



Forestry Department

Food and Agriculture Organization of the United Nations

BRIEF ON NATIONAL FOREST INVENTORY NFI

SOUTH KOREA

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.

Note for NFI- Brief on South Korea

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General Information

South Korea, officially known as the Republic of Korea (ROK), is an East Asian state on the southern half of the Korean Peninsula. To the north, it is bordered by North Korea (Democratic People's Republic of Korea), with which it was united until 1945. To the west, across the Yellow Sea, lies China and to the southeast, across the Korea Strait, lies Japan. Approximately one-half of South Korea's population lives in or near the capital Seoul, the country's largest city. Seoul is one of the most populous metropolitan areas in the world.

Map of the Country



Figure 1. Map of South Korea

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

Land Area and Landuse

The total area of South Korea is 9,946,000 hectares and table 1 presents the categorisation and land use in South Korea for 1990 and 2000 (FRA 2005).

Table 1: Land area and landuse

National Categories	Area (1,000 hectares)	
	1990	2000
Forests		
Stocked	6,302	6,268
Un-stocked	174	154
Sub-total	6,476	6,422
Other land	3,451	3,524
Total Area	9,927	9,946

(Source: FRA 2005)

Forests

The forest areas was predominated by Coniferous forests in 1990s but now the area is more or less equally divided between coniferous, deciduous forest and mixed species forest. The predominant coniferous species are Korean red pine (*Pinus densiflora*) Japanese Larch (*Larix leptolepis*), and Pitch pine (*Pinus rigida*). The oaks (*Quercus acutissima Carruth.*, *Quercus variabilis Bl.*, and *Quercus serrata Thunb*) are predominating broadleaved species. A high proportion of the South Korea's forests are large-scale reforestation.

Table 2: Area of forest of different types

National Classification	Area in ha.		
	1990	2000	2003
Natural Forest			
Conifers	3,078,827	2,711,421	1,508,386
Non-conifers	1,389,215	1,665,550	1,550,960
Mixed	1,809,717	1,885,247	1,876,150
Bamboo	7,997	6,087	6,099
Un-stocked	174,438	153,823	144,409
Un-surveyed	15,836	-	-
Sub-total	6,476,030	6,422,128	5,086,004
Plantation			
Conifers			1,211,339
Non-conifers			108,989
Sub-total			1,320,328
TOTAL	6,476,030	6,422,128	6,406,332

(Source: FRA 2005)

Brief History of Forest Inventories

The National Forest Inventory in Korea is carried out by the Division of Forest Resources Information, Korea Forest Research Institute under Korea Forest Service. The NFI has been conducting on a regular basis from 1972 approximately at 10-year intervals. Thereafter, the 2nd, 3rd, and 4th were done in the period 1978-80, 1986-92 and 1996-2005. In the past NFIs, the results of province-wise inventory data are reported to the KFS at the end of the year, and KFS compiles inventory data and publishes the Statistical Yearbook of Forestry annually. There are 16 sub-national-units (7 cities and 9 provinces) or SNU. The inventories have been made in different years for the various SNU's and have been updated yearly by subtraction of forest areas destroyed by fire, logging and transformation to other land uses.

The 5th NFI for the period 2006-2010 have seen a big change of the inventory system moving from periodic to annual inventory. The objective is to address international demands for forest resource information as well as to monitor and assess national forest resources and ecosystem.

Table 3: 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			
1975	The 1 st National Forest Inventory	Forest Research Institute	1972-74	1971-73	1:15,000(B/W aerial photograph)	National	Full	NF, PL, FAC, TV, PA, FO
1981	The 2 nd National Forest Inventory	Forest Research Institute	1978-80	1977-79	1:15,000(B/W aerial photograph)	National	Full	NF, PL, FAC, TV, PA, FO
1993	The 3 rd National Forest Inventory	Forest Research Institute	1986-92	1985 – 91	1:15,000(B/W aerial photograph)	National	Full	NF, PL, FAC, TV, PA, FO
2006	The 4 th National Forest Inventory	Forest Research Institute	1996-2005	1995 – 2004	1:15,000(B/W aerial photograph)	National	Full	NF, PL, FAC, TV, PA, FO

****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
[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.

Note : There are two major works in the National Forest Inventory. One is the field plot survey to estimate growing stock volume per ha, the other is forest type classification to estimate forest land area. In every NFI, new 750 forest type maps for whole country had been produced, interpreting B/W aerial photos(1:15,000)

National forest inventory design

The 5th NFI has undergone major change in the inventory system moving from periodic to annual system. Core changes can be summarized as follows: Inventory period is 5 years. About 4,000 permanent sample plots are systematically laid out all over the country. The sample plots are divided into five panels. One panel per year is measured for five consecutive years. Each panel will be re-measured every five years.

Remote Sensing

Panchromatic aerial photograph at a scale of 1:15,000 has been traditionally used in forest inventory for sampling design and field plot survey. In addition, aerial photos are interpreted in terms of forest types, major tree species, diameter classes, age classes and crown densities, finally to produce 750 forest type maps(1:25,000) for whole country. While ground sample plots provide detailed stand information such as volume, tree height, DBH, species composition and growth rate, forest type maps provide areas by major forest types. Both volume and forest area data are combined to calculate national forestry statistics. From the 5th NFI, digital orthophoto database has been established and used for both sampling design and forest type mapping. Aerial photographs are preferable for forest type classification rather than satellite images because of ability of stereoscopic interpretation.

Sampling Plot Design

The first phase of the sampling design is a stratification of potential sample points into forest and non-forest plots, superimposing a 4×4 km grid on digital orthophoto maps for all of Korea. Each grid point is examined to decide whether it is located on forests or not. In this way, about 4,000 permanent sample plots(PSP) have been systematically distributed all over the forests. At the second phase of the sampling, about 25% of the total PSPs are systematically subsampled to carry out vegetation and soil carbon survey in addition. The ground plot consists of a cluster of four circular subplots. The subplots 2, 3, and 4 are 50m away from the subplot 1 at azimuths of 360°, 120°, and 240°, respectively.(See Figure 2)

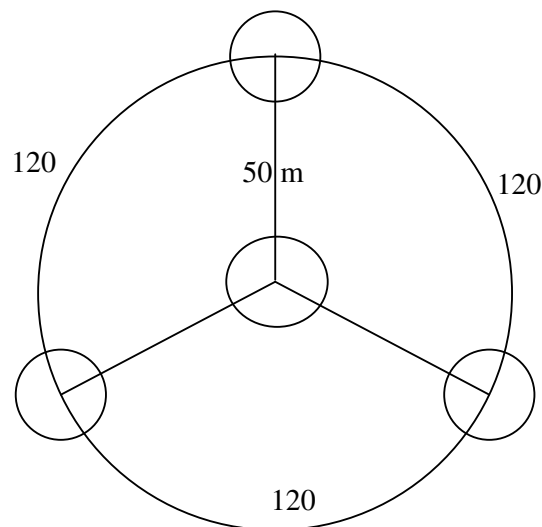


Figure 2: Ground plot design

Content and Methodology of Data collection in NFI

Geo-Physical

	N	SN	FMU	Methodology
Geo-Coordinates	X			Digital topographic map and survey
Altitude	X			Digital topographic map and survey
Topography	X			Survey and map
Orientation (or Aspect)	X			Digital topographic map and survey
Slope	X			Digital topographic map and survey
Soil	X			Records and soil sample analysis
Geological structure	X			Survey and map
Rainfall	X			Records

Bio-Physical

	N	SN	FMU	Methodology
Number of trees	X			Sampling survey
Diameter of trees	X			Sampling survey
Height of trees	X			Sampling survey
Length of stem	X			Sampling survey
Stump height	X			Sampling survey - only the number of stump and diameter
Age class (for plantation and/or natural Branches regeneration)	X			Sampling survey
Branches	X			Separate biomass research
Twigs	X			Separate biomass research
Bark	X			Sampling survey
Leaves	X			Separate biomass research

Forest extent

	N	SN	FMU	Methodology
Forest land area	X			Remote sensing (Aerial photo ,1:15,000)
Area of forest canopy/crown cover	X			Remote sensing (Aerial photo ,1:15,000)
Area under forest management	X			Map/records
Area under formal forest management plan	X			Map/records
Area under sustainable forest management				<i>Definition and category of SFM is not clear</i>
Forest area with certification	X			<i>records</i>
Area under public owned forest	X			Map/records
Area under private owned forest	X			Map/records

Forest characteristics (Naturalness) and forest type

	N	SN	FMU	Methodology
Primary forest	X			Survey and photo interpretation
Modified natural forest				<i>No national classification</i>
Semi-natural forest				<i>No national classification</i>
Productive plantation	X			Survey, map
Protective plantation	X			Survey, map
Coniferous	X			Aerial photo(scale=1/15,000)

			interpretation and field check
Broadleaved	X		Aerial photo(scale=1/15,000)
Mixed forest	X		Aerial photo(scale=1/15,000)
Forest area by dominant species (bamboo, mangroves, rubber)	X		Aerial photo(scale=1/15,000), only bamboo forest in Korea
Forest area by ecological zone (tropical, subtropical, temperate, boreal, polar)	X		Aerial photo(scale=1/15,000)

Use (designated functions) of forests

	N	SN	FMU	Methodology
Area of forest under production	X			Records (covered by land use classification)
Area of forest for protection of soil and water	X			Records (covered by land use classification)
Area of forest for conservation of biodiversity	X			Records (covered by land use classification)
Area of forest for social services	X			Records (covered by land use classification)
Area of forest for multiple purpose	X			Records (covered by land use classification)
Forest area available for wood supply	X			Records (covered by land use classification)
Forest area within protected areas	X			Records (covered by land use classification)

Note : Not covered by NFI, but by the and land use classification survey .

Social Services

	N	SN	FMU	Methodology
Area of forest managed for recreation	X			Records (covered by land use classification)
Area of forest managed for tourism	X			Records (covered by land use classification)
Area of forest used for education	X			Records (covered by land use classification)
Area of forest managed for conservation of cultural/spiritual site	X			Records (covered by land use classification)

Note : Not covered by NFI, but by the Statistical Yearbook of Forestry and land use classification survey.

Mapping of forest distribution

	N	SN	FMU	Methodology
Distribution of forests	X			Aerial photo(scale=1/15,000)
Forest Characteristics	X			Aerial photo(scale=1/15,000)
Land use	X			Aerial photo(scale=1/15,000)
Administrative/political/legal boundaries	X			Records
Designated functions of forests	X			Records
Other wooded land				No national classification for OWL

Other land with tree cover				No national classification for OWL
Other land	X			Aerial photo(scale=1/15,000)

Status of the forest and disturbances affecting forest health and vitality

	N	SN	FMU	Methodology
Disturbance by insects	X			Survey and records
Disturbance by diseases	X			Survey and records
Disturbance by other biotic agents	X			Survey and records
Disturbance by fire	X			Survey and records
Disturbance caused by other abiotic factors	X			Survey and records

Biodiversity

	N	SN	FMU	Methodology
Tree species	X			Survey
Shrub species	X			Survey
Herbs species	X			Survey
Endangered species	X			Survey and records
Critically endangered species	X			Survey and records
Vulnerable species	X			Survey and records
Native species	X			Survey and records
Endemic species	X			Survey and records
Introduced species	X			Survey and records

Beneficiaries of forest goods and services

	N	SN	FMU	Methodology
By locality of user (e.g. indigenous/local/national)?	X			No statistics, but possible to calculate using other data
By good/service (e.g. timber, fuelwood, NWFP, bamboo/rattan, water, etc) used by them	X			Records (data from the statistical yearbook of forestry)
By economic class of the beneficiaries (high, medium, low income)				
By level of dependency on forest (as percentage of total employment)	X			No statistics, but possible to calculate using other data
By physical accessibility to the forest (distance from forest)	X			No statistics, but possible to calculate using other data

Note : Not covered by NFI, but by the Statistical Yearbook of Forestry.

Economic value

	N	SN	FMU	Methodology
Removal of timber	X			Records(data from the the statistical yearbook of forestry)
Removal of fuelwood	X			Records(data from the the statistical yearbook of forestry)

Removal of other wood products	X	Records(data from the the statistical yearbook of forestry)
Removal of wood products derived from forest under sustainable management		
Removal of wood products derived from forest plantations		
Removal of non wood forest products	X	Records(data from the the statistical yearbook of forestry)
Annual allowable cuts/yields		
Social services	X	Records(data from the the statistical yearbook of forestry)
Environmental services	X	Records(data from the the statistical yearbook of forestry)
Employment	X	Records(data from the the statistical yearbook of forestry)
Support to livelihood of communities		
Market price/cost of wood in forest	X	Records(data from the the statistical yearbook of forestry)
Market price/cost of non wood forest products	X	Records(data from the the statistical yearbook of forestry)
Estimate of value of social services	X	Records(data from the the statistical yearbook of forestry)
Estimate of value of environmental services	X	Records(data from the the statistical yearbook of forestry)
Estimate of value of employment	X	Records(data from the the statistical yearbook of forestry)
Estimate of the contribution of forest sector to national economy	X	Records(data from the the statistical yearbook of forestry)

Note : Not covered by NFI, but by the Statistical Yearbook of Forestry.

Policy, legal and institutions (PLI) framework

	N	SN	FMU	Methodology
Forest policy	X			Records and maps
Forest legislation	X			Records and maps
Forest administration	X			Records and maps
Forest education and research	X			Records and maps
Annual outlay, expenditure, investment in forestry sector	X			Records and maps

Note : Not covered by NFI, but by the Statistical Yearbook of Forestry.

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