaches, remote sensing application and products, derived from field inventories.

Ms. Kh. Enkhjargal (Department of Land Management, Agency for Land Administration and Management, Geodesy and Cartography) presented the laws and regulation related to domestic integrated land inventory system, that accounts also forest area and changes on annual basis.

Ms. A. Uyanga, (National Statistical office) presented current condition of official statistics information on environmental sector. During the presentation, workshop participants were familiarized with legal framework for environmental statistics, fundamental principles of statistics, data acquisition/sharing procedure, quality assurance, relevant surveys and census, that produce socio-economic statistics of forest sectors.

At the end of first session, the participants were informed about also case study findings of gap analysis on environmental statistics and progress on establishment of Forest certification system in Mongolia, presented by Dr. Ts. Banzragch and L. Dorjtseden (Mongolian Sustainable Forest Management NGO) respectively.

According to agenda, the questions and answers related to presentations took place among participants. During the first session, all stakeholders were familiarized with legal environment and institutional landscape on existing forest monitoring system in MAR context and forestry data gaps/challenges as well as capacity needs.

The second session, has started with presentation on the analytic study findings, held by E.Erdenebat (national consultant). It was followed by discussion and feedback to findings concerning gap analysis

for MAR and national C&I set for SFM. The received feedback and comments from stakeholders were incorporated into this report.

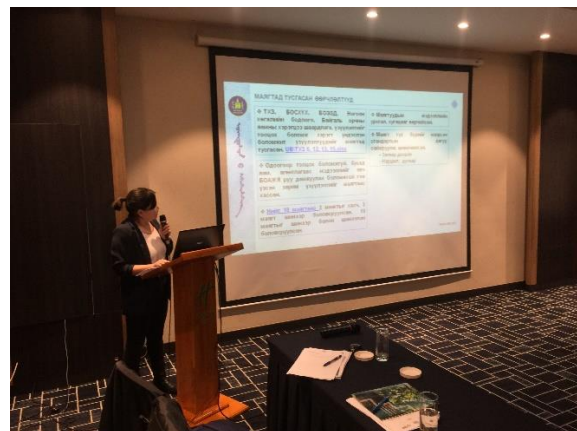*Photo documentation of some presenters*

Ms. Njeri Kariuku (UNFF)
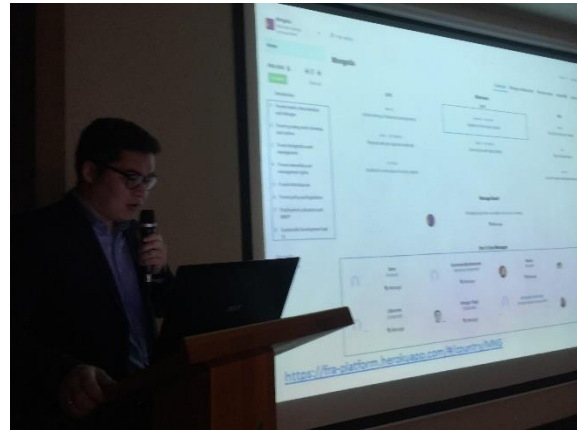
Mr. J. Altangadas (FRDC)

Ms. Kh. Enkhjargal (ALAMGC)

Ms. A. Uyanga (NSO)

INVITATION

Dear Ms./Mr. …………………

Ministry of Environment and Tourism; and UN Forum on Forests (UNFF) Secretariat project „Monitoring Progress towards Sustainable Forest Management" cordially invite you to attend on

NATIONAL WORKSHOP ON MONITORING, ASSESSMENT AND REPORTING OF SUSTAINABLE FOREST MANAGEMENT IN MONGOLIA

Objectives of the workshop are:

➤ *Introduction on existing forest related data gathering and sharing framework in Mongolia*
➤ *Assessment on availability of forest data, mapping of existing gaps in Mongolia*
➤ *Identification of priority indicators for monitoring progress towards sustainable forest management in Mongolia*

Moderator: **Dr. Erdenebat Erdenejav** /National Consultant, UNFF Secretariat project „Monitoring Progress towards Sustainable Forest Management"/

Date**: *06-07th November 2019***

Venue**: *Conference room at first floor in Holliday Inn Hotel*** *(Sambuu St 24, Ulaanbaatar 15141, tel: 70142424)*

RVSP latest by 04th November 2019

For further details, please contact to Tel: 89982223 or email: e_bata82@yahoo.com

AGENDA

Day 1 (6th November 2019)

Timeframe	Session	Presenter
9:00 – 9:30	Registration	
09:30 – 09:45	Opening remarks	Dr. B. Oyunsanaa */Director of Department for Forest Policy and Coordination, Ministry of Environment and Tourism,* *UNFF national focal point/* Afsa Kemitale, *Senior Programme Officer, UNFF*
09:45 – 10:15	United Nations Strategic Plan for Forests 2017-2030	Njeri Kariuki, Sustainable Development Officer, UNFF
10:15-10:25	Q&A	
10:25 – 10:40	Coffee break	
10:40 – 11:00	National communication to FAO FRA	J. Altangadas /Forest research and development center, MET/
11:00 – 11:30	Environmental information database	G. Batkhishig */Head of division for environment information center, IRIHME/*
11:30 – 11:50	Forest information tables	Z. Narangerel /*Forest database specialist, Environmental Information Center, IRIHME/*
11:50 – 12:10	Q&A	

12:15 – 13:20	Lunch break	
13:20 – 13:40	Forest resource inventory system	B. Khosbayar /Head of unit, Forest research and development center, MET/
13:40 – 14:00	Integrated land inventory system	Kh. Enkhjargal /Department of Land Management, Agency for Land Administration and Management, Geodesy and Cartography/
14:20 – 14:40	Q&A	
14:40 – 15:00	Official statistics on environment, house hold, business register, industry and Agricultural census	A. Uyanga, /National Statistical office/
15:00 – 15:20	Coffee break	
15:20 – 15:35	Gap analysis on environmental statistics	Dr. Ts. Banzragch /Head of Biosphere NGO/
15:35 – 15:50	Progress on Forest certification system in Mongolia	D. Munkhzorig /Head of Mongolian Sustainable Forest Management NGO/
15:50-16:00	Q&A and closure of day 1 event	
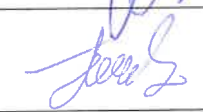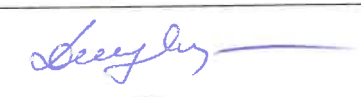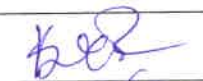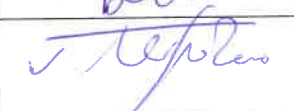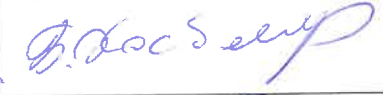
Day 2 (7th November 2019)

Timeframe	Session	Presenter
9:30 – 10:00	Registration	
10:00 – 10:40	Assessment on availability, potential of forest data, existing gaps and proposed indicators for monitoring progress towards sustainable forest management in Mongolia	E. Erdenebat (National consultant of UNFF project)
10:30 – 10:50	Q&A	
10:50 – 11:00	Coffee break	
10:50-12:00	Building working groups and group work on peer-reviewing the findings in accordance with provided templates	
12:00 – 13:00	Lunch break	
13:00 – 14:00	Groups work to be continued	
14:00 – 14:30	Presentation of groups work feedback	Leaders of working groups
14:30 – 15:00	Discussion	
15:00 – 15:15	Coffee break	
15:15 – 15:30	National Workshop closure remarks	Dr. Oyunsanaa Byambasuren /Director of Department for Forest Policy and Coordination,Ministry of Environment and Tourism, UNFF national focal point/ Afsa Kemitale, /Senior Programme Officer, UNFF/

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