



Forestry Department

Food and Agriculture Organization of the United Nations

BRIEF ON NATIONAL FOREST INVENTORY NFI

MONGOLIA

Forest Resources Development Service

Rome, June 2007



Strengthening Monitoring, Assessment and Reporting (MAR) on Sustainable Forest Management (SFM)

FAO initiated activities to strengthen Monitoring, Assessment and Reporting on Sustainable Forest Management in January 2006 with the objective to facilitate development of harmonized forest related national monitoring, assessment and reporting (MAR) for contributing directly to the improvement of national sustainable forest management (SFM) regimes. It also aims to catalyze national discussions, analyses, policy actions and planning that promote national SFM regimes besides clarifying the contribution of forests to global environment and to human well-being. This initiative shares the ambition of the Collaborative Partnership on Forests (CPF) about simple, harmonised, efficient and action oriented MAR systems both at international and national levels and thus provides a response to some of the key recommendations made by the CPF task force on streamlining the reporting on forests with particular focus on national capacity building.

The MAR initiative has recently updated goals include country capacity building for better, consistent and regularly updated information to facilitate implementation of non-legally binding instrument (NLBI) on SFM, adopted at UNFF 6 (2007) that aims to,

- Strengthen political commitment and action at all levels to implement effectively sustainable management of all types of forests and to achieve the shared four global objectives ((a) reverse the loss of forest cover worldwide, (b) enhance forest-based economic, social and environmental benefits, (c) increase significantly the area of protected forests worldwide, and (d) reverse the decline in official development assistance for SFM;
- Enhance the contribution of forests to the achievement of the internationally agreed development goals, including the Millennium Development Goals, in particular with respect to poverty eradication and environmental sustainability; and
- Provide a framework for national action and international cooperation.

All countries can participate in this initiative, although the actual level and intensity of their involvement may vary among them. The initiative is organized under the Forest Resources Development Service (FOMR) of FAO Forestry Department. The contact persons are:

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The MAR-SFM Working Paper Series is designed to reflect the activities and progress of the MAR on SFM programme of FAO. Working Papers are not authoritative information sources – they *do not* reflect the official position of FAO and should not be used for official purposes. Please refer to the FAO forestry website (www.fao.org/forestry) for access to official information.

The MAR-SFM Working Paper Series provides an important forum for the rapid release of preliminary findings needed for validation and to facilitate the final development of official quality-controlled publications. Should users find any errors in the documents or have comments for improving their quality they should contact Kailash.Govil@fao.org or Dan.Altrell@fao.org.

Brief Note on MAR-SFM Working Paper Series (AP) on NFI- Brief

The NFI – Brief for a country attempts to provide a bird’s eye view of the National Forest inventories (NFI). However, some countries conduct forest inventories at sub-national and or field management unit level. Therefore, this brief presents brief information on the forest inventories in a country at national level, sub-national level and or field management level depending on the available information.

It is useful to regularly update our understanding of elements and specifications of forest inventories because the information generated by forest inventories is simply manifestation of its span, design and methods to collect and analyse the primary information during its implementation. This is important because the NFI provides information on the state and trends of forest resources, their goods and services, and other related variables that support. It also defines the policy and trade decisions, science and field initiatives, national and international reporting, and direct and indirect contribution of forests to society like poverty alleviation. Regular updates are necessary because countries do change the set of elements, their specifications, designs and methods over period of time to address new emerging demands and to take advantage of new technologies.

The purpose of developing the NFI-briefs is, therefore, to document (working paper) the current and historical span of elements (variables or fields), their specifications, sampling designs and methods used in NFI. The document may serve as data source as well as reference material.

These briefs have been initially developed on the basis of the country submission to FAO. The initial draft of this report was sent to following national focal point for review and country validation before its finalisation.

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B. Compilation and Supervision

This report has been compiled by Mr. Marco Piazza under supervision of Dr. Kailash Govil, Senior Forestry Officer, MAR and Dan Altrell, Forestry Officer, NFA.

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General Information

Mongolia is the world's second-largest landlocked country after Kazakhstan. It is typically classified as being a part of East Asia, although sometimes it is considered part of Central Asia, and the northern rim of historical Mongolia extends into North Asia. It is bordered by Russia to the north and China to the south.. Its capital and largest city is Ulaanbaatar.

Map of the Country



Figure 1. Map of Mongolia

(Source: <https://www.cia.gov/library/publications/the-world-factbook/geos/bg.html>)

Land Area and Landuse

The total area of Mongolia is 1 566 500 square km and the following table presents the categorisation and projection of land use in Mongolia for 1990, 2000 and 2005 (FRA 2005).

Table 1. Categorisation and projection of land use in Mongolia (FRA 2005).

FRA 2005 Categories	Area (1000 hectares)			
	1990	2000	2005	2007
Natural forest	11 492	10 665	10 252	10 589
Other wooded land	6 264	3 034	2 388	2 253
Other land	138 894	142 951	144 010	143 808
Other land of which with tree cover	0	0	0	0
Inland water bodies	0	0	0	0
TOTAL	156 650	156 650	156 650	156 650

Forests

The forest area in Mongolia is mainly located in the northern parts of the country along the Russian border forming a transition zone between the Siberian taiga forest and the Central Asian steppe zone (Figure 2 and 3). Data from FRA 2005 indicate a total of 10.2 million ha of forest which is equivalent to 6.5 percent of total land area. An additional 2.4 million ha is classified as other wooded land as indicated in Table 1. About half of the forest land (5.4 mill ha) is covered by modified natural forest while the rest (4.7 million ha.) is primary forest. Productive plantation cover an area of 112 000 ha. (Table 2)

Table 2. Characteristics of Forests in Mongolia (FRA 2005)

FRA 2005 Categories	Area (1000 hectares)		
	1990	2000	2005
Natural forest	5 540	4 923	4 733
Modified Natural	5 922	5 667	5 407
Semi-natural			
Productive plantation	30	75	112
Protective plantation			
TOTAL	11 492	10 665	10 252

From the naturalistic point of view, the forest area of Mongolia can be divided into six zones: High Mountain, Taiga forest, Mountain Forest steppe, Steppe, Desert Steppe and desert as shown in figure 3.

The forests of Mongolia contain about 140 species of trees, shrubs and woody plants with coniferous species playing a dominant role (Table 3 and Figure 4). Most forests are inaccessible due to lack of roads and steep slopes. The natural regeneration of Mongolian forests is slow, and fires and insects often damage the forests.

FOREST COVER MAP OF MONGOLIA

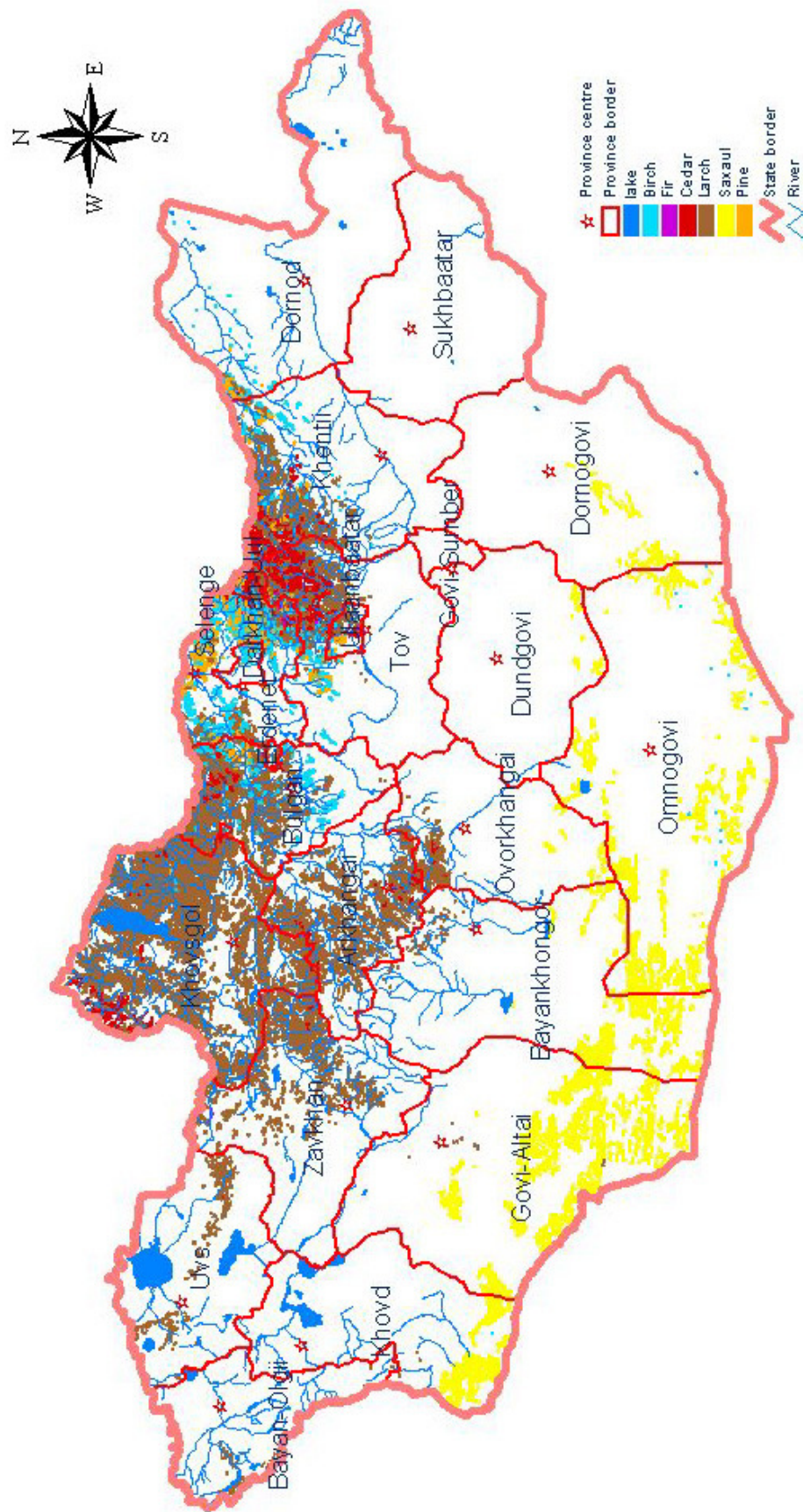


Figure 2. Forest cover map of Mongolia

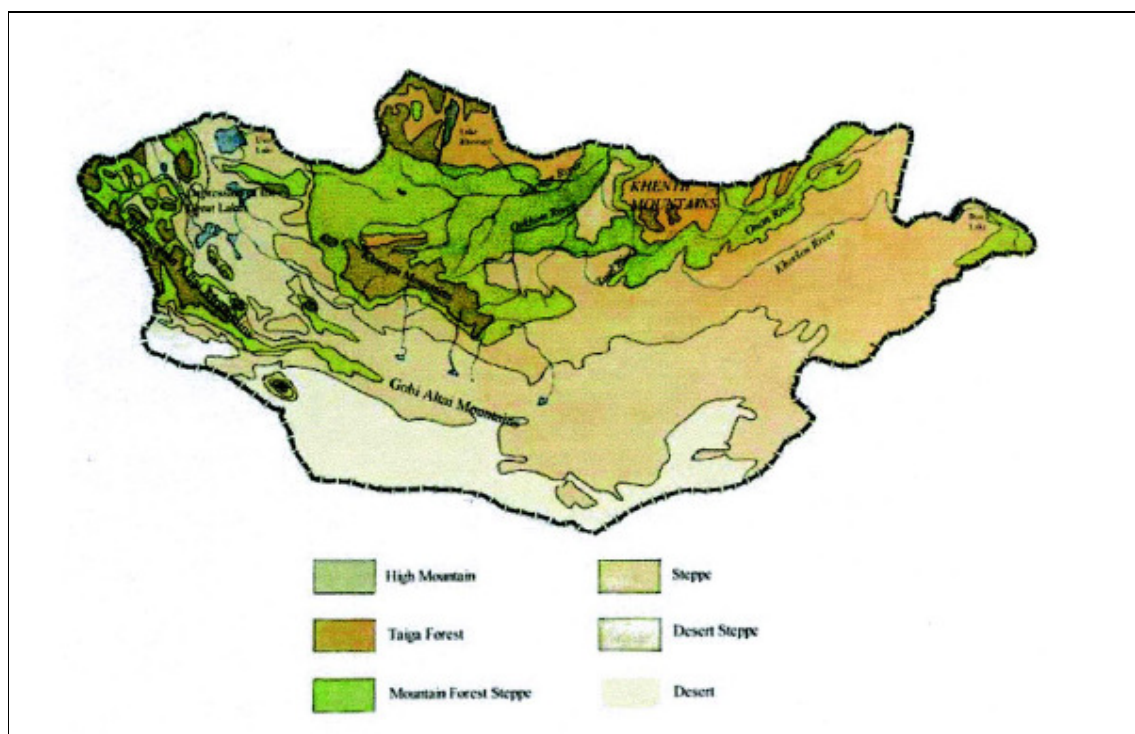


Figure 3. Natural zones of Mongolia

Table 3 . Species composition of Mongolia's Forest

Tree species	Forest covered			
	Area 1000 hectares	Percentage %	Stand volume 1000 cubic meter	Percentage %
Larch (<i>Larix sibirica</i>)	7776.2	72.1%	1033017	74.6%
Pine (<i>Pinus sylvestris</i>)	630.3	5.1%	97085	6.8%
Cedar(<i>Pinus sibirica</i>)	816.1	7.3%	150525	12.1%
Fir (<i>Picea obavata</i>)	31.8	0.3%	3434.2	0.3%
Abies(<i>Abies sibirica</i>)	2.4	0.02%	375.5	
Birch (<i>Betula ratundifolia</i>)	1194.3	11.2%	89404.5	6.0%
Poplar (<i>Populus diversifolia</i>)	40.7	0.4%	1814.3	0.1%
Poplar (<i>Populus laurifolia</i>)	25.5	0.2%	1509.3	0.1%
Willow (<i>Salix Sibirica</i>)	65.9	0.4%	529	
Ulmus (<i>Ulmus pumila</i>)	3.7	0.0%	37.7	
Shrub	607.6	2.9%		
Saxaul (<i>Haloxylon ammodendron</i>)	2253.8	16.0%	1400.1	0.1%
	13448.3	100.0%	1377731.3	100.0%

Source: Forests and Forestry in Mongolia, FAO 1997

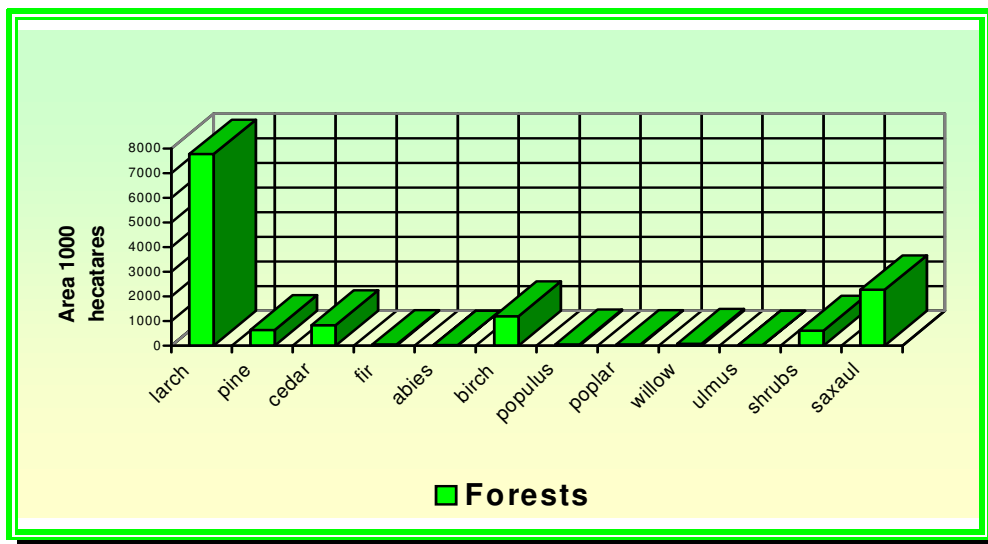


Figure 4 . Species composition of Mongolia's Forest

Source: Forest resource of Mongolia, Forest and water research Centre 2007

Brief History of Forest Inventories

Efforts toward a National Forest Inventory in Mongolia date back to 1958 when inventory work started with the support of Russian Forest Inventory Institutions. A number of regional level forest inventories have been conducted in the last few decades however, a comprehensive dataset at national level appears to be lacking. Further information and details, if available, are listed in table 4 below.

Utilization of black and white aerial photos (scales of 1:60.000, 1:45.000 and 1:32.000) for mapping forest areas started in 1963. Topographic maps of scale 1:100.000 were also used to determine forest compartments and sub-compartments and various features like valleys, watersheds, borders, roads and rivers.

The last nationwide forest inventory was started in 1974 with the help of the Russian Forest Planning Association and resulting in the "Central Scheme (Master Plan) of complex utilization of Forest Resources in Mongolia 1975-1990". Although inventory fieldwork in most cases has been performed after 1974, the average reference year for the area data is set at early 1970's. The inventory methods involved un-systematic sampling and field verification. Not all forest area has been covered and the original forest inventory maps at scale of 1:50,000 have not been updated systematically.

Additional forest inventories have been conducted in different years for different provinces (Aimags), in some cases with a specific focus on certain tree species, such as the studies on Saxaul forests which have been carried out since 1940.

Table 4. National forest inventories years and provinces composition of Mongolia's Forest

	Name of provinces	Forest inventory year	Total forest area (1000 hectares)
Forest			
1	Arkhangai	1995-1996	1165.4
2	Bayan-Ulgii	1986, 2001	43
3	Bulgan	1997-1999	1986.4
4	Bayankhongor	2006	24
5	Govi-Altai	2004	8.8
6	Dornod	2003	189
7	Tuv	1986,1989-1990	1505.1
8	Khentii	2004-2005	1784
9	Zavkhan	2006	778.4
10	Uvs	1990, 2000	185.5
11	Selenge	1993-1995	2225.6
12	Uvurkhangai	1998	203
13	Khuvsgul	2000-2003	4209.4
14	Ulaanbaatar (green zone)	1998	267
Total Forest area			14574.6
Saxaul			
1	Govi-Altai	1991	1925.7
2	Bayankhongor	2006	554.5
3	Khovd	1991	644.3
4	Dundgobi	1991	58.5
5	Dornogobi	1991	159.4
6	Umnugobi	1991	1173.9
7	Uvurkhangai	1998	75.7
Total saxaul area			4592
COMPLETE TOTAL			19166.6

Source: Forest resource of Mongolia, Forest and water research Centre 2007

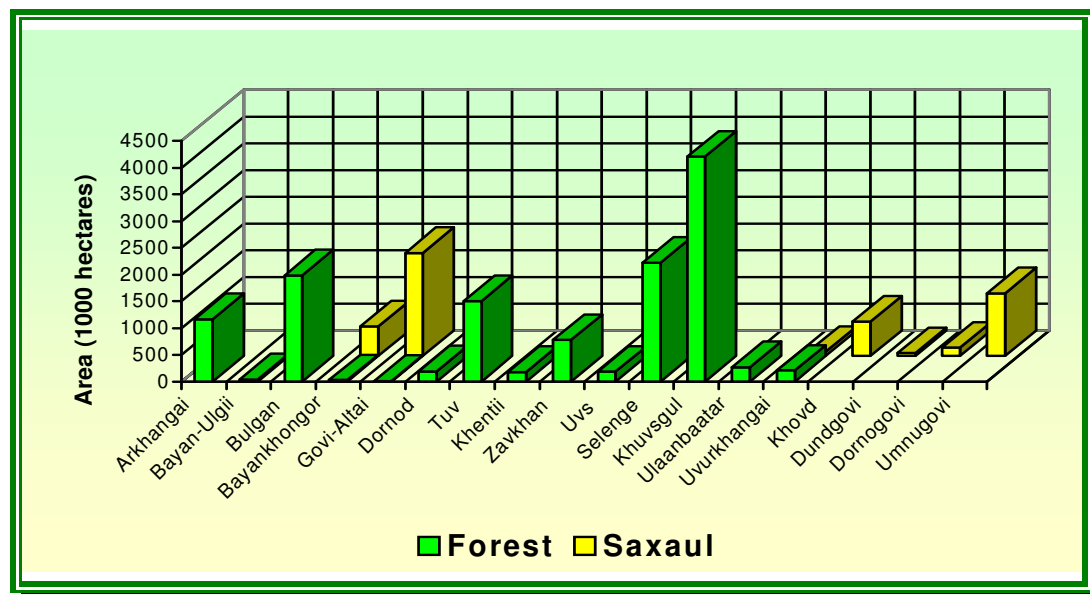


Figure 5. Provinces composition of Mongolia's Forest

In 1994, the Forest Survey Expedition of Mongolia, carried out by the Ministry of Nature and Environment (MNE), published the “Commonwealth Forest Review 1994”, providing official data on forest cover and forestry developments in the country.

Within the framework of the project, “Studies on Forest Reserves“, Japanese and Mongolian forest experts have carried out a remote sensing study using Landsat data covering 4,280,000 hectares of area in the Selenge aimag. The project was possible through a grant from the Japanese Government during 1994-1997 and data was gathered on forest distribution and land use.

Table 5. History of Assessments

Publication Year ¹	Title ²	Institution ³	Ground Inv. Year(s) ⁴	Remote Sensing		Estimation Level ⁷	Country Coverage (Full/Partial, %) ⁸	Thematic cover**
				Data Year(s) ⁵	Scale of Interpretation ⁶			
1963 – onwards	Forest Management Plan Individual Provinces		different years for each province 70s – 90s		b&w aerial photos: 1:60,000; 1:45:000, 1:32,000. to produce maps at 1:50,000	Regional	partial	NF, OWL, TV, WSP
1995	Nation-Wide Forest Inventory Data. Minister's Order No.42	Ministry of nature and Environment. Ulaanbaatar. Mongolia						NF, OWL, TV
1998	The Forest Management Study in Selenge Aimak, Mongolia – Final Report	Japan International Cooperation Agency (JICA) Forest Management Center (FMC) Ministry of Nature and the Environment, Mongolia	1994-97	1994	Landsat TM images used for mapping Selenge Prov. Aerial photos: 1:25,000 and SPOT images used.	Model area: 30,000 ha of Selenge prov. Intensive area: 1,600,000 of Selenge prov.	Partial	NF, PL, OWL, TV, CV, FF

****Legend:** **NF**=Natural Forest; **PL**=Plantations; **OWL**=Other Wooded land; **FAC**=Forest Area Change; **TV**=Total Volume; **TB**=Total Biomass; **CV**=Commercial Value; **PA**=Protected Areas; **BD**=Biodiversity; **FO**=Forest Ownership; **WSP**=Wood Supply Potential; **NWGS**=Non-wood Goods and services; **TOF**=Trees outside of forest; **FF**=Forest Fires

Legend:

[1] Publication Year	Year in which the assessment was published
[2] Title	Title of the assessment
[3] Institution	Institution(s) responsible for the Assessment
[4] Ground Inventory Year(s)	Year or Interval of years during which the field inventory has been carried out
[5] Remote Sensing Data Year(s)	Year(s) of the Remote Sensing Images
[6] Remote Sensing Scale of Interpretation	Scale of Remote Sensing Images (e.g. 1:250,000)
[7] Estimation Level	Whether the Assessment was at National, Sub-national, District, Management Unit, etc. level
[8] Country Coverage (Full / Partial, %)	Amount of country area covered by the assessment (e.g. full, partial). If partial, indicated by % of total area.

National Forest Inventory Design

Both Simple Random Sampling and Systematic sampling have been used since 1958 for NFIs which are carried out at intervals of 10 to 15 years with an approximate area of 800,000 – 1,000,000 ha inventoried each year. In reality, time intervals have stretched to more than 20 years in some cases resulting in temporally inhomogeneous data. No permanent sampling plots are maintained and within the sampling plots not all trees are enumerated however, the ones that are tallied are also geo-referenced.

Remote Sensing

In spite of an effort to compile information in the natural resources of Mongolia, mainly based on the joint Russian-Mongolian expeditions that took place up to the early 1980s, the application of remote sensing and GIS has been under-utilized.

Digital data are generally out of date and based on country wide mapping in the form of small scale maps. An exception to this are the remote sensing technologies applied since the late 1980s by the Information and Computer Centre (ICC) of the Ministry of Nature and Environment (MNE) in the fields of environmental monitoring and hazard risk assessments (e.g. forest fires, dust storms, snow coverage), which are based on medium resolution NOAA-AVHRR satellite data.

Since 1992 the National Remote Sensing Centre (NRSC) of Mongolia has initiated research activities related to Land cover mapping using AVHRR. In 1998 a Land Cover assessment and monitoring project was launched by NRSC and UNEP using NOAA-AVHRR 1 Km resolution satellite data for the years of 1985-86 and 1992-93.

Content and Methodology of data collection in NFI

Note: [N=National; SN=Sub-National; MU=Management Unit]

Geo-physical

	N	SN	MU	Methodology
Geo-Coordinates	X			No info available
Altitude	X			No info available
Topography	X			No info available
Orientation (or Aspect)	X			No info available
Slope	X			No info available
Soil	X			No info available
Geological structure	X			No info available
Rainfall	X			No info available

Bio-Physical

	N	SN	MU	Methodology
Number of trees	X			No info available
Diameter of trees	X			No info available
Height of trees	X			No info available
Length of stem				
Stump height				
Age class	X			No info available
Twigs				
Bark				
Leaves				

Forest extent

	N	SN	MU	Methodology
Forest land area	X			No info available
Area of forest canopy/crown cover				
Area under forest management	X			No info available
Area under formal forest management plan	X			No info available
Area under sustainable forest management	X			No info available
Forest area with certification	X			No info available
Area under public owned forest	X			No info available
Area under private owned forest	X			No info available

Forest characteristics (Naturalness) and forest type

	N	SN	MU	Methodology
Primary forest	X			No info available
Modified natural forest	X			No info available
Semi-natural forest	X			No info available
Productive plantation	X			No info available
Protective plantation	X			No info available
Coniferous	X			No info available
Broadleaved	X			No info available

Mixed forest	X			No info available
Forest area by dominant species (bamboo, mangroves, rubber)	X			No info available
Forest area by ecological zone (tropical, subtropical, temperate, boreal, polar)	X			No info available

Use (designated functions) of forests

	N	SN	MU	Methodology
Area of forest under production	X			No info available
Area of forest for protection of soil and water	X			No info available
Area of forest for conservation of biodiversity	X			No info available
Area of forest for social services	X			No info available
Area of forest for multiple purpose	X			No info available
Forest area available for wood supply	X			No info available
Forest area within protected areas	X			No info available

Social Services

	N	SN	MU	Methodology
Area of forest managed for recreation	X			No info available
Area of forest managed for tourism	X			No info available
Area of forest used for education	X			No info available
Area of forest managed for conservation of cultural/spiritual site	X			No info available

Mapping of forest distribution

	N	SN	MU	Methodology
Distribution of forests	X			No info available
Forest Characteristics				
Land use	X			No info available
Administrative/political/legal boundaries	X			No info available
Designated functions of forests	X			No info available
Other wooded land	X			No info available
Other land with tree cover	X			No info available
Other land	X			No info available

Status of the forest and disturbances affecting forest health and vitality

	N	SN	MU	Methodology
Disturbance by insects	X			No info available
Disturbance by diseases	X			No info available
Disturbance by other biotic agents	X			No info available
Disturbance by fire	X			No info available
Disturbance caused by other abiotic factors	X			No info available

Biodiversity

	N	SN	MU	Methodology
Tree species	X			No info available
Shrub species	X			No info available
Herbs species	X			No info available
Endangered species	X			No info available
Critically endangered species	X			No info available
Vulnerable species	X			No info available
Native species	X			No info available
Endemic species	X			No info available
Introduced species				

Beneficiaries of forest goods and services

	N	SN	MU	Methodology
By locality of user (e.g. indigenous/local/national)?	X			No info available
By good/service (e.g. timber, fuelwood, NWFP, bamboo/rattan, water, etc) used by them	X			No info available
By economic class of the beneficiaries (high, medium, low income)	X			No info available
By level of dependency on forest (as percentage of total employment)	X			No info available
By physical accessibility to the forest (distance from forest)	X			No info available

Economic value

	N	SN	MU	Methodology
Removal of timber	X			No info available
Removal of fuelwood	X			No info available
Removal of other wood products	X			No info available
Removal of wood products derived from forest under sustainable management	X			No info available
Removal of wood products derived from forest plantations	X			No info available
Removal of non wood forest products	X			No info available
Annual allowable cuts/yields	X			No info available
Social services	X			No info available
Environmental services	X			No info available
Employment	X			No info available
Support to livelihood of communities	X			No info available
Market price/cost of wood in forest	X			No info available
Market price/cost of non wood forest products	X			No info available
Estimate of value of social services	X			No info available
Estimate of value of environmental services				
Estimate of value of employment				
Estimate of the contribution of forest sector to national economy				

Policy, legal and institutions (PLI) framework

	N	SN	MU	Methodology
Forest policy	X			<i>No info available</i>
Forest legislation	X			<i>No info available</i>
Forest administration	X			<i>No info available</i>
Forest education and research	X			<i>No info available</i>
Annual outlay, expenditure, investment in forestry sector	X			<i>No info available</i>

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