

Chapter 16

Hungary

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16.1 Development of the Hungarian National Forest Inventory

The National Forest Inventory (NFI) has a long tradition in Hungary. The first order, to survey and map Hungary's forests, was decreed by Mária Terézia and came into force in 1769. The first forest act was issued in 1879. Treatment of the majority of forests had to be based on forest management plans. Sustainability was ensured based on existing age classes as it was ordered in 1920.

In 1935 the forest act meant that forest owners had to manage their forest using forest management plans. Development of forest management plans has been supported by computerised data processing since 1970. Forest management plans are prepared for districts and have been called District Forest Plans (DFP) since 1996.

16.1.1 District Forest Planning

Forest inventory and forest management planning are accomplished at the same time based upon stand-level surveys including site surveys and mapping. Considering that DFPs are made for a 10-year period, 10% of the total forest area is inventoried each year which amounts to approximately 180,000 ha per year. The inventory system principally is a full census. Sampling, aimed at volume, soil, species, sizes, etc. using very conventional methods, is always carried out at the sub-compartment level. There are more than 170 forest management planning districts and the size of districts ranges from approximately 3,000 to 24,000 ha.

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16.2 The Use and Users of the Results

16.2.1 General Use

About 25% of the arable soil of the country is used for forest management. The national economic importance of the sector is unquestionable, because forests are present in both the natural and man-made environment. Even though the sector has a moderate (0.3%) contribution to Gross Domestic Product, the size of the area, the large number of owners, managers and employees, the variety of natural conditions and the multiple, constantly renewed expectations of society regarding forests require a professionally founded administration system.

The information collected by the NFI is principally used to prepare DFPs and is stored in the National Forest Database. This database is used for reporting national and international annual statistics on Hungarian forests and serves as the essential basis for national forest policy. International obligations such as reporting to the Forest Resources Assessment of Food and Agriculture Organization of the United Nations (FAO 2006), to the Ministerial Conference on the Protection of Forests in Europe (MCPFE 2007) and to the United Nations Framework Convention on Climate Change (UNFCCC) concerning the Land Use, Land-Use Change and Forestry (LULUCF) (IPCC 2003), are also based on this information. In addition, all forest related stakeholders (Fig. 16.1) are interested in and provide information on Hungary’s forests.

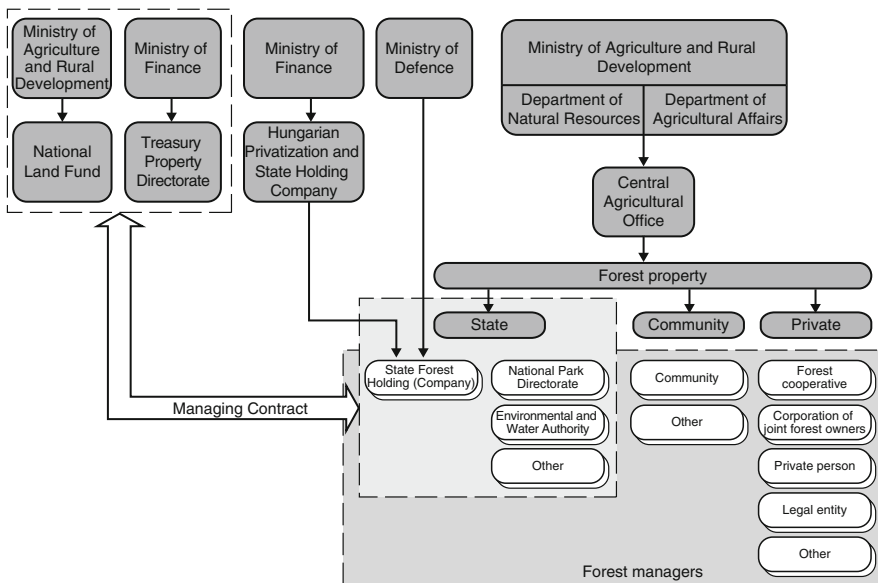


Fig. 16.1 Flow chart of forest stakeholders

The information used by forest authorities and other forest related authorities, (e.g. environmental authority, water management authority, etc.), political decision makers or potential investors are expected at both the sub-compartment level and also in more aggregated forms. The Hungarian NFI and the related database are the basis for supervision of all forest operations and contribute to the implementation and control of national and European Union subsidy systems.

16.2.2 The Use of NFI Data in UNFCCC Including Kyoto Reporting

The NFI supplies data for Kyoto Protocol reporting. Growing stock information is calculated for the forest management (FM), as well as afforestation, reforestation and deforestation (ARD) categories. The digital geographic information stored in the database is used to identify ARD areas.

16.2.3 The Role of the NFI in Assessing the Status of Biodiversity

Within the traditional NFI, tree species composition is assessed at the sub-compartment level. Additional descriptive data referring to the shrub and ground vegetation layers are also available in the NFI database.

The organization responsible for biodiversity monitoring in Hungary is the Ministry of Environmental Protection and Water. A special monitoring system was developed with more than 100 permanent 1-km² sample areas representing all the different habitats within Hungary, including forests. Recently, the two responsible ministries – Ministry of Environmental Protection and Water and Agriculture and Rural Development strengthen their cooperation to increase efficiency and improve the methods of biodiversity monitoring. A new approach is in development to use common sampling plots for forest inventory, forest condition monitoring and biodiversity monitoring. In the frame of this cooperation the National Forest Database will contain information on naturalness of sub-compartments in the near future.

In response to the European Union's new Life+ (the new Financial Instrument for the Environment in the EU) call for proposals, an international project proposal has been submitted aiming at the elaboration of methodologies and implementation of new methods for the assessment of forest biodiversity.

16.3 Current Estimates

Unlike most European countries, Hungary's NFI is based on stand-level inventories. Basic forest resources estimates are given in Table 16.1.

Table 16.1 Basic area and volume estimates with the definitions used in the Hungarian NFI

Quantity	Description	Estimate
Forest land (1,000 ha)	- With defined tree species - Minimum block size 0.5 ha	1,869.3
Other forest related land (1,000 ha)	- Crown cover min. 50% (30% if protection function) - Areas directly supporting forest management (e.g. glade, nursery, lane, etc.)	129.1
Primary forest function (1,000 ha)		
- Productive forests	- Primary aim is the tree production	1,188.9
- Protective forests	- Protective and protected forests	656.1
- Health-care, social and tourist forests	- Primary function is health-care, public welfare and tourism	18.7
- Educational and research forests	- Primary function is education and research including game park too	5.6
Tree mixture ratio	Trees with canopy cover greater than 5% of the area of sub-compartment were assessed during the field survey	
Growing stock (million cubic metre)	Growing stock of sub-compartments are assessed by sampling tree height and <i>dbh</i> for direct calculation or assessing crown cover and mixture rate for yield table calculation	341.4
Gross annual increment (million cubic metre per year)	Calculation uses yield tables based on assessed variables	13.7

16.4 Sampling Design

With Hungary's stand-level inventory system, each stand/sub-compartment is inventoried. In mature stands the sampling is mostly carried out using a strip sampling within the sub-compartment. The sampling method, and the reliability expected, is determined by the age and quality of the stands. In immature stands, the growing stock is estimated using yield tables; therefore a much less dense sampling density is required in these sub-compartments which range in size from 0.1 to 50 ha. This means that although the inventory covers the whole country, no systematic sampling is used. However, the sampling can be considered as a random from an inventory perspective, because the areas to be inventoried are determined by the management plans that have expired. Each year, approximately 180,000 ha are inventoried.

Aerial photos at scales of 1:10,000–1:30,000 have been used for multiple purposes: mapping, delineation of the borders of forested areas and sub-compartments, estimation of forest area, estimation of forest land use change, and supporting daily working plans. The number of photos is approximately 8,000–10,000 at the scale of 1:10,000. The last 2 years orthophotos have been available to support this work.

16.4.1 Sample Plots

Because of the stand-level inventory approach used by the NFI, data collection is carried out at a number of levels. The variables in the following subsections are discussed in the same order as they are found in the inventory records. There are four groups of variables the first group describes the sub-compartment as a land property, the second group describes the site, the third one describes the stand, while the last group of variables defines the management activities (CAO 2007a) which are suggested to be performed within the next 10 years. All data listed below are collected at sub-compartment level. Sub-compartment is the smallest economic/land unit in the forest.

16.4.1.1 Sub-compartment Data

The following variables are recorded at sub-compartment level.

- Owner
- Municipality
- Sub-compartment ID
- Cadastral ID
- Responsible forest administration
- Actual forest area
- Primary forest function
- Restrictions (if any)
- Goal of wood production
- Game feeding potential
- Size of forest block
- Date of last management action

16.4.1.2 Site Data

Site data reveal habitat at sub-compartment level.

- Topography: elevation, exposition, slope declination
- Climate
- Hydrology
- Genetic soil type, soil texture and depth of fertile layer
- Potential/optimal stand type with its estimated mean increment
- Canopy class
- Shrub cover

16.4.1.3 Stand Data

All tree in the sub-compartment are grouped by tree species for stand data.

- Storey
- Tree-species, age, origin
- Species composition (by area), type of mixing
- Diameter at breast height *dbh*
- Height
- Stem quality
- Volume
- Basal area
- Current increment
- Method of volume measurement
- Dominant damage type, intensity

16.4.1.4 Management Data by Tree-Species

Management data by tree-species are used to describe wood utilization at sub-compartment level.

- Rotation age
- Drain/removal
- Intensity (m³/ha to be harvested)
- Type of felling (cleaning, thinning, selective cutting, etc.)
- Reforestation
- Reforestation method
- Tree-species composition

16.4.2 Management

16.4.2.1 Personnel and Equipment

The Forestry Directorate of the Central Agriculture Office (CAO), the former State Forest Service, is responsible for carrying out the Hungarian NFI and DFP preparation. The cycle of the NFI is 10 years.

Inside the CAO there are ten regional forestry directorates and a headquarter responsible for forestry administration duties. About 110 persons are involved in the NFI and management planning, although they also work on other forestry related tasks (e.g. forest health monitoring, growth monitoring, mapping, etc.).

The field survey is supported with equipment such as global positioning system (GPS) receivers, rangefinders, and Bitterlich relascopes. Due to ongoing

development subsidized by the EU more advanced technology will be introduced in the near future (CAO 2007b).

16.4.2.2 Quality Assurance

Quality assurance methodologies used by the Hungarian NFI include field manuals, training and control of field crews, spot-checks and tests, statistical checks of attribute qualities, and evaluation of changes on Hungarian NFI.

16.5 Estimation Techniques

16.5.1 Area Estimation

Forest area is defined by using aerial photos to delineate the border lines of sub-compartment boundaries. If there is a need for additional geodetic information, field surveys are undertaken.

16.5.2 Volume Estimation

Stand volume is calculated directly by evaluating the sampling data from the field survey using models and the parameters needed for yield table modelling.

16.6 Increment Estimation

Increment is always calculated at the sub-compartment level for the given tree species using yield tables.

16.7 Options for Harmonized Reporting

Reference definitions developed during the COST Action E43 project ensure a common basis for more exact, harmonized, understanding of forest inventory related definitions across Europe. Because Hungary has a very detailed data set, (not aggregated), establishing “bridge-building” processes from national levels estimates towards estimates based on reference definitions can be fulfilled in most cases.

16.8 Current and Future Prospects

To comply with the harmonization recommendations of COST Action E43, Hungary will initiate developmental work aiming at establishing a forest inventory based upon a statistical sampling design. Development of an appropriate methodology and initiation of a pilot project for a statistical forest inventory is a high priority task for the next two years. Experience with the existing growth monitoring system and the knowledge obtained from cooperation within the COST Action E43 project provide a good framework for preparing such a complex method within a short time frame.

References

- CAO, Forestry Directorate (2007a) Manual for Forest Inventory and Forest Management Planning. Budapest (in Hungarian). The original publication: MgSzH Erdészeti Igazgatóság (2007a) Erdőrendezési Útmutató, Budapest
- CAO, Forestry Directorate (2007b) Manual for Growth Monitoring. Budapest (in Hungarian). The original publication: MgSzH Erdészeti Igazgatóság (2007b) Útmutató a Faállományok Növedékének Megfigyeléséhez (FNM), Budapest
- FAO (2006) Global Forest Resources Assessment. FAO Forestry Paper 147, FAO, Rome, 320 p
- IPCC (2003). Good practice guidance for land use, land-use change and forestry. In: Penman J, Gytarsky M, Hiraishi T, Krug T, Kruger D, Pipatti R, Buendia L, Miwa K, Ngara T, Tanabe K, Wagner F (eds) The Intergovernmental Panel on Climate Change (IPCC), Institute for Global Environmental Strategies (IGES) 2108–11, Kamiyamaguchi Hayama, Kanagawa, 570 p
- Ministerial Conferences on the Protection of Forests in Europe (MCPFE) (2007) State of Europe's Forests 2007: The MCPFE Report on Sustainable Forest Management in Europe. http://www.mcpfe.org/files/u1/publications/pdf/state_of_europes_forests_2007.pdf. October 30, 2009