Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia - Forest Directorate, Belgrade

# THE NATIONAL FOREST INVENTORY OF THE REPUBLIC OF SERBIA

## The growing stock of the Republic of Serbia

Belgrade, 2009

**THE NATIONAL FOREST INVENTORY OF THE REPUBLIC OF SERBIA**
**The growing stock of the Republic of Serbia**


Publisher: Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia - Forest Directorate, Belgrade

For the Publisher: Dr. Saša Orlović

Reviewers: Dr. Stein Tomter, Aleksandar Vasiljević, B.Sc.

Technical Editor: Nenad Ranković

Print and cover: „Planeta print" d.o.o., Belgrade

Circulation: 500

CIP Cataloguing-in publication
The National Library of Serbia, Belgrade

**630*524.6 (497.11)**

The NATIONAL Forest Inventory of the Republic of Serbia : the growing stock of the Republic of Serbia. - Belgrade : Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia, Forest Directorate. 2009 (Beograd : Planeta print). - 238 str. : ilustr. ; 29 cm

Monograph workout Staniša Banković, Milan Medarević, Damjan Pantić, Nenad Petrović --> Preface. - Tiraž 500. - Bibliografija : str. 87-89

**ISBN 978-86-83285-21-1**

1. Banković, Staniša [autor], 1945-
a) Šume - Inventarisanje - Srbija

**COBISS.SR-ID 156384780**

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# PREFACE

Till 2004, stand inventories were the only inventories conducted in Serbia. The information on the growing stock obtained by stand inventories was used directly in the drawing up of forest management plans and private forest management programmes, and after their "reduction" and sublimation, they were used for the elaboration of Regional forest development plans, for macro-economic plans, cooperation with international bodies, etc. The problems resulting from the reduction of the stand inventory quantitative data, caused also by a great variability of current volume increment and often unreliable forest management records, made this information unreliable from the aspect of real multi-functional planning at the "higher level", particularly at the level of the entire country. In the past period in Serbia, the information on the growing stock was obtained also by other procedures, even less acceptable, wherefore the basic data on forest state at the country level in the professional and scientific literature was inconsistent.

A reliable data base for higher-level forest area planning was supplied by the National Forest Inventory (of the large area). In 2003, thanks to the donation of the Kingdom of Norway, the Norwegian Forestry Group (NFG) and the Faculty of Forestry, University of Belgrade, started a pilot project "The National Forest Inventory of the Republic of Serbia". After the methodological definition, definition of the scope of information and the training of the field crews, the inventories were conducted in Borski, Zaječarski, Mačvanski and Kolubarski Districts in 2004. Further financing of the National Forest Inventory was taken over by the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia, and the inventory was successfully finished for the whole territory of the Republic (except Kosovo and Metohija) by the end of 2006. The data base on forests in Serbia enables a more reliable macro-economic planning, the elaboration of the National Forest Programmes, the cooperation with international organisations (UN FAO Food and Agriculture Organization, UNECE Economic Commission for Europe, TBFRA Temperate & Boreal Forest Resource Assessment 2000, MCPFE Ministerial Conference on the Protection of Forests in Europe, etc.), i.e. exploitation by numerous users. After an in-depth analysis of the applied methodology and its potential correction, and offers the legal, institutional and organisational definition and implementation, the future National Forest Inventories will enable also a permanent monitoring of the growing stock at the country level. Its control function, i.e. from the planning aspect, its corrective function in the forest inventory, will be fully expressed.

Taking into account the fact that it is the first National Forest Inventory in Serbia and its significance, we shall present the names of the professionals of different profiles who participated in its realisation with different assignments.

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Belgrade, 2009

# 1. INTRODUCTION

The evolution of the idea of forest role and significance for human society, from production solely to multi-functional, with an ever-increasing conflict between the demands (pressures) and forest capacities, lead to a progressively greater demand for information on this natural resource, both in quantitative, and in qualitative senses, at all levels of planning and decision-making, from the local to the global. In this sense, Šmelko Š. (1991) reports: "*In addition to the data which characterise wood production (diameters, age structure, tree species, timber supply, increment and the expected felling volume), our attention has been increasingly directed to forest quality characteristics and forest health, as well as to the inter-relationship of forest functions and ecological characteristics. Taking this into account, the permanent monitoring of the trends of forest state and development is increasingly significant*".

The above trend is followed by the permanent development of forest inventory, as the scientific discipline which provides the base for forestry production, rational and sustainable use of all forest potentials, for planned, control, prognostic and management activities in this and in other branches of economy. The development proceeded in three directions: methodological (implementation of the principles of mathematical statistics, particularly sampling methods), technological (development of instruments used in forest measurement, application of computer technologies, aerial and satellite images) and in the direction of increasing the spectre of information acquired by the inventory. Thanks to its dynamic, multilateral development and flexibility, today forest inventory can meet the demands by numerous users of information on forest ecosystems. The union of the national organisations dealing with forest inventory (primarily large area inventory) in different regional and global associations is also one of the characteristics of its development in the past period. The activities of such associations are reflected in the exchange of experiences, standardisation of information and definition of criteria for their acquisition, processing, and presentation within the National Forest Inventories, in the aim of creating the data base for forest ecosystem monitoring by different ecological and economic indicators at the regional and global levels. In this sense, the political and professional actions were defined.

Stand inventories were conducted in Serbia for many years as an exclusive form of data collection on the growing stock. By the introduction of the new forms of sample plots in partial measurement and by its establishment on mathematical-statistical base, by the typification of stand conditions (degree of homogeneity) in which a method gives the best results, definition of the scope of information, the development of information subsystem for forest management planning stand inventory was enhanced and modernised, in the eighties of the last century. The resultant of this methodology, which was fully affirmed in Serbian forestry soon after its definition, is reflected in the creation of a more reliable and more complex data base for the elaboration of forest management plans and private forest management programmes.

In the absence of the regional and national inventories, stand inventory data were used also for the elaboration of general forest management plans, macro-economic plans, cooperation with international associations, etc. However, stand inventory should meet the following conditions necessary for a reliable base for higher-level planning:

- application of unique methodology,
- collection of data necessary also for planning at higher levels,
- inventory of all management units of the forest area of the entire country, per year,
- reliability of felling records,
- availability of information in computer compatible format, etc.

As it has been mentioned, the unique methodology of stand inventory, computer data processing and the creation of a uniform data base, has been applied for a long time in the Republic of Serbia. However, due to organisation and financial problems and inconsistent enforcement of the Law regarding forest

management records, the other necessary conditions were not satisfied, so in the past period it was necessary to "reduce" the quantitative stand inventory data to the year of the "higher level" planning. The problems which resulted from the great variability of current volume increment and often unreliable felling records (two key elements in the procedure of data reduction) made the information unreliable from the aspect of real multi-functional planning, particularly the planning at the country level.

So, in the past thirty years or so, forestry in Serbia was characterised by the application of methodologically and technologically modern stand inventory harmonised with the European standards, capable of producing the reliable information for the elaboration of forest management plans and private forest management programmes, but by the absence of regional and National Inventory. For this reason, the state of the growing stock at the level of forest areas and at the country level was assessed by the methodologically questionable procedures, with the direct negative implications to the reliability of plan documents based on such information.

The first National Forest Inventory in the Republic of Serbia (without Kosovo and Metohija) started in 2004 after the methodological definition, definition of the scope of information (mostly compatible with the standards of international associations), and the training of field crews. It was completed in 2006. By forming the data base on forests at the country level and by its periodical updating, it is possible to overcome the previous problems related to higher-level planning, i.e. to elaborate more real and reliable macro-economic plans and the National Forest Programmes. Also, this improved the cooperation with international organisations dealing with forest ecosystem monitoring at the regional and global levels, as well as the data base searching by numerous users - apart from different ministries, in agreement with the law on free access to the information of public significance (Official Gazette RS 12/04), such as commercial sectors, non-governmental organisations, professional societies, individuals, etc.

# 2.
# METHODOLOGY OF THE NATIONAL FOREST INVENTORY OF THE REPUBLIC OF SERBIA

## 2.1. Sampling design

The definition of the National Forest Inventory methodology in the Republic of Serbia is based on the experience of the European countries with multiannual tradition of national inventories (first of all Norway), the guidelines and criteria of international organisations dealing with forest ecosystem monitoring at the regional and global levels (UNFAO, UNECE, TBFRA, MCPFE, etc.), taking into account the ecological and historically conditioned specificities of Serbian forests.

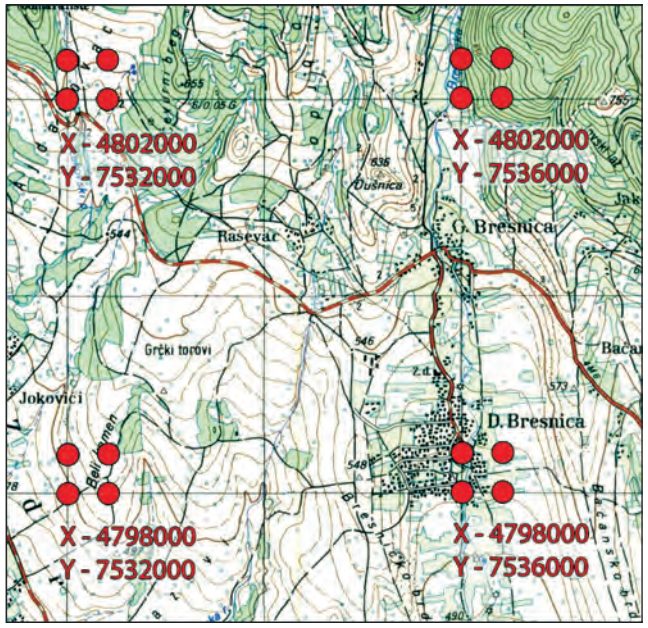



**Figure 1**

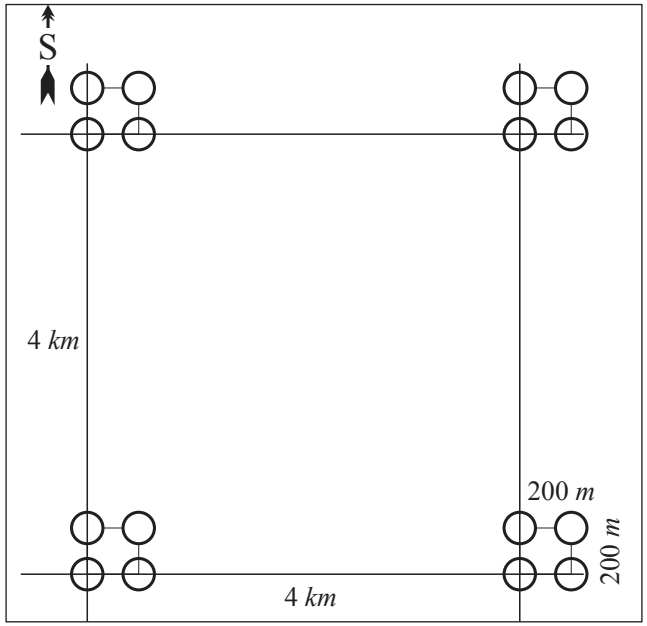



**Figure 2**

This concept includes the application of the systematic sample in the form of clusters, distributed in the 4×4 *km* network (grid) (distance between cluster centres, i.e. reference points is 4 *km* (Figure 1, Figure 2). The term cluster means a set of sample plots which are surveyed in order to assess the state of the growing stock and to evaluate the tendencies of its development. Each cluster consists of 4 sample plots, the centre of the first one being in the reference point (intersection point of the cluster network), and the other three sample plots are distributed in the vertexes of the square the side of which is 200 metres (Figure 3). The sides of the clusters and squares with sample plots are oriented in north-south and east-west directions.

The plot area consists of three concentric circles, the radius of the first circle is 3 (three) metres, the second - 10 (ten) metres, and the third - 15 (fifteen) metres (Figure 4). The following diameter measurements are conducted in the concentric circles:

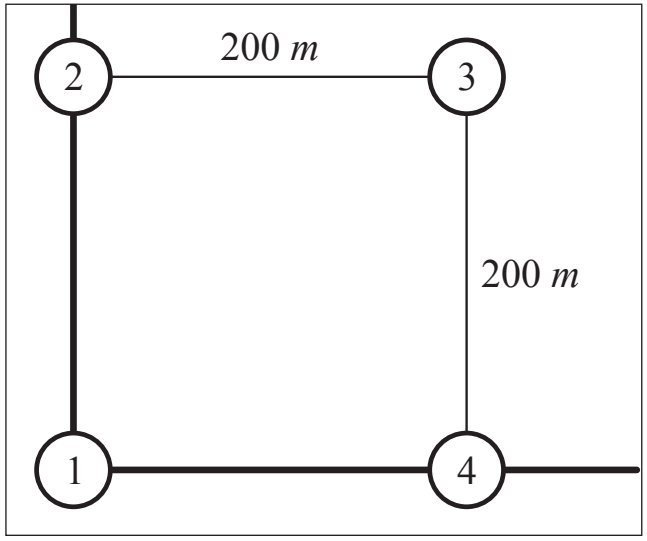



**Figure 3**

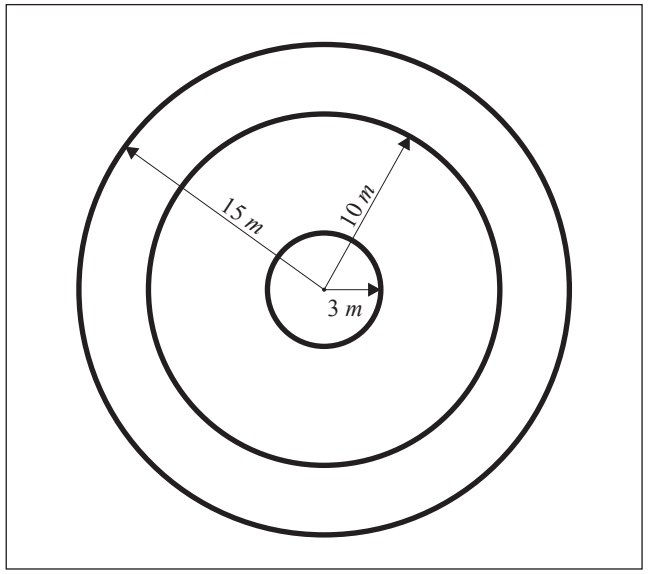



**Figure 4**

– in the first concentric circle, counting of all trees of diameter below 5 *cm*;
– in the second concentric circle, diameter measurement of all trees above 10 *cm*;
– in the third concentric circle, diameter measurement of all trees above 30 *cm*.

The data on the general identification of clusters and sample plots, site description and stand description, are collected in each plot. In addition to counting the saplings and diameter measurement (by the mentioned principle), the measured data also include tree height, tree health, crown class, technical quality, agents and degrees of damage, as well as the degree of dead wood usability. Also, the position of each tree is determined, i.e. the distance and azimuth to the plot centre, on the first plot within one cluster, which gives it the permanent character.

Regarding the cluster forms and distances, the sample plot number, distribution, form and size, the sampling design applied in the National Forest Inventory of the Republic of Serbia is mostly consistent with the concepts which are applied in most European countries (clusters are mostly in square form), with the distance between the centres 4-16 *km*, and depending on their size, 4-8 sample plots are established at the distance of 150-600 *m*, mostly circular in form (more rarely WZP Austria, Germany and partially Finland), area 250-500 $m^2$, so that individually they represent the area of 200-1,000 *ha*.

Because of the absence of experience in large-scale inventories, more detailed research should be undertaken in future regarding the optimal distance between cluster centres in the districts with different forest cover percentages, the most favourable sample plot forms and sizes and, in this sense, a possible correction of the methodology applied in the first National Forest Inventory of the Republic of Serbia.

## 2.2. Map preparation and the design of cluster and sample plot network

The cluster and sample plot network was designed on four-colour topographic maps, scale 1:25,000. Some maps were already in digital form, and the other maps were first scanned in tif format, resolution of 300 *dpi*, and then georeferenced (vectored) by software package Wingis 2003. The prepared maps were upgraded with administrative boundaries of districts (Figure 5) and political municipalities, and the boundaries of state forests by forest areas. The cluster network (grid) was also drawn by the above software

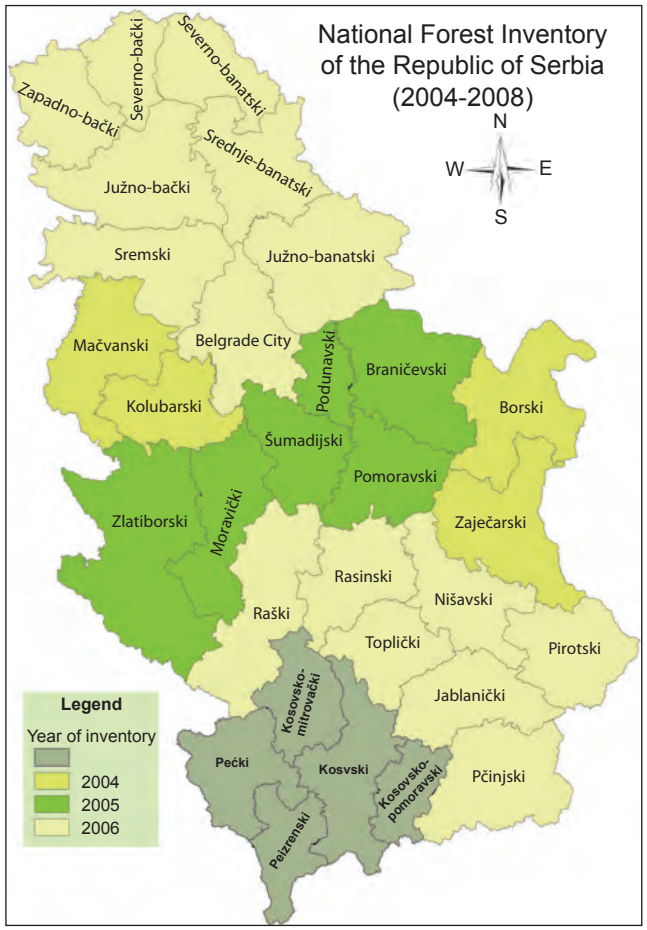



**Figure 5**

**Table 1.** Number of sample plots per districts

| District | № of plots |
|---|---|
| Borski | 880 |
| Zaječarski | 925 |
| Mačvanski | 817 |
| Kolubarski | 627 |
| Zlatiborski | 1,519 |
| Moravički | 770 |
| Šumadijski | 590 |
| Podunavski | 304 |
| Pomoravski | 641 |
| Braničevski | 976 |
| Pčinjski | 879 |
| Jablanički | 690 |
| Pirotski | 687 |
| Toplički | 542 |
| Nišavski | 605 |
| Rasinski | 747 |
| Raški | 974 |
| Belgrade City | 807 |
| Sremski | 860 |
| Južno-Bački | 978 |
| Zapadno-Bački | 627 |
| Severno-Bački | 451 |
| Severno-Banatski | 572 |
| Srednje-Banatski | 835 |
| Južno-Banatski | 1,068 |
| **Republic of Serbia** | **19,371** |

and the starting reference point (centre of the first cluster) were the coordinates of ICPF (network for the assessment of defoliation and desertification at the national level). The clusters were numbered (each reference point) and their coordinates were entered. Also, the numbers and coordinates of reference points were entered in GPS receiver, which made their identification in the field easier. By the described procedure, the territory of Serbia (without Kosovo and Metohija) was covered with 19,371 sample plots (Table 1).

The positive experience of satellite imagery in Vojvodina, the acquisition of preliminary and additional data on clusters, i.e. in the reduction of fieldwork (Figure 6), points to its wider use in the future National Forest Inventories on the entire territory of the Republic of Serbia. It is necessary to take into account the experience of European countries regarding the type and degree of reliability of some data acquired in this way in different site and stand conditions.

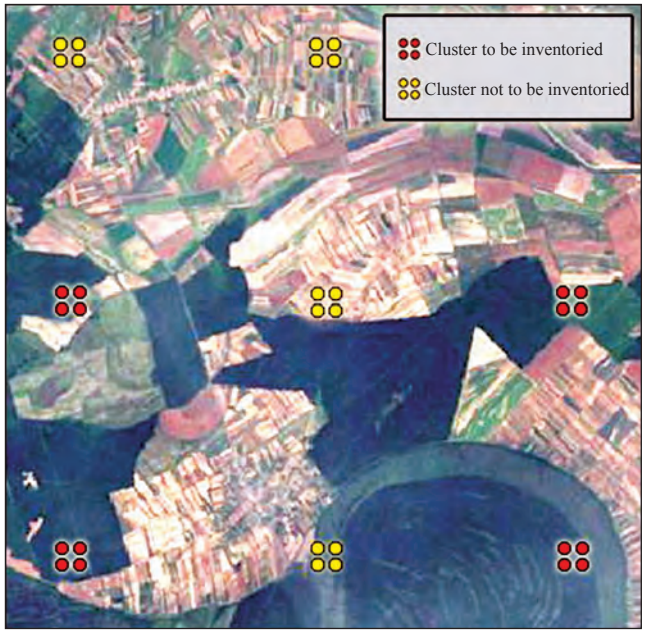



**Figure 6**

# 3.
# TYPE AND STRUCTURE OF INFORMATION

The standards and criteria of the international associations (UNFAO, UNECE, TBFRA, MCPFE, etc.), the specificities of forest ecosystems in Serbia, and the level of planning and decision-making that will be based on the collected data, were the starting points in the definition of information to be collected by the National Forest Inventory of the Republic of Serbia. The qualitative and quantitative data is structured as follows:

A. GENERAL IDENTIFICATION OF CLUSTERS AND SAMPLE PLOTS,
B. SITE DESCRIPTION,
C. STAND DESCRIPTION,
D. INFORMATION ON TREES, SAMPLE PLOT CRUISING.

**Group A** determines the position and inventory status of each cluster and sample plot, and includes the following information: cluster identification number, sample plot identification number, inventory status and sample plot status, district, and political municipality.

**Group B** determines land use, land ownership, conditions of the development of forest vegetation, including also some risk factors, as well as the following data: soil type, altitude, slope, aspect, land ownership, water and wind erosion, dead cover, and humification process.

**Group C** provides a comprehensive and real assessment of forest stand, preliminary definition of management goals and measures for their realisation, and includes the following data: tree species and age, age class identification number, stand categories, origin, stand structure, development stage, preservation status, mixture and canopy, main characteristics of the young crop, naturalness, and potential silvicultural treatment.

**Group D** provides the data on individual trees on sample plots, such as: diameter at breast height, height, distance and azimuth from plot centre, health, usability of dead trees, crown class, technical class, cause and degree of damage. Based on these data, the values of the basic cruising elements (number of trees, basal area, volume and volume increment) are obtained both per unit area (1 ha) and at the level of political municipalities, districts, and the Republic, and the stand health, quality and assortment structure can be evaluated. Based on the principles of permanent inventory, it is possible to observe the development trends of individual trees, stands and larger forest complexes.

All the information with the codes, definitions and the procedures can be found in the Technical Guidelines and the Code Manual for the National Forest Inventory of the Republic of Serbia. During the initial stage of the inventory, the data were filled in Field forms (Table 2), and during 2005 and 2006, they were entered in PDA computer (Figure 15/a,b, p 20), and then automatically transferred to PC computer for logical control and further processing.

**Table 2.** Field form for the National Forest Inventory of the Republic of Serbia

# THE NATIONAL FOREST INVENTORY OF THE REPUBLIC OF SERBIA

## FIELD FORM

| | |
|---|---|
| **A.** | GENERAL IDENTIFICATION OF THE CLUSTER AND THE SAMPLE PLOTS |
| **B.** | SITE DESCRIPTION |
| **C.** | STAND DESCRIPTION |
| **D.** | SAMPLE PLOT CRUISING |

| Field crew | |
|---|---|
| 1 | |
| 2 | |

| Date of the National Forest Inventory | | |
|---|---|---|
| Day | Month | Year |
| | | |

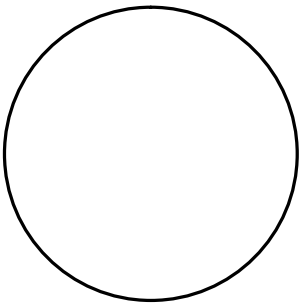
| **A.** | Cluster identification number | |
|---|---|---|

| Sample plot identification number | |
|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***x*** | | | | | | | |
| ***y*** | | | | | | | |

| Map Number | | | | | |
|---|---|---|---|---|---|

| Moving of the stake from the circle centre |
|---|



| $A$ [°] | |
|---|---|
| $l$ [*cm*] | |

| Ensuring the cluster centre (centre of permanent sample plot) | | | | | |
|---|---|---|---|---|---|
| Landmark 1 | | Landmark 2 | | Landmark 3 | |
| $A_1$ | $l_1$ | $A_2$ | $l_2$ | $A_3$ | $l_3$ |
| ° | *dm* | ° | *dm* | ° | *dm* |
| | | | | | |
| object | | object | | object | |
| | | | | | |

| District | |
|---|---|
| Political municipality | |
| Inventory status of a sample plot | |
| Distance of the segment from the centre of the circle | |
| **B.** Land use | |
| Altitude | |
| Slope | |
| Aspect | |
| Land ownership | |
| Erosion | |
| Dead cover | |
| Humification process | |
| **C.** Tree species | |
| | |
| Tree age | |
| Age class identification number | |
| Stand categories | |
| Stand origin | |
| Stand structure | |
| Stand development stage | |
| Stand preservation | |
| Stand mixture | |
| Stand canopy | |
| Main characteristics of regeneration | |
| Tree species | |
| Regener. abundance | |
| Naturalness | |
| Potential silvicultural treatment | |

| Controllers | |
|---|---|
| 1 | |
| 2 | |

| Circle identification number | Code |
|---|---|
| South-west of the cluster | 1 |
| North-west of the cluster | 2 |
| North-east of the cluster | 3 |
| South-east of the cluster | 4 |

| Inventory status of a sample plot | Код |
|---|---|
| Circle for inventory | 1 |
| Circle not for inventory | 2 |

| Status of sample plot | Code |
|---|---|
| Complete sample plot | 1 |
| Part of sample plot | 2 |

| Land use | Code |
|---|---|
| Forest | 01 |
| Other wooded land | 10 |
| Barren land | 20 |
| Agricultural land | 30 |
| Meadows / pastures | 31 |
| Built-up area | 40 |
| Inland water | 50 |

| Land ownership | Code |
|---|---|
| State | 1 |
| Private | 2 |

| Erosion | Code |
|---|---|
| No erosion risk | 1 |
| Water erosion | 2 |
| Wind erosion | 3 |

| Dead cover | Code |
|---|---|
| No dead cover | 1 |
| Poorly represented | 2 |
| Abundant | 3 |

| Humification process | Code |
|---|---|
| Favourable humification | 1 |
| Unfavourable humification | 2 |

| Tree species | Code |
|---|---|
| Willow | 11 |
| Alder | 21 |
| White poplar | 23 |
| Black poplar | 24 |
| Euramerican poplar | 25 |
| Gray poplar | 32 |
| Common walnut | 37 |
| Smooth-leaved elm | 38 |
| European white elm | 39 |
| Narrow-leaved ash | 41 |
| Common oak | 42 |
| Hornbeam | 43 |
| Turkey oak | 44 |
| Small-leaved lime | 45 |
| Large-leaved lime | 46 |
| Silver lime | 47 |
| European hackberry | 48 |
| Hungarian oak | 49 |
| Cherry | 50 |
| Other broadleaves (OB) | 51 |
| Horse chestnut | 52 |
| Pubescent oak | 53 |
| Flowering ash | 54 |
| Oriental hornbeam | 55 |
| Hop hornbeam | 56 |
| Sessile oak | 57 |
| Aspen | 58 |
| Birch | 59 |
| Turkish hazel | 60 |
| Beech | 61 |
| Wych elm | 62 |
| White ash | 63 |
| Norway maple | 64 |
| Maple | 65 |
| Balkan maple | 66 |
| Fir | 67 |
| Spruce | 68 |
| Serbian spruce | 69 |
| Austrian pine | 70 |
| Scots pine | 71 |
| Macedonian pine | 72 |
| White-bark pine | 73 |
| Mountain pine | 74 |
| Black locust | 75 |
| Black walnut | 76 |
| White ash | 77 |
| Ash-leaved maple | 82 |
| Douglas-fir | 83 |
| Weymouth pine | 84 |
| Larch | 87 |
| Yew | 91 |
| Other conifers (OC) | 93 |
| Mountain ash | 94 |
| Field maple | 95 |
| Wild service tree | 99 |

| Stand categories | Code |
|---|---|
| Alder forests | 1 |
| Willow forests | 2 |
| Poplar forests | 3 |
| Narrow-leaved ash forests | 4 |
| Common oak forests | 5 |
| Hornbeam forest | 6 |
| Turkey oak forests | 7 |
| Hungarian oak forests | 8 |
| Pubescent oak forest | 9 |
| O. hornbeam, Hop hornbeam & Flow. ash forests | 11 |
| Lime forests | 12 |
| Sessile oak forest | 13 |
| Birch, Aspen and Black locust forests | 14 |

| | |
|---|---|
| Ash and Maple forests | 15 |
| Beech forests | 16 |
| Pine forests | 17 |
| Fir forests | 18 |
| Spruce forests | 19 |
| White-bark pine forests | 21 |
| Macedonian pine forests | 22 |
| Shrub formations | 24 |
| Forests of other broadleaves | 25 |
| Forests of other conifers | 26 |

| Stand origin | Code |
|---|---|
| High natural stand | 1 |
| Natural coppice stand | 2 |
| Artificially established stand | 3 |

| Stand structure | Code |
|---|---|
| Even-aged stand | 10 |
| Uneven-aged stand | 20 |
| Selection stand | 30 |
| Virgin forest | 40 |

| Stand development stage | Code |
|---|---|
| Regeneration | 11 |
| Sapling | 12 |
| Middle-aged stand | 13 |
| Mature stand | 14 |

| Stand preservation | Code |
|---|---|
| Well-preserved stand | 1 |
| Insufficiently stocked stand | 2 |
| Devastated stand | 3 |

| Stand mixture | Код |
|---|---|
| Pure broadleaved stand | 1 |
| Mixed broadleaved stand | 2 |
| Mixed broadleaved and coniferous stand | 3 |
| Mixed coniferous stand | 4 |
| Pure coniferous stand | 5 |

| Stand canopy | Code |
|---|---|
| Dense (0.8-1.0) | 1 |
| Complete (0.6-0.8) | 2 |
| Incomplete (0.4-0.6) | 3 |
| Scattered (<0.4) | 4 |

| Regeneration abundance | Code |
|---|---|
| Dense (> 80%) | 1 |
| Satisfactory (50–80%) | 2 |
| Unsatisfactory (< 50%) | 3 |
| No regeneration (< 5%) | 4 |

| Naturalness | Code |
|---|---|
| Forest without anthropogenic interventions | 1 |
| Semi-natural forest | 2 |
| Plantation | 3 |

| Potential silvicultural treatment | Code |
|---|---|
| No intervention | 0 |
| Regeneration without site preparation | 1 |
| Regeneration with site preparation | 2 |
| Repair planting | 3 |
| Conversion | 4 |
| Cleaning | 5 |
| Thinning | 6 |
| Regeneration cutting in even-aged forests | 7 |
| Regeneration cutting in uneven-aged forests | 8 |
| Clearing | 9 |
| Selection cutting | 10 |

| D. | № of broadleaf trees $d \leq 5$ *cm* | | | | | | № of coniferous trees $d \leq 5$ *cm* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree identification number | Tree species | $d_{1.30}$ ($d_{½}$ of the part of fallen tree) | Distance | Azimuth | Height (length of a part of fallen tree) | Tree health | Usability of dead trees | Crown class | Technical quality | Causing agents of tree damage | Degree of tree damage |
| | | *mm* | *dm* | ° | *dm* | | | | | | |
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| 11 | | | | | | | | | | | |
| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |
| 16 | | | | | | | | | | | |
| 17 | | | | | | | | | | | |
| 18 | | | | | | | | | | | |
| 19 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| ~ | ~ | | | | | | ~ | | | | |
| 50 | | | | | | | | | | | |

| Tree health | Code |
|---|---|
| Healthy | 1 |
| Damaged | 2 |
| Dead standing tree | 3 |
| Dead lying tree | 4 |
| Part of a fallen tree | 5 |

| Usability of dead tree | Code |
|---|---|
| Usable | 1 |
| Unusable | 2 |

| Crown class | Code |
|---|---|
| Dominant | 1 |
| Codominant | 2 |
| Suppressed | 3 |

| Technically good-quality trees | Code |
|---|---|
| High technical quality | 1 |
| Medium technical quality | 2 |
| Low technical quality | 3 |

| Causing agents of tree damage | Code |
|---|---|
| Without damage | 0 |
| Fires | 1 |
| Wild or domestic animals | 2 |
| Insects | 3 |
| Phytopathological diseases | 4 |
| Other abiotic factors | 5 |
| Anthropogenic factors | 6 |
| Unknown | 7 |

| Degree of tree damage | Code |
|---|---|
| No damage | 0 |
| Dead top $d$>10 *cm* | 1 |
| Dead branches 10-25% | 2 |
| Dead branches >25% | 3 |
| Partially dead crown >25% | 4 |
| Broken tree | 5 |
| Damage >100 $cm^2$ | 6 |
| Defoliation >25% | 7 |

# 4.
# FIELD REALISATION OF THE INVENTORY

## 4.1. Instruments and equipment

A working crew - the section for the work on the sample plots - consists of one operator and at least one worker. The working crew must take the following items for the fieldwork:

– GPS receiver (Figure 7);
– Compass (Figure 8);
– Measuring tape 30-50 *m* long (Figure 9) or ultrasonic distance measuring equipment (Figure 10);
– Regular (Figure 11) or digital calliper (Figure 12);
– Hypsometer Vertex III (Figure 13);

Figure 7

Figure 8

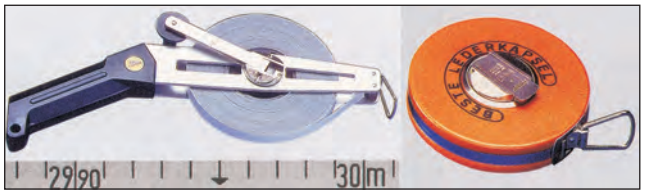


Figure 9

Figure 10

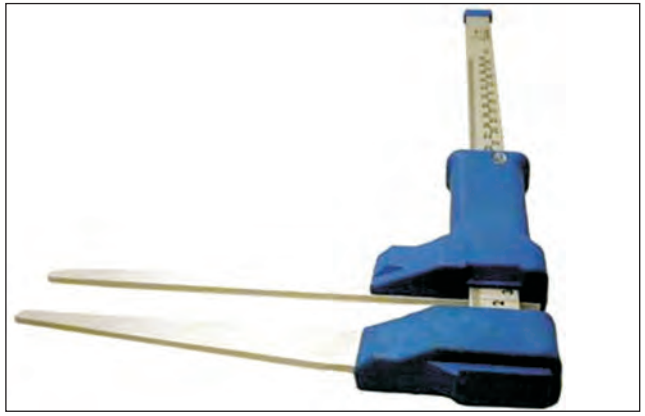


Figure 11

Figure 12

Figure 13

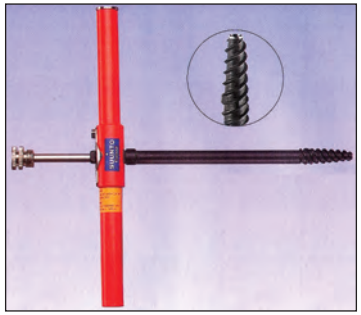


Figure 14

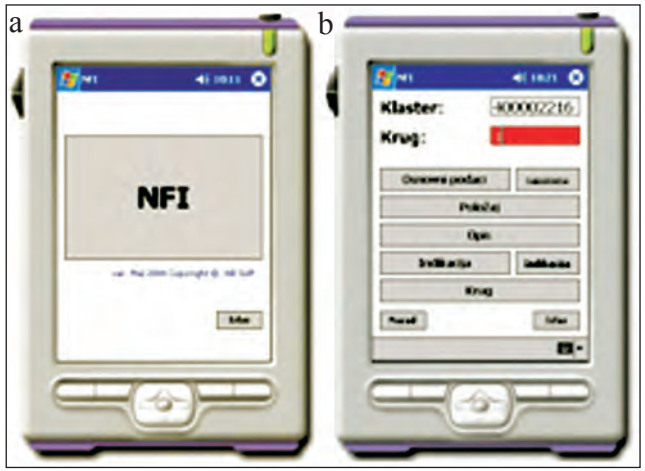



**Figure 15**

– Pressler's increment borer (Figure 14);
– Field forms (Table 2) or PDA computer (Figure 15/a, b) with programming package for the data collected on sample plots;
– Sufficient number of metal bars for plot marking;
– Small hand axe;
– Forest (or white) chalk;
– Red spray paint for plot marking.

## 4.2. Location of clusters and sample plots

Identification numbers and coordinates are entered in GPS receiver for each reference point (cluster centre) so their location in the field is done by GPS receiver.

The locations of other circles within the clusters are found by using a compass in combination with the distance measuring equipment (by measuring tape, ultrasonic distance measuring or Vertex III hypsometer with transponder), depending on the concrete field conditions.

## 4.3. Marking of clusters and sample plots

Cluster centre (reference point), which is simultaneously the centre of the first (permanent) sample plot, is marked permanently with a metal stake driven deep into the ground (only if it is in the forest or other wooded land) (the tip of the metal stake is driven below the surface of the ground) and it remains as a permanent marking of a cluster (reference point) network throughout the area of the Republic of Serbia. If it is not possible to get the metal stake into the ground (inaccessible terrain, rocks, etc.), the marking of the plot centre could be moved to the nearest location making this possible (maximum 9.99 *m*). The distance and azimuth of the planned centre to the new (dislocated) centre are measured and the measured values are entered in the Field forms or PDA computer.Also, the cluster centre (reference point) is ensured by three orientation markings (red paint at the diameter at breast height and just above ground, on stumps, rocks, or other immovable objects), regularly distributed at the distance of 15-30 *m* from the cluster centre (Figure 16). The distance and azimuth of these markings from the cluster

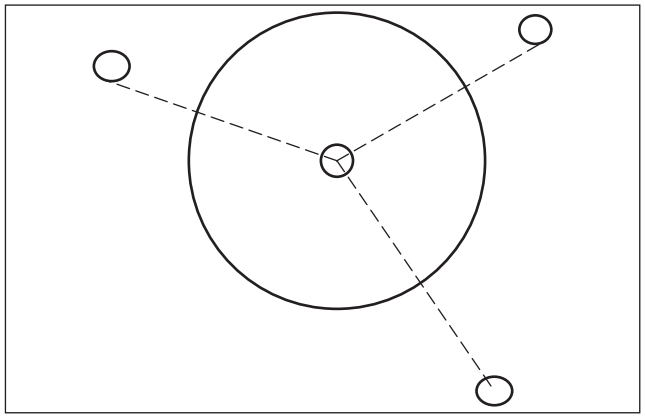


**Figure 16**

centre, as well as the marked objects (trees, rocks, etc.) are entered in the Field forms or in PDA computer.

The centres of the other three circles (only if they are in the forest or other wooded land) are marked with wooden stakes. If the plot centre falls on immovable rocks or bedrock, the plot centre should instead be marked with red paint.

Sometimes the same circle, radius 15 *m*, includes two or more land uses or forest types. If the forest or the land characteristics are very different, the plot is divided into two parts, and the inventory should be conducted on the specific part (the representative circle) surrounding the plot centre, e.g.

– If the sample plot is divided by a boundary between forest and non-forest;
– If the sample plot is divided by a boundary between other wooded land and non-forest;
– If the sample plot is divided by a boundary between forest and other wooded land;

– If the sample plot is divided by a clearly defined boundary between a coniferous and a broadleaved stand (not in the case of mixed stands);
– If the sample plot is divided by a boundary between two clearly different age classes, or between an existing stand and a temporarily unstocked forest area (to consider the stand as divided, the height difference between the two parts should be at least 5 *m* for younger stands, i.e. at least 10 *m* for older stands).

In the case of a boundary between an older stand and a regenerated stand, or between an older stand and an unstocked area, etc., the stand boundary is the outer limit of the tree crown projection on the ground.

In cases where a plot centre falls exactly on the boundary between two different land uses (or forest stands), the area located north/east of the centre should be decisive for the classification. One circle can be assigned only to one of the land use classes.

## 4.4. Method of work on sample plots

When the cluster centre (reference point) is fixed and marked, the data for Groups A, B, C and D are collected on each sample plot individually (on the permanent plot and the other three circles). The data on site description (Group B) and stand description (Group C) are collected, if not otherwise indicated, at the distance of up to 30 *m* from the sample plot centre.

### 4.4.1. General identification of clusters and sample plots

The localisation of the position in space of each cluster and sample plot is based on the maps with geographic and administrative-territorial division and the Code Manual for the National Forest Inventory of the Republic of Serbia.

#### 4.4.1.1. List of Districts

01 Severno-Bački District
02 Srednje-Banatski District
03 Severno-Banatski District
04 Južno-Banatski District
05 Zapadno-Bački District
06 Južno-Bački District
07 Sremski District
08 Mačvanski District
09 Kolubarski District
10 Podunavski District
11 Braničevski District
12 Šumadijski District
13 Pomoravski District
14 Borski District
15 Zaječarski District
16 Zlatiborski District
17 Moravički District
18 Raški District
19 Rasinski District
20 Nišavski District
21 Toplički District
22 Pirotski District
23 Jablanički District
24 Pčinjski District
25 Kiosk District
26 Penki District
27 Prizrenski District
28 Kosovsko-Mitrovački District
29 Kosovsko-Pomoravski District
30 Belgrade City.

The sample plot classification by Districts is based on the map with administrative-territorial division of the Republic of Serbia.

#### 4.4.1.2. List of political municipalities

***Severno-Bački District***
80071 Bačka Topola
80241 Mali Iđoš
80438 Subotica

***Srednje-Banatski District***
80144 Žitište
80152 Zrenjanin
80250 Nova Crnja
80268 Novi Bečej
80373 Sečanj

***Severno-Banatski District***
80012 Ada
80195 Kanjiža
80209 Kikinda
80276 Novi Kneževac
80365 Senta

80489 Čoka

***Južno-Banatski District***
80039 Alibunar
80098 Bela Crkva
80128 Vršac
80217 Kovačica
80225 Kovin
80292 Opovo
80314 Pančevo
80349 Plandište

***Zapadno-Bački District***
80047 Apatin
80233 Kula
80306 Odžaci
80381 Sombor

***Južno-Bački District***
80055 Bač
80063 Bačka Palanka
80080 Bački Petrovac
80101 Beočin
80110 Bečej
80462 Vrbas
80136 Žabalj
80284 Novi Sad
80390 Srbobran
80411 Sremski Karlovci
80446 Temerin
80454 Titel

***Sremski District***
80179 Inđija
80187 Irig
80322 Pećinci
80357 Ruma
80403 Sremska Mitrovica
80420 Stara Pazova
80497 Šid

***Mačvanski District***
70289 Bogatić
70408 Vladimirci
70637 Koceljeva
70661 Krupanj
70734 Loznica
70777 Ljubovija
70793 Mali Zvornik
71269 Šabac

***Kolubarski District***
70360 Valjevo
70700 Lajkovac
70769 Ljig
70831 Mionica
70882 Osečina
71218 Ub

***Podunavski District***
70386 Velika Plana
71099 Smederevo
71102 Smederevska Palanka

***Braničevski District***
70394 Veliko Gradište
70475 Golubac
70521 Žabari
70530 Žagubica
70696 Kučevo
70807 Malo Crniće
70912 Petrovac
70947 Požarevac

***Šumadijski District***
70033 Aranđelovac
70076 Batočina
70599 Knić
70645 Kragujevac
71277 Lapovo
71013 Rača
71153 Topola

***Pomoravski District***
70491 Despotovac
70904 Paraćin
71030 Rekovac
71048 Jagodina
71056 Svilajnac
71200 Ćuprija

***Borski District***
70327 Bor
70572 Kladovo
70785 Majdanpek
70840 Negotin

***Zaječarski District***
70319 Boljevac
70556 Zaječar
70602 Knjaževac
71129 Sokobanja

***Zlatiborski District***
70041 Arilje
70068 Bajina Bašta

70629 Kosjerić
70866 Nova Varoš
70955 Požega
70971 Priboj
70980 Prijepolje
71072 Sjenica
71145 Užice
71234 Čajetina

***Moravički District***
70483 Gornji Milanovac
70564 Ivanjica
70742 Lučani
71242 Čačak

***Raški District***
70459 Vrnjačka Banja
70653 Kraljevo
70874 Novi Pazar
71021 Raška
71188 Tutin

***Rasinski District***
70017 Aleksandrovac
70343 Brus
70378 Varvarin
70670 Kruševac
71005 Ražanj
71170 Trstenik
71196 Ćićevac

***Nišavski District***
70025 Aleksinac
70467 Gadžin Han
70513 Doljevac
70823 Merošina
70858 Niš
71064 Svrljig

***Toplički District***
70262 Blace
70548 Žitorađa
70688 Kuršumlija
70998 Prokuplje

***Pirotski District***
70050 Babušnica
70084 Bela Palanka
70505 Dimitrovgrad
70939 Pirot

***Jablanički District***
70297 Bojnik
70424 Vlasotince
70718 Lebane
70726 Leskovac
70815 Medveđa
71226 Crna Trava

***Pčinjski District***
70335 Bosilegrad
70351 Bujanovac
70416 Vladičin Han
70432 Vranje
70963 Preševo
71137 Surdulica
71161 Trgovište

***Kosovski District***
90034 Glogovac
90115 Kačanik
90131 Kosovo Polje
90166 Lipljan
90204 Obilić
90247 Podujevo
90263 Priština
90301 Uroševac
90310 Štimlje

***Pećki District***
90069 Dečani
90085 Đakovica
90107 Istok
90123 Klina
90239 Peć

***Prizrenski District***
90336 Gora
90344 Opolje
90212 Orahovac
90255 Prizren
90280 Suva Reka
90328 Štrpce

***Kosovsko-Mitrovački District***
90026 Vučitrn
90352 Zvečan
90093 Zubin Potok
90298 Kosovska Mitrovica
90158 Leposavić
90271 Srbica

***Kosovsko-Pomoravski District***
90018 Vitina
90042 Gnjilane
90140 Kosovska Kamenica

90182 Novo Brdo

***Belgrade City***
70092 Barajevo
70106 Voždovac
70114 Vračar
70122 Grocka
70149 Zvezdara
70157 Zemun
70165 Lazarevac
70173 Mladenovac
70181 Novi Beograd
70190 Obrenovac
70203 Palilula
70211 Rakovica
70220 Savski Venac
70238 Sopot
70246 Stari Grad
70254 Čukarica

The sample plot classification by administrative (political) municipalities is based on the administrative-territorial map and the Code Manual. After the circle is positioned on the map, the District is found in the Code Manual (with the names of municipalities). The codes are entered in the Field forms or PDA computer.

If one sample plot falls on the territories of two or more political municipalities, it is assigned to the municipality containing the greatest part of its area.

#### 4.4.1.3. Cluster identification number

The cluster identification number is written in Arabic numerals from 1 to 99999. The coordinates of each cluster are also entered in Field forms or in PDA computer.

#### 4.4.1.4. Sample plot identification number

The sample plot identification number is written in Arabic numerals from 1 to 4, depending on its position in the cluster:

1 - Circle in the south-west of the cluster;
2 - Circle in north-west of the cluster;
3 - Circle in north-east of the cluster;
4 - Circle in south-east of the cluster.

#### 4.4.1.5. Inventory status of a sample plot

Code 1 is assigned to the circle that will be inventoried if, based on the maps, aerial or satellite images, it is positive that the cluster is located in a forest or on other wooded land.

Code 2 is assigned to the circle that will not be inventoried, if the cluster is located on other land use categories (barren land, farmland, built-up land, meadows, pastures and inland water). However, if in this way the land use of the designed cluster cannot be precisely determined, it is necessary to check the land use in the field and then to determine the inventory status.

#### 4.4.1.6. Status of a sample plot

Code 1 - complete sample plot, is assigned to the circle which is not to be divided by further processing. Code 2 - part of sample plot, is assigned to the circle which is divided into two or more parts (by ownership: state and private, by stocking percent: forest and clearing, by stand origin: high stand and coppice stand, by age when age difference exceeds the range of age class, by stand structure: even-aged and uneven-aged, etc.), and each part is surveyed separately by the above criteria.

The representative circle is the greater part of the sample plot in which detailed description is conducted (site description, stand description, and complete cruising):

– If a greater part of the sample plot is owned by one forest owner, the greater part is taken as the representative circle;
– If a greater part of the sample plot is under forest (centre of the sample plot is in the forest), and a smaller part is in an open space (public road, farmland, barren land, and other land uses), the part under forest is taken as the representative circle;
– If a greater part of the sample plot is in a clearing (centre of the sample plot is in the clearing), and a smaller part is in a forest, the part in the clearing is taken as the representative circle;
– If the centre of the sample plot is exactly in the middle between a forest and a clearing, the part under forest is taken as the representative

circle, but the measured number of trees is multiplied by 2 (two);
– If a greater part of the sample plot (according to the criteria of stand differentiation: stand origin, tree species, age, development stage, silvicultural form, and mixture) is in one stand and a smaller part in the other stand, the greater part of the sample plot is taken as the representative circle;
– If the sample plot centre is exactly in the middle between two segments, the north-east part of the sample plot is taken as the representative circle (from the sample plot centre);
– if a small stand is located in the centre of the sample plot, the north-east part of the sample plot is taken as the representative circle (from the sample plot centre).

#### 4.4.1.7. Distance of the segment from the centre of the circle

In each sample plot division, it is necessary to draw the sketch which is the component part of Field forms. The surveying is conducted with a compass and Vertex III hypsometer with transponder.

Although there are different cases of sample plot division in the field (most often as sectors and segments with regular or irregular limits), a straight line is taken as the boundary (tree crown projection) between the two parts of sample plots. Therefore, in sample plot division into two parts, the perpendicular distance is measured (to the nearest decimetre) from the sample plot centre to the segment boundary (Figure 17) and the data is entered into Field forms or PDA computer.

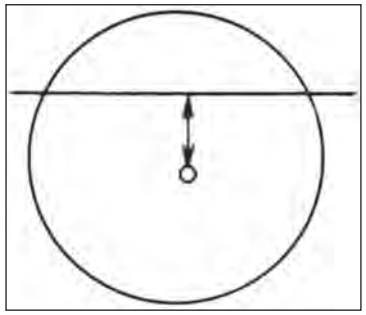


**Figure 17**

#### 4.4.1.8. The date of the National Forest Inventory

The date of the acquisition of the basic inventory data (day, month and year) is entered in the Field records or PDA computer.

### 4.4.2. Site description

#### 4.4.2.1. Land use

The determination of the sample plot (inventory unit) land use category is based on its actual basic land use *in situ*.

code 01: Forest - Land with canopy cover of more than 10 percent and area of more than 0.5 *ha*. The trees should be able to reach a minimum height of 5 *m* at maturity *in situ*. May consist either of closed forest formations, where trees of various storeys and undergrowth cover a high proportion of the ground, or of open forest formations with a continuous vegetation cover in which canopy cover exceeds 10%. Young natural stands and all artificially established stands that have not yet, but are expected to reach a canopy cover of 10% and tree height of 5 *m* are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked resulting from human intervention or natural causes that are expected to regenerate (felling units, burned areas, etc.). It also includes forest nurseries and seed orchards that constitute an integral part of the forest; forest roads, cleared tracts, firebreaks and other small open areas within the forest; forest in national parks, nature reserves and other protected areas, such as those of specific environmental, scientific, historical, cultural or spiritual interest; windbreaks and shelterbelts of trees with an areas of more than 0.5 *ha* and width of more than 20 *m*. Excludes: Land predominantly used for agricultural practices

A forest road constituting an integral part of the forest should be considered “forest”, while a public road through a forest should be considered “urban area, built-up land”. That means, if the plot centre falls on a forest road, the trees located inside the 15 *m* radius should be measured and all the other measurements should be taken, that are normally carried out in the forest. On the other hand, if the plot centre is located on a public road, no tree measurements, or any other measurements should be carried out inside the sample plot. Also, the plot will be considered a full one if the plot centre is located at the roadside of a forest road, but a partial one when located at the roadside of a public road.

code 10: Other wooded land (OWL) - is the land either with a canopy cover of up to 10% of trees able to reach a height above 5 *m* at maturity *in situ*; or a crown cover of more than 10% of trees not able to reach a height of 5 *m* at maturity in situ, and a combined cover of maquis, shrubs and bushes. The category of other wooded land does not include the areas having the tree, shrub or bush and maquis cover of less than 0.5 *ha* and width to 20 *m*, which are classed under "other land", or land predominantly under agricultural or urban land use.

The minimum size of continuous forest or other wooded land should be 0.5 *ha* (a square of 71×71 *m*, or a corresponding area). Areas having some tree cover, but that at the same time do not meet the requirements of forest or other wooded land, should be assigned to another land use category.

code 20: Barren land - includes infertile areas which are not used as forests, or for agricultural production (public roads, rocky land, stock piles, waterlogged land, pools, soil of 8$^{th}$ site class, etc.).

code 30: Agricultural land - includes the areas used for agricultural production (farmland, orchards, vineyards, etc.).

code 31: Meadows/pastures - are grassland areas which are used exclusively for livestock and wild animal pasturage.

code 40: Built-up land - includes the areas under buildings (towns, villages) and other urban structures.

code 50: Inland water - includes lakes and reservoirs, major waterways, larger pools, etc.

#### 4.4.2.2. Altitude

Altitude of each sample plot is determined based on the topographic maps with isohypses or by GPS receiver and it is entered in Field forms or in PDA computer to the nearest metre.

#### 4.4.2.3. Slope

The sample plot slope is determined by Vertex III hypsometer. It is measured in the direction of the steepest inclination (viewed through the plot centre), by viewing a point above the ground, at eye level, at the distance of 15 *m* from the plot centre. After two measurements in opposite directions, the two readings are averaged and recorded. In the case when the plot has status 2 (part of sample plot), the slope is measured only in the part which is predicted for measurement. The valid values are 000 through 900.

#### 4.4.2.4. Aspect

Aspect is the azimuth of the steepest slope on the sample plot, i.e. the azimuth direction of the steepest slope on the sample plot. Actually, it is the direction of drainage in the greatest part of the plot, and it is recorded as the azimuth of this direction (downhill direction). Valid values are 000° through 360°. 0° is only valid when the slope is also 0°. A 15 *m* radius sample plot should be considered for the assessment.

#### 4.4.2.5. Land ownership

Based on the cadastral data, the inventory unit is assigned to one of the three ownership categories:

code 1: State - sample plot owned by the state enterprise which manages the inventoried forest management unit;

code 2: Private - sample plot in private ownership.

#### 4.4.2.6. Erosion

Erosion risk is determined based on the Erosion Cadastre, erosion map, or by direct assessment in the field:

code 1: No erosion risk - stable terrain in natural conditions and without visible traces of erosion, or artificially stabilised area (re/afforestation, gully reclamation, catchment regulation, etc.), further development of erosion is stopped leading to land rehabilitation;

code 2: Water erosion risk - when there is runoff in the area of the inventory unit and soil deposition at the base of the slope, in cases of rills, canals, and gullies of different depths, landslides, as well as other forms of land degradation caused by water;

code 3: Wind erosion risk - when there are visible signs of the loss of topsoil and nutrients - land deformation (sand dunes, deflation depressions), drifting of aeolian sediment, or other signs of land degradation caused by wind.

#### 4.4.2.7. Dead cover

Dead cover is assessed based on the covered percentage of the inventory unit area, proportion of area under dead cover to total area of the inventory unit:
code 1: None - when dead cover occupies less than 10% of the inventory unit area;
code 2: Poorly represented - when dead cover occupies 10-60% of the inventory unit area;
code 3: Abundant - when dead cover occupies above 60% of the inventory unit area.

#### 4.4.2.8. Humification process

Humification process depends mainly on physico-chemical properties of the soil, microclimate, tree species, and general environmental conditions:
code 1: Favourable humification - when the organic matter (leaves and needles) is humified in 13 years;
code 2: Unfavourable humification - when the organic matter (leaves and needles) is humified in 38 years.

### 4.4.3. Stand description

#### 4.4.3.1. Tree species

Tree species in the inventory unit are entered in the following order: the principal tree species first, and then other species by their percentage, taking into account that the overstory tree species are entered first. The codes of tree species are the following:

11 Willow
21 Alder
23 White poplar
24 Black poplar
25 Euramerican poplar
32 Gray poplar
37 Common walnut
38 Smooth-leaved elm
39 European white elm
41 Narrow-leaved ash
42 Common oak
43 Hornbeam
44 Turkey oak
45 Small-leaved lime
46 Large-leaved lime
47 Silver lime
48 European hackberry
49 Hungarian oak
50 Cherry
51 Other broadleaves (OB)
52 Chestnut
53 Pubescent oak
54 Flowering ash
55 Oriental hornbeam
56 Hop hornbeam
57 Sessile oak
58 Aspen
59 Birch
60 Turkish hazel
61 Beech
62 Wych elm
63 White ash
64 Norway maple
65 Maple
66 Balkan maple
67 Fir
68 Spruce
69 Serbian spruce
70 Austrian pine
71 Scots pine
72 Macedonian pine
73 White-bark pine
74 Mountain pine
75 Black locust
76 Black walnut
77 White ash
82 Ash-leaved maple
83 Douglas-fir
84 Weymouth pine
87 Larch
91 Yew
93 Other conifers (OC)
94 Mountain ash
95 Field maple
99 Wild service tree.

#### 4.4.3.2. Age of tree species

The age of tree species in a stand is determined only in high even-aged stands, coppice stands and in artificially established stands. Stand age is not assessed in high uneven-aged stands and selection stands. Only the age of the principal tree species is usually assessed.

Stand age can be assessed indirectly from local knowledge, management plans or any other reliable source, or directly by counting growth rings on the stump, by boring to the core of the stem and counting

annual rings from bore samples, and by counting branch whorls (in young coniferous stands). To assess the total age, in the case of direct measurement, the number of growth rings on the stump should be added by a number of years necessary to reach the height of the stump, the number of growth rings in the increment core should be added by a number of years necessary to reach the height of increment boring, i.e. the number of branch whorls should be added by a number of years necessary to attain the height of the first whorl. After the age of several trees is assessed by a direct method, the average age (arthmetical mean) is adopted as the age of the inventory unit.

For the assessment of stand age, the 20 *m* radius sample plot should be considered. On the first (permanent) plot, no bore samples should be taken inside this radius.

### 4.4.3.3. Age class identification number

Age class identification number is determined based on the age of the principal tree species and the interval of the age class. Age class intervals are as follows:

- 20 years for all high forests of regeneration period up to 20 years and rotation longer than 80 years;
- 40 years for all high forests of regeneration period up to 40 years and rotation longer than 80 years;
- 10 years for all high forests and coppice forests with rotation period 40-80 years;
- 5 years for all high forests and coppice forests with rotation period 15-40 years;
- Age class is not formed for rotations below 15 years.

### 4.4.3.4. Stand categories

Stand category is detemined by the principal tree species in the stand, regardless of the percentage of other species, and the following codes are entered in Field forms or PDA computer:

1 Forests of Alders;
2 Willow forests;
3 Poplar forests;
4 Narrow-leaved ash forests;
5 Common oak forests;
6 Hornbeam forests;
7 Turkey oak forests;
8 Hungarian oak forests;
9 Pubescent oak forests;
11 Oriental hornbeam, hop hornbeam and flowering ash forests;
12 Lime forests;
13 Sessile oak forests;
14 Birch, Aspen and Black locust forests;
15 Ash and Maple forests;
16 Beech forests;
17 Pine forests;
18 Fir forests;
19 Spruce forests;
21 White-bark pine forests;
22 Macedonian pine forests;
24 Shrub formations;
25 Forests of other broadleaves;
26 Forests of other conifers.

### 4.4.3.5. Stand origin

Stand origin in the inventory unit is determined by direct surveying in the field. The characteristics of tree species, i.e. hard broadleaves, soft broadleaves, or conifers, as well as the regeneration method of artificially established stands, are also the elements of stand origin identification, i.e.:

1 - Natural high stands;
2 - Natural coppice stands;
3 - Artificially established stands.

### 4.4.3.6. Stand structure

Stand structure is determined based on its internal structure, i.e. based on the characteristics of diameter and height structure, e.g.:

10 - Even-aged stand;
20 - Uneven-aged stand;
30 - Selection stand;
40 - Virgin forest.

### 4.4.3.7. Stand development stage

The following development stages are defined in even-aged stands of high origin:

code 11: Regeneration stage - includes the period from the moment of the emergence of young plants on felling units, till the beginning of their barely visible differentiation by diameter and height, conditioned by severe competition. By the end of this stage, all plants

can be grouped in two categories (1. somewhat higher and larger-diameter young plants and 2. somewhat smaller-diameter and lower young plants);

code 12: Sapling stage - is characterised by very high differentiation of trees (particularly in height increment) and their grouping in several distinctive categories (predominant, dominant, codominant and suppressed trees), by the beginning of the process of natural cladoptosis, and canopy formation. Depending on the site quality, trees attain the diameters of 7- 20 *cm*;

code 13: Middle-aged stage - is characterised by the continuation of the tree differentiation process, culmination of height increment and intensive flagging and shedding of lower branches, as well as the dying of suppressed trees due to a very dense canopy (according to German rules, middle-aged stand includes smaller-diameter trees of 21-35 *cm* and medium-diameter trees 36-50 *cm* diameter at breast height, depending on the site quality);

code 14: Mature stand - is the stand which has attained the felling maturity planned by rotation, i.e. it is the stand in the terminal age class.

In artificially established stands of soft broadleaves, the development stage depends on the stand age:

code 11 - plantations aged 1-5 years;

code 12 - plantations aged 6-10 years;

code 13 - plantations aged 11-15 years;

code 14 - plantations above 15 years.

### 4.4.3.8. Stand preservation status

Stand preservation in the inventory unit is assessed based on the degree of canopy stocking, proportion of principal and minor tree species, stand health, risk, and quality. Stands can be:

code 1: Well-preserved stand - is characterised by dense to complete canopy (1.0-0.6), good health and good-quality trees, favourable ratio of principal and minor tree species. As such, it can reach the felling maturity;

code 2: Insufficiently stocked stand - is characterised by incomplete canopy (0.4-0.6), good health and good-quality trees, more unfavourable ratio of principal and minor tree species. As such, it can reach the planned felling maturity with somewhat changed management regime, compared to code 1 category;

code 3: Devastated stand - is characterised either by broken canopy (below 0.4), or by poor tree health and quality, or completely unfavourable tree species ratio (changed in favour of minor species). It cannot reach the planned felling maturity (it is removed before reaching the felling maturity).

### 4.4.3.9. Stand mixture

Stand mixture is mainly assessed by the percentage (by volume) of tree species in the inventory unit. Mixed stand is the stand in which minor tree species do not exceed 25% in total volume. By their presence by number of trees, they affect significantly the management of the principal tree species (e.g. in two-layer stands in which the second layer consists of minor species which are mainly below the cruising limit). Stand mixture categories are:

code 1: Pure broadleaved stand, when more than 75% of the growing stock volume consists of one single broadleaved species;

code 2: Mixed broadleaved stand, when one or more minor broadleaved tree species individually account for above 25% of the growing stock volume;

code 3: Mixed broadleaved/coniferous stand, when one or more minor broadleaved or coniferous tree species individually account for above 25% of the growing stock volume;

code 4: Mixed coniferous stand, when one or more minor coniferous tree species individually account for above 25% of the growing stock volume;

code 5: Pure coniferous stand, when more than 75% of the growing stock volume consists of one single coniferous species.

### 4.4.3.10. Stand canopy

Stand canopy is determined based on the stand area coverage by tree crowns and it is the proportion of the area under crowns and total stand area:

code 1: Dense canopy (0.8-1.0), when single layer canopy coverage is 80-100%;

code 2: Complete canopy (0.6-0.8), when single layer canopy coverage is 60-80%;

code 3: Incomplete canopy (0.4-0.6), when single layer canopy coverage is about 40-60%;
code 4: Scattered canopy (below 0.4), when single layer canopy coverage is below 40%.

### 4.4.3.11. Basic characteristics of the young crop

Main characteristics of the young crop are assessed in even-aged stands only during their regeneration process (in maturing and mature stands), and in selection stands. Main characteristics of the young crop are assessed for major or principal tree species in the stand and for minor species only if they are significant for stand management.

***Tree species***

Maximum three tree species in the stand are assigned the corresponding Code listed in the Code Manual for the National Forest Inventory of the Republic of Serbia.

***Abundance of regeneration***

Abundance of regeneration is determined based on its percentage per stand area:
code 1: Dense regeneration, when it is sufficient throughout the stand area, so there is no need of any additional silvicultural interventions;
code 2: Regeneration satisfactory, when it covers about 50-80% of the stand area (repair planting or re-seeding is necessary only in the insufficiently regenerated parts of the stand;
code 3: Regeneration unsatisfactory, when it covers less than 50% of the total stand area;
code 4: No regeneration, when there is no new crop, or when it covers less than 5% of the stand area.

### 4.4.3.12. Naturalness

Naturalness of forest ecosystems is an indicator of the intensity of human interventions (activities) in the forest:
code 1: Forest without anthropogenic interventions, i.e. forest in which there are no visible indicators of human activities and in which ecological processes are not significantly disturbed. This category includes also the areas on which forest products are harvested (except wood), but under the condition that human impact is minimal. Individual trees may be removed from the stand;
code 2: Semi-natural forest includes the naturally regenerated areas (including re-seeding and repair planting as supplementary measures of natural regeneration) on which there are clearly visible indicators of human activities. This category includes also the naturally regenerated areas previously used as agricultural land, areas which are undergoing rehabilitation after wildfires, etc., therefore not only the harvested areas;
code 3: Plantation includes areas covered with pure, even-aged stands of introduced tree species (in some cases also stands of autochthonous species), established by planting or seeding. Their priority function is production of timber, or other forest products.

This information is determined on all sample plots classified as forest or other wooded land, if the relevant area is minimum 0.5 *ha*.

### 4.4.3.13. Potential silvicultural treatment

The silvicultural treatment is selected depending on stand conditions, i.e. tree species, degree of preservation, canopy closure, development stage, structure, regeneration degree, etc., as well as the defined management goals. The selected silvicultural practice should be the one than can improve the existing state and realise the management goals. The relevant area radius is 20 *m*. The silvicultural treatment can be:
code 0: No interventions - the stand is characterised by an adequate canopy and moderately good state by other indicators, so no silvicultural treatment is necessary for the time being;
code 1: Regeneration without site preparation - the stand of inadequate canopy in which growth and development of the concrete tree species would be considerably below the concrete site productivity if the stand is left to spontaneous development, Conditions for natural regeneration are not good, and artificial seeding or planting requires a little site preparation, although the site preparation can be omitted;
code 2: Regeneration with site preparation - the stands are not suitable for further management due to inadequate canopy. Tree growth and development would be considerably below the concrete site productivity if the stand is left to

spontaneous development. Natural or artificial regeneration requires site preparation;

code 3: Supplementary planting - in naturally or artificially insufficiently regenerated stands (less than 70% area), in order to utilise maximally the growth space and site production potential;

code 4: Conversion - in coppice stands (except poor coppice stands at poor sites) in which tree growth and development is considerably below site productivity. The best option is the conversion in high silvicultural form by indirect conversion or direct conversion (with restitution or substitution of one or more tree species);

code 5: Cleaning - in even-aged stands in the stage of late seedling and early sapling, and sometimes even in later stages, if this silvicultural practice is applied for the first time. The treatment is commercial, conducted by the principles of negative selection, so as to prevent the spontaneous development of juvenile stands, i.e. to direct the development to phenotypically best-quality individuals;

code 6: Thinning - in even-aged stands in the late sapling stage and in middle-aged stands. The treatment has a commercial character and is conducted by the principles of positive selection. The goals are to favour the future trees, to improve the stand structure, stand health, etc.;

code 7: Regeneration cutting in even-aged stands - in the maturing and mature stage, in which natural regeneration process has started or has not started, i.e. in which the site and stand conditions can ensure natural regeneration. The treatment has a commercial character;

code 8: Regeneration cutting in uneven-aged forests - in forests of the above structural form in which by regeneration cutting of long regeneration period, or by different forms of group-selection felling, in addition to regeneration, this method tries to conserve also the uneven-agedness. The treatment has a commercial character;

code 9: Clear cutting - in coppice stands in the case of direct conversion, in plantations, and all natural high stands (regardless of the structure) in which the state is such that further management has no future, and natural regeneration is not possible;

code 10: Selection cutting - in selection stands. This cutting integrates regeneration, silvicultural, sanitation, and commercial components. The goal is to preserve the selection structure.

### 4.4.4. Sample plot cruising

Tree measurement on sample plots starts after the collection of all data for cluster and sample plot general identification (group A), site description (group B) and stand description (group C). The data in Group D are collected by a fixed order.

1. After marking the sample plot centre, the radiuses of all three concentric circles are measured by ultrasonic distance meter in Vertex III hypsometer with transponder, from both directions of movement (radiuses of the circles are constant lengths, they do not depend on the slope) The points are temporarily marked (with a stake) as benchmarks for all concentric circles. Then, moving clockwise, on the first concentric circle, all broadleaf, i.e. coniferous trees $d \leq 5$ *cm* are counted and their number is entered in Field forms or PDA computer.
2. In addition to counting, on the first concentric circle, the diameters of all trees $d > 5$ *cm* are measured. After diameter measurement in the first circle, the diameters of all trees $d > 10$ *cm* are measured in the second concentric circle by the same principle, i.e. the diameters of all trees $d > 30$ *cm* in the third concentric circle. Identification numbers of each measured tree should be marked with forest (or white) chalk, at the diameter at breast height, both to control if all trees in the concentric circle are measured, and to keep the same order in the measurement of tree height.

The trees located at the border of the plot (if considered as being inside the concentric circle) are controlled with hypsometer Vertex III with transponder. Only the trees of the following diameters are controlled: in the first concentric circle - only border trees $d > 10.0$ *cm*, in the second concentric circle - only border trees of diameter 10.1-30.0 *cm*, and in the third concentric circle - only border trees above 30 *cm*.

The following rules should be observed in diameter measurement:

– On flat terrain, tree diameter is measured at 1.3 *m* breast height above the ground, and on inclined terrain, measurement is taken from an uphill position at 1.3 *m* from the highest point of the butt end;
– During diameter measurement, the calliper is kept in a position that is perpendicular to the tree axis at 1.3 *m*. Its end is directed in the same direction (towards the sample plot centre, or in the opposite direction) for all trees in a circle;
– If tree diameter exceeds the physical division on the calliper, measurement is performed by electronic calliper option "double scale", or the circumference is measured by measuring tape, and the diameter is calculated;
– If the trees have irregular stem at 1.3 *m*, tree diameter is measured at an equal minimal distance below and above the irregular point, and their arithmetic mean is taken as the definite diameter value;
– If the cross section at 1.3 *m* has an irregular form, the largest and the smallest diameters are measured, and their arithmetic mean is taken as the definite diameter value;
– If the fork begins below the diameter at breast height, each stem is treated as a single tree, and in the opposite case, as one tree.

If standard (manual) calliper is used, tree species codes and measured diameters of each tree (to the nearest mm) are entered in the columns of Field forms or PDA computer, and if an electronic calliper (e.g. Mantax digitech calliper, Mantax computer calliper, etc.) is used, the data are sent to PDA computer.

3. Parallel with diameter measurement, the position in space of each tree *d*>5 *cm* is found only in the first (permanent) circle. Tree position is found by Vertex III hypsometer and compass. The transponder is placed in the centre of the circle, and tree distance from the sample plot centre is measured to the nearest dm and reduced to horizon. Simultaneously, azimuth data of the trees on the sample plot are also measured. The data on tree position (distance from the sample plot centre and azimuth are entered in the Field forms or PDA computer).

4. After diameter measurement, in all three concentric circles, tree height of all trees is measured to the nearest *dm* (except suppressed, overtopped, or significantly damaged trees in any other way), in the same order as in diameter measurement (from number 1 onwards), by Vertex III hypsometer and transponder for the measurement of the distance between the taxator and the tree.

5. Tree health of each tree on the sample plot is indicated by the following codes:
   1 - Healthy tree;
   2 - Damaged tree;
   3 - Dead standing tree;
   4 - Dead fallen tree;
   5 - Parts of lying trees.

6. Usability of dead trees is determined for each dead tree on the sample plot according to the following codes:
code 1: Usable tree - tree which can still be used in mechanical or chemical processing;
code 2: Unusable tree - tree which cannot be used in mechanical or chemical processing.

7. Biological (social) position of a tree is the category based on crown position relative to other trees on the sample plot. Types of crown classes are the following:
code 1: Dominant - crown class consists of all trees with crowns in the first layer (as a rule, they are the largest-diameter and the highest trees with crowns higher than 5/6 of the highest crowns);
code 2: Codominant - crown class consists of all trees with crowns in the second layer (somewhat below tree crowns of the first crown class, or the trees narrowed by the crowns of the trees in the first crown class). The height of the crowns ranges from $^{4}/_{6}$ to $^{5}/_{6}$ of the highest crowns;
code 3: Suppressed - crown class consists of all trees with crowns in the third storey, below tree crowns of the first and the second crown classes.

8. Technical quality of the trees with diameter *d*>25 *cm* on sample plot is indicated by the following codes:

code 1: High technical quality - a tree which has a straight stem with slight taper, desirably clean of branches, in good health and without technical defects. In broadleaves, the stem must produce minimum one veneer log, cylindrical in form and with diameter of at least 40 *cm*;

code 2: Medium technical quality - a tree with straight stem with slight taper, branched, in less good health and with minor technical defects;

code 3: Low technical quality - a tree with curved stem with sweep, very much branched stem, in poor health and with other technical defects.

9. The causes of tree damage refer only to living trees on the sample plot and are indicated as follows:
   0 - No damage;
   1 - Tree damaged by fire;
   2 - Tree damaged by livestock or wild animals;
   3 - Tree damaged by insects;
   4 - Tree damaged by phytopathological diseases;
   5 - Tree damaged by other abiotic factors;
   6 - Tree damaged by anthropogenic factors;
   7 - Tree damaged by unknown agent.

If tree damage is caused by several agents, only the most represented agent is entered.

10. Degree of damage of each tree in the circle is assessed according to the following codes:
    0 - tree without damage;
    1 - tree with dead top, diameter above 10 *cm*;
    2 - tree with dead branches 10-25%;
    3 - tree with dead branches above 25%;
    4 - tree with partially dead crown, above 25%;
    5 - broken tree;
    6 - damaged tree more than 100 $cm^2$;
    7 - defoliation above 25%.

The acquired data on tree health, usability of dead trees, crown class, technical quality, cause and degree of damage of the trees on the sample plot are entered in the columns of the Field forms of the National Forest Inventory of the Republic of Serbia or in PDA computer.

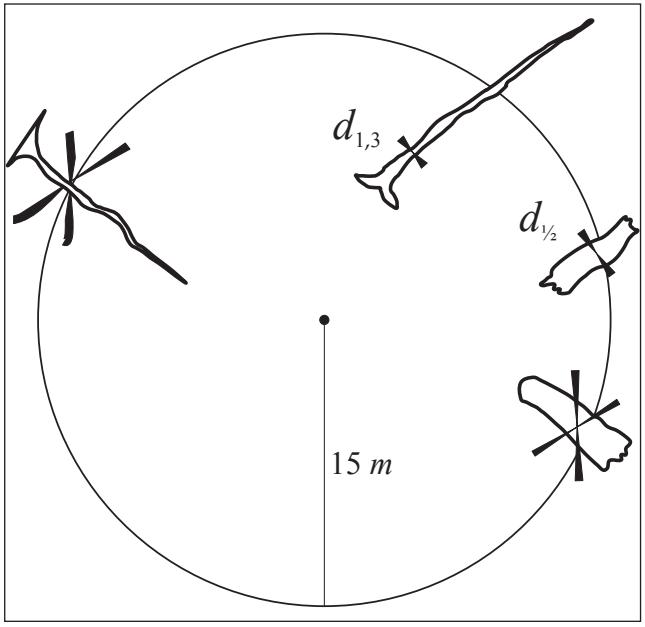



**Figure 18**

11. After the measurement of standing trees, dead fallen trees, and the parts of fallen trees are measured in all three concentric circles. Dead fallen trees belong to the sample plots in which their larger-diameter ends are located. If the larger-diameter end is within the 15 *m* radius circle, it is considered as being inside the circle and it is measured if the diameter at 1.3 *m* from the larger-diameter end of the lying tree, i.e. the diameter in the middle of the length of the part of lying tree, is larger than 10 *cm* (Figure 18). Along with diameter, length, and degree of usability, tree species should also be identified if possible. If tree species cannot be identified, the tree should be identified only as broadleaf (code 01) or conifer (code 02). All data on dead lying trees and parts of lying trees are entered in the Field forms or in PDA computer.

# 5.
# CONTROL OF FIELDWORK

The control of fieldwork was conducted parallel with the National Forest Inventory in the aim to prevent or reduce to the tolerable level, the rough systematic errors (because of their characteristics and causes, no mathematical method can assess their magnitude or remove them from the final results). Because of the nature of the assessed basic set (primarily its size), and because of the character of the applied representative method, the control was conducted on a sample which was considerably smaller than the sample which was controlled.

The size of the control sample accounted for 2 - 5% of the total number of sample plots (clusters) in the particular districts. To avoid the biased (random) variation of the sample elements, i.e. to determine only the unbiased deviations and glaring errors, the same elements (sample plots) were randomly selected from the sample which was controlled, in the above percentage.

On the control sample plots, all the data were collected and all cruising measurements were taken, in the same way as during the regular inventory, and the same types of Field forms were filled. The control was conducted by experienced taxators, with the supervision of the representatives of the responsible Ministry which financed the National Forest Inventory of the Republic of Serbia.

Detailed results of the control and the tests of the evaluated cruising data at the district level were included in the periodic reports to the Ministry, and they are going to be the initial material for the in-depth scientific analysis. We shall present the results of the control of a minor number of data referring only to clusters in the forests, unified at the level of Serbia, which is sufficient for the study of this type and sufficient for the general assessment of the quality of the National Forest Inventory. The following data are presented: sample plot status, stand origin, stand structure, preservation, mixture and canopy, diameters at breast height, and tree heights. The results of the control are presented in Diagrams 1-8.

In the majority of data, the error (proportion between the number of circles with errors in the concrete data and the total number of circles in the control sample) did not exceed 5.5%. Therefore, it can be concluded that there was a high degree of conformity between the field crews and the control, except in the assessment of stand canopy, which was incorrect in 11.2% of cases. The majority of errors originated from the first inventory year (2004) and were caused by insufficient experience of field crews, in the context of the absence of quantitative expressions for most of the controlled data. The errors in diameter and tree height measurements are both ways, and they account for 0.28%, i.e. 0.13% respectively, of the average values of these cruising elements. Also, there were no statistically significant differences between the field crews and the control, at the 99% level of significance, which implies a high degree of reliability of the cruising data (basal area, volume, volume increment) per unit area, and altogether, at the level of individual Districts, i.e. Serbia.

In general, it can be concluded that the first National Forest Inventory of the Republic of Serbia is of good quality and that the formed database is a reliable basis for the level of planning for which it will be used.

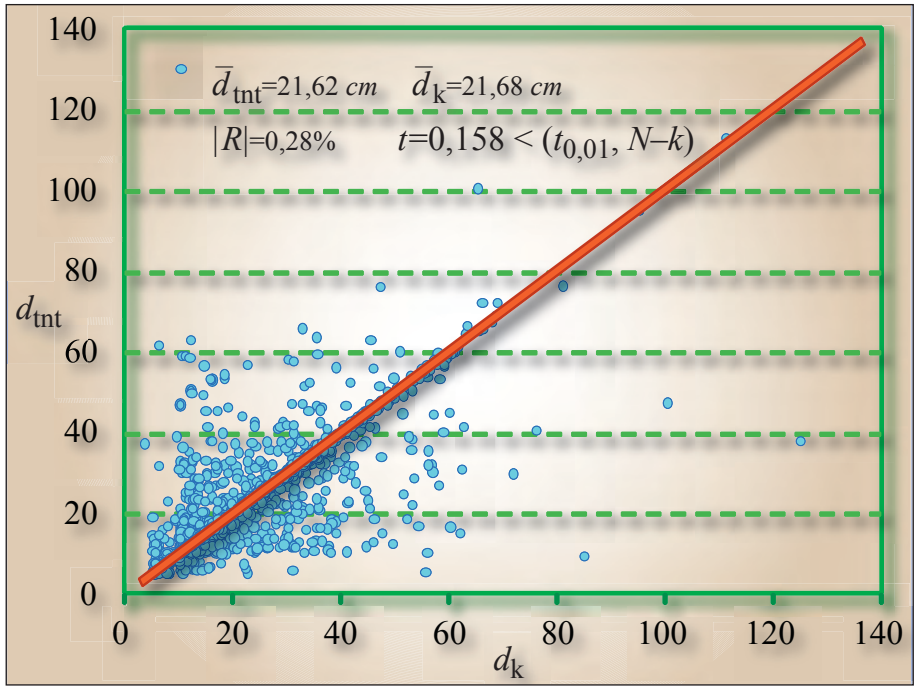



**Diagram 1.** Control of diameters

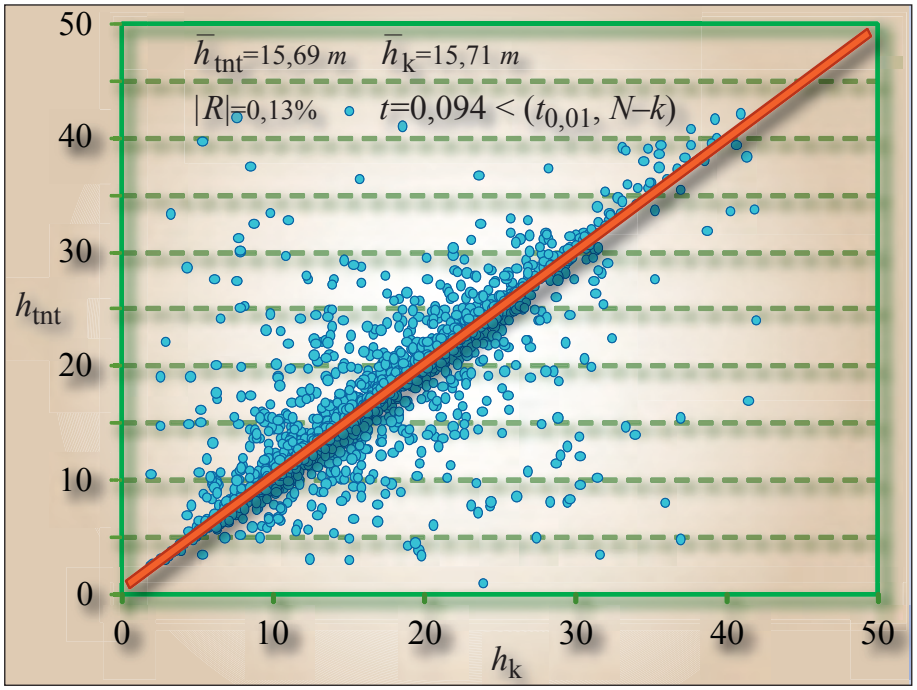



**Diagram 2.** Control of heights

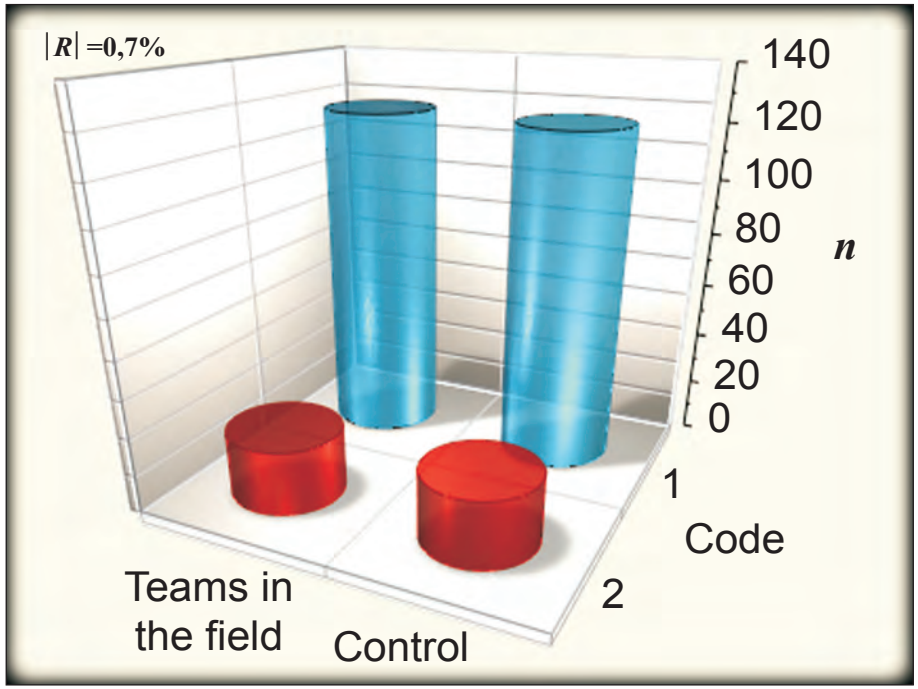



**Diagram 3.** Control of sample plot status

**Legend:** Code 1 - Complete sample plot, Code 2 - Part of sample plot

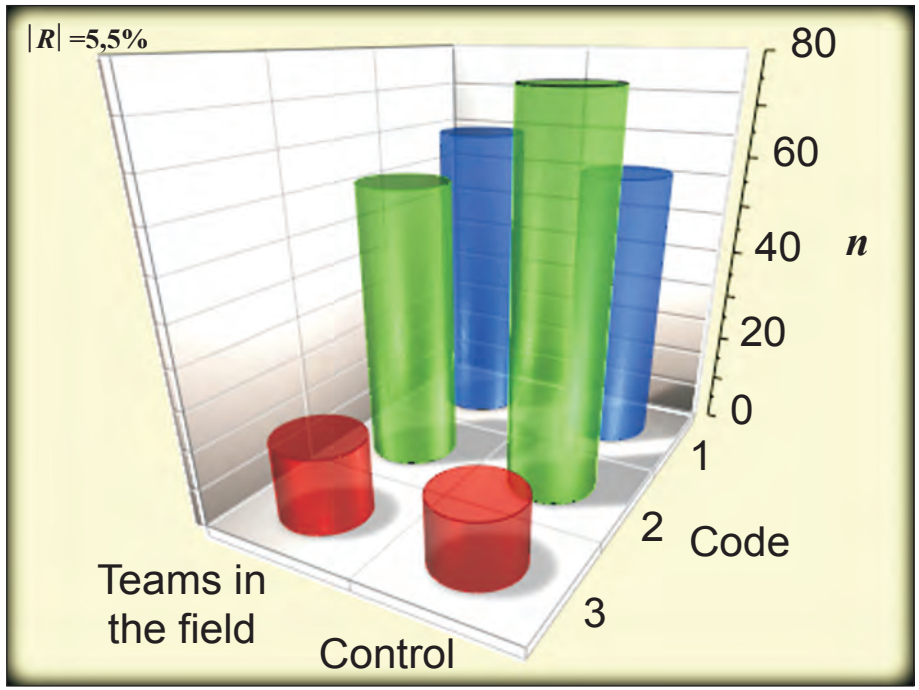



**Diagram 4.** Control of stand origin

**Legend:** Code 1 - Natural high stand, Code 2 - Natural coppice stand, Code 3 - Artificially established stand

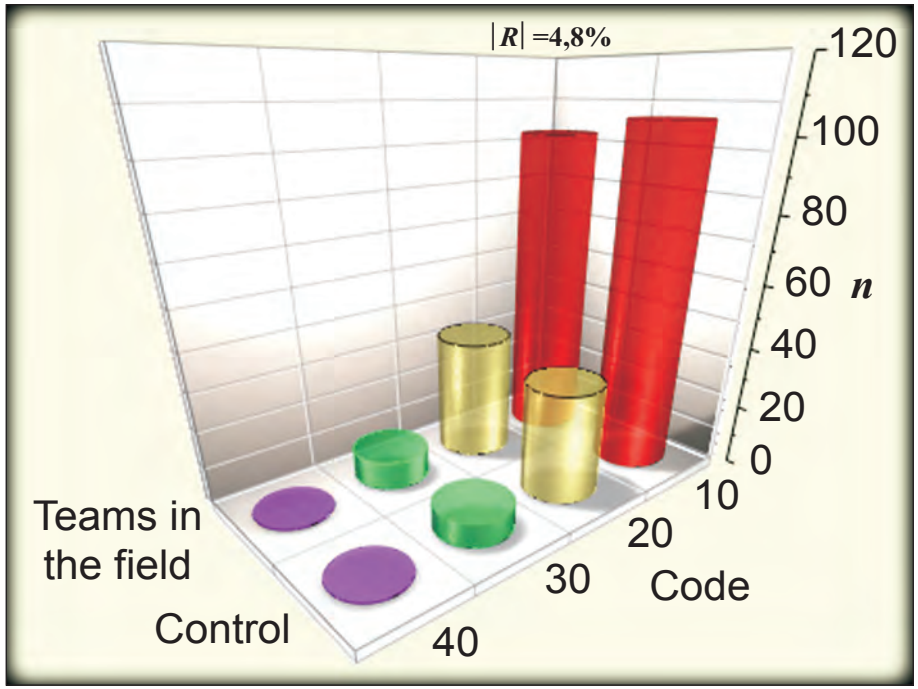



**Diagram 5.** Control of stand structure

**Legend:** Code 10 - Even-aged stand, Code 20 - Uneven-aged stand, Code 30 - Selection stand, Code 40 - Virgin forest

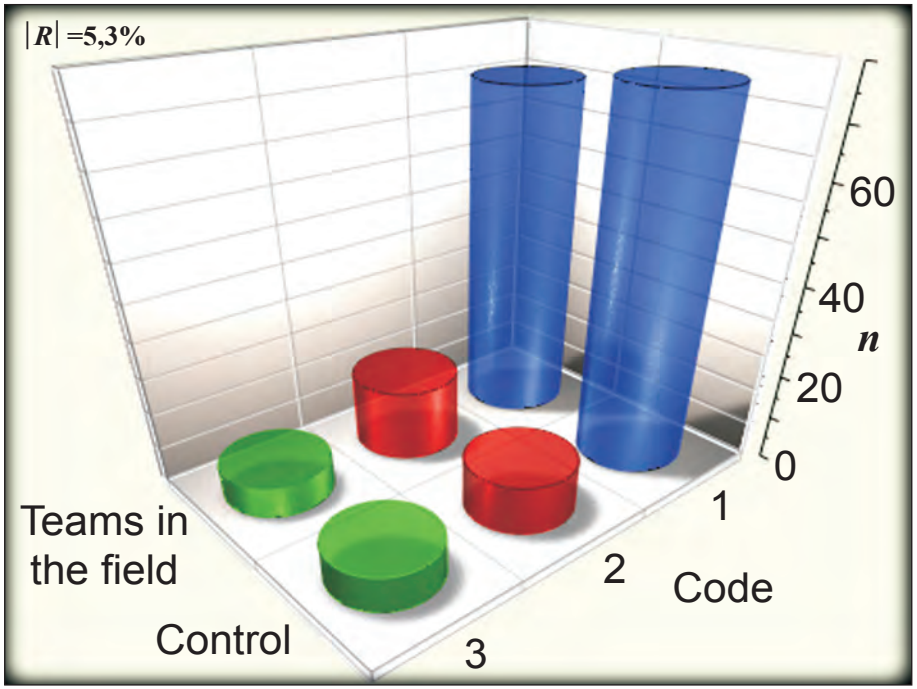



**Diagram 6.** Control of stand preservation

**Legend:** Code 1 - Well-preserved stand, Code 2 - Insufficiently stocked stand, Code 3 - Devastated stand

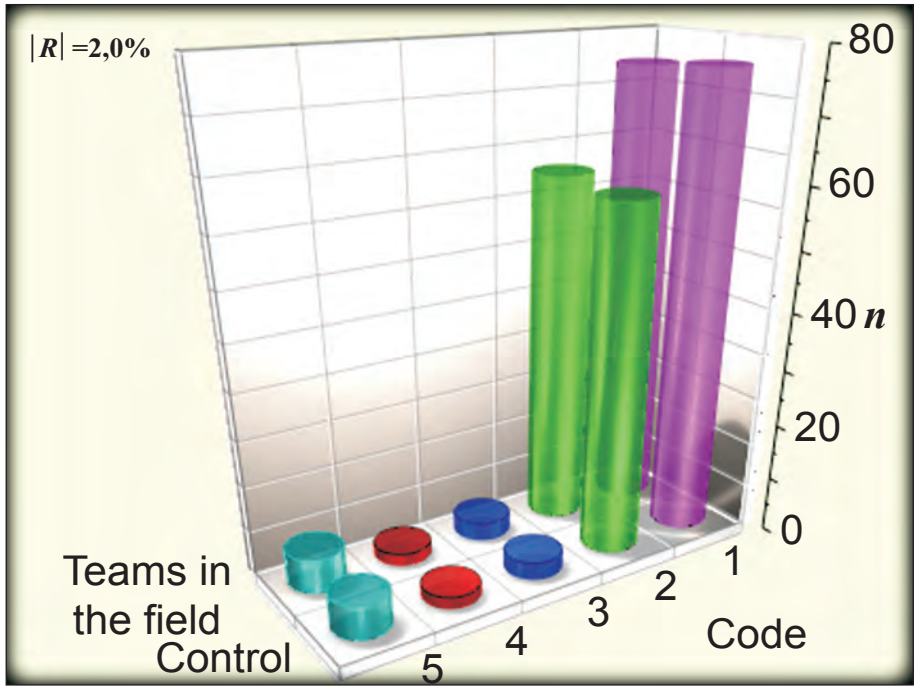



**Diagram 7.** Control of stand mixture

**Legend:** Code 1 - pure broadleaved stand, Code 2 - mixed broadleaved stand, Code 3 - mixed broadleaved and coniferous stand, Code 4 - mixed coniferous stand, Code 5 - pure coniferous stand

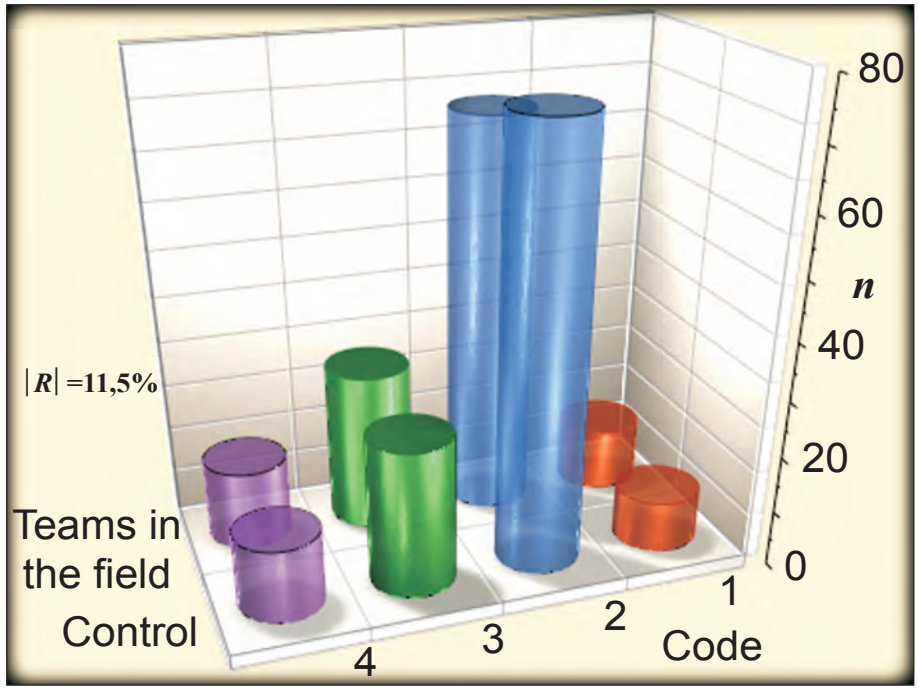



**Diagram 8.** Control of stand canopy

**Legend:** Code 1 - Dense (0.8-1.0), Code 2 - Complete (0.6-0.8), Code 3 - Incomplete (0.4-0.6), Code 4 - Scattered (<0.4)

# 6.
# GROWING STOCK OF THE REPUBLIC OF SERBIA

## 6.1. Forest cover percentage in Serbia

Forest cover percentage in Serbia is considered as medium. 29.1% of the total area is under forest (in Vojvodina 7.1%, and in central Serbia 37.6%). Other wooded land, which by international definition includes also thickets and brushland, includes 4.9% of the territory, which is altogether 34.0%, or 36.3% of the area of productive land in Serbia (Table 1, Appendices 2-4).

The increase of forest cover percentage compared to the reference year 1979 is 5.2%, which by all means had a positive effect on the state and quality of the environment in general. The increase of the area under forest is a part of the process present in the surroundings, where forest cover percentage increased by 3-5% in the past 20-30 years. This was caused, in addition to regular planned operations on the increase of forest cover percentage, by re/afforestation, by the population decrease in rural areas, particularly in hilly and mountainous areas, and also by the decline and absence of extensive agrarian production in that belt. The lack of cadastre updating should also be taken into account, particularly in the case of actual land use categories.

Forest cover percentage is, compared to the global aspect, close to the global percentage which accounts for 30%, but it is considerably lower than the European percentage, which is 46% (2000). Forest cover percentage in Serbia is similar to that in Romania (28.0%), Spain (28.8%), Norway (28.9%), France and Greece (27.9%).

**Figure 19**

In Serbia, forest cover percentage amounts to 0.3 *ha per capita*. In Austria, it is 1.01 *ha*, Bosnia and Herzegovina 1.38 *ha*, Bulgaria 1.31 *ha*, Croatia 1.25 *ha*, Check Republic 0.75 *ha*, Finland 5.91 *ha*, Germany 0.92 *ha*, Norway 6.93 *ha*, Romania 1.02 *ha*, Slovenia 1.01 *ha*, Switzerland 0.54 *ha*, and Russia 11.11 *ha per capita*.

An important indicator of forest cover percentage is its qualitative structure, and forest origin is one of the attributes that determine the forest cover percentage in the qualitative sense. The dominant growing stock in Serbia are coppice forests with 64.7% of the total forest area, natural high stands cover 27.5%, and artificially established stands (with plantations) cover 7.8%.

Average forest density in Serbia is 939 trees per *ha*: it is 596 $trees \cdot ha^{-1}$ in natural high forests, 1,090 $trees \cdot ha^{-1}$ in coppice forests, and 896 $trees \cdot ha^{-1}$ in artificially established stands.

Average forest volume is 161 $m^3 \cdot ha^{-1}$, 254 $m^3 \cdot ha^{-1}$ in high forests, 124 $m^3 \cdot ha^{-1}$ in coppice forests, and 136 $m^3 \cdot ha^{-1}$ in

artificially established stands (plantations). Average volume in the inventory area in 1979 was 115 $m^3 \cdot ha^{-1}$. Average volume in forests of some European countries is the following: Bosnia and Herzegovina 96 $m^3 \cdot ha^{-1}$, Austria 309 $m^3 \cdot ha^{-1}$, Bulgaria 128 $m^3 \cdot ha^{-1}$, Croatia 200 $m^3 \cdot ha^{-1}$, France 196 $m^3 \cdot ha^{-1}$, Slovenia 282 $m^3 \cdot ha^{-1}$ and Switzerland 333 $m^3 \cdot ha^{-1}$ (2000).

Average current volume increment in Serbia is 4.0 $m^3 \cdot ha^{-1}$, in high forests 5.5 $m^3 \cdot ha^{-1}$, in coppice forests 3.1 $m^3 \cdot ha^{-1}$ and in artificially established stands 7.1 $m^3 \cdot ha^{-1}$. Increment percentage at the total level is relatively high and accounts for 2.5%, and it is also high in the main forest categories: in high forests 2.2%, in coppice forests 2.5% and in artificially established stands 5.2% (Table 3, Appendix 2). Volume increment in the area of the National Forest Inventory in 1979 was 3.09 $m^3 \cdot ha^{-1}$. Average current volume increment in some European countries is as follows: Austria 8.16 $m^3 \cdot ha^{-1}$, Bulgaria 3.28 $m^3 \cdot ha^{-1}$, Croatia 4.22 $m^3 \cdot ha^{-1}$, France 6.38 $m^3 \cdot ha^{-1}$, Slovenia 5.92 $m^3 \cdot ha^{-1}$, and Switzerland 7.69 $m^3 \cdot ha^{-1}$ (2000).

In Serbia 6.7 trees per *ha* have diameters below 5 *cm* (Table 13, Appendix 2).

## 6.2. Forests by ownership

Total forest area in Serbia amounts to 2,252,400 *ha* of which state forests cover 1,194,000 *ha* or 53.0%, and private forests cover 1,058,400 *ha* or 47.0%. The ratio of state forests to private forests in some European countries is the following: Austria 17.5%:82.5%, Croatia 75.5%:24.5%, Bosnia and Herzegovina 78.4%:21.6%, Check Republic 84.1%:15.9%, France 26.2%:73.8%, Romania 94.6%:5.4%, Slovenia 30.0%:70.0%, Finland 28.9%:71.1% (2000).

Compared to previous reference reports (45.2% state forests:54.8% private forest), the ratio of forest ownership changed in favour of private forests by 1.8%. In general, compared to the reference year 1979, the increase of area under forest is 356,863 *ha* of state forests and 108,748 *ha* of private forests.

**Figure 20**

In general, the condition of state forests can be characterised as satisfactory, which is supported by the fact that the average volume in state forests is 185 $m^3 \cdot ha^{-1}$, and current volume increment 4.5 $m^3 \cdot ha^{-1}$. Increment percentage is 2.4%, which is generally rather high, and proves the stability of stands in Serbian state forests.

Private forests are poorer in the quantitative sense, with average volume 133 $m^3 \cdot ha^{-1}$ and current volume increment 3.5 $m^3 \cdot ha^{-1}$. Increment percentage in private forests is somewhat higher than in state forests and accounts for 2.6%. The reasons are the dominant coppice origin and age structure.

It can be concluded that the average volume increased considerably compared to the reference year (1979), when the average volume in state forests was 136 $m^3 \cdot ha^{-1}$, current volume increment 3.37 $m^3 \cdot ha^{-1}$, and increment percentage 2.5%. In private forests in that period average volume was 91 $m^3 \cdot ha^{-1}$, current volume increment 2.32 $m^3 \cdot ha^{-1}$, and increment percentage was also 2.5%.

As for the annual changes, it can be concluded that the average volume increased in state forests by 2 $m^3 \cdot ha^{-1}$ annually, and in private forests by 1.6 $m^3 \cdot ha^{-1}$ annually. These facts should be manipulated

with care, because of the previous data collection procedure and intensity (till 1979), particularly in private forests, which was based on stand inventory data, and the method of assessment was applied in the unmanaged part of the area in state forests. Private forests were managed and inventoried minimally by the inventory 1947-1949, and the statistical data per years and periods were calculated by balance compared to the mentioned inventory.

**Figure 21**

Forest density, expressed by the number of trees per ha, was considerably higher in private forests and amounted to 1,011 *trees·ha*$^{-1}$ compared to 875 *trees·ha*$^{-1}$ in state forests. The cause of the higher number of trees per *ha* in private forests is their more unfavourable age structure (younger forests), the dominant coppice origin and, for this reason, the dominant even-aged stand structure.

## 6.3. Forests by origin

In Serbia, high stands occupy 27.5%, coppice regenerated stands 64.7%, artificially established stands 6.1% and plantations (poplar and willow clones) 1.7% of the total forest area. The above forest categories differ significantly in production effects. The value of average volume in high forests is 254 $m^3 \cdot ha^{-1}$, in coppice forests 124 $m^3 \cdot ha^{-1}$, plantations of conifers and broadleaves 127 $m^3 \cdot ha^{-1}$ and in poplar and willow clonal plantations 172 $m^3 \cdot ha^{-1}$. Current volume increment in naturally regenerated high stands is 5.5 $m^3 \cdot ha^{-1}$, in coppice forests 3.1 $m^3 \cdot ha^{-1}$, plantations 6.5 $m^3 \cdot ha^{-1}$, and in clonal plantations 9.0 $m^3 \cdot ha^{-1}$. Regarding the differences in production effects, it can be concluded that the loss in coppice forests is about 3,500,000 $m^3$ per year compared to high forests, and there are also the differences in the quality of actual production of both forest categories. The percentage of plantations is

**Figure 22**

a concern only at the local level, in forest areas and in state forests in which the percentage of plantations is higher than the country average.

It should be emphasised that the majority of European countries (from 39 to 21) do not report

the coppice forest category. The percentage of coppice forests in some countries is the following: Albania 93.9%, Bulgaria 10.0%, Croatia 12.8%, Hungary 29.0%, Italy 44.1%, Portugal 53.3%, Holland 28.6%, Slovenia 13.3%, Moldavia 19.0%, Russia 1.9%.

The percentage of plantations by individual countries is the following: Austria 14.0%, Belgium 75.6%, Bulgaria 35.7%, Croatia 7.7%, Check Republic 95.8%, Finland 70.7%, France 26.9%, Germany 60.0%, Poland 94.2%, Slovakia 88.9%, Slovenia 6.7%, Switzerland 4.2%, Russia 28.0% (2000). The highest percentage of naturally regenerated high forests is recorded in Switzerland 87.9%, Slovenia 77.3%, Austria 76.0% and Croatia 71.8%.

### 6.3.1. State forests

Three categories of forests are differentiated in state forests: high naturally regenerated stands, natural coppice regenerated stands and plantations (artificially established stands).

The relative percentage by area of the dominant coppice forests is 51.5%, naturally regenerated high stands account for 37.1%, and the percentage of artificially established stands, i.e. plantations is considerably lower and accounts for 11.4% (Table 2.1, Appendix 2).

Relative indicators of volume and volume increment are far more favourable in high forests. Namely, high forests dominate in the total standing volume with 53.3%, coppice forests account for 37.9%, and artificially established stands account for 8.8%. In the total volume increment, the percentage of high forests is dominant and accounts for 46.0%, the percentage of coppice forests is 35.6%, and artificially established stands 18.4%. This is a considerably more favourable percentage compared to volume. Stand density, depending on the origin, amounts to: in natural high stands 576 trees per *ha*, in coppice stands 1,095 $trees \cdot ha^{-1}$, and in artificially regenerated stands 852 $trees \cdot ha^{-1}$.

Naturally regenerated high forests are characterised by high average volume, which is 266 $m^3 \cdot ha^{-1}$. In coppice forests, it is far lower and amounts to 136 $m^3 \cdot ha^{-1}$, and in artificially established stands, primarily limited by age structure, average volume is 144 $m^3 \cdot ha^{-1}$. These values are real and close to the values obtained by the reduction of data from general forest management plans drawn up by the analytical service of the Forest Directorate (Ministry of Agriculture, Forestry and Water Management) in 2006 (internal material), amounting to: natural high stands 258 $m^3 \cdot ha^{-1}$, coppice stands 136 $m^3 \cdot ha^{-1}$ and artificially established stands 116 $m^3 \cdot ha^{-1}$.

Average current volume increment in high forests is 5.6 $m^3 \cdot ha^{-1}$, in coppice forests 3.1 $m^3 \cdot ha^{-1}$, and in artificially established stands 7.3 $m^3 \cdot ha^{-1}$. Increment percentage in high forests is 2.1%, in coppice forests 2.3%, and in plantations 5.1%. Average current volume increment by the Forest Directorate internal documents (2006) is 5.3 $m^3 \cdot ha^{-1}$ in high forests, 3.6 $m^3 \cdot ha^{-1}$ in coppice forests and 5.3 $m^3 \cdot ha^{-1}$ in artificially established stands and plantations. A good congruence of the average values of volume and current volume increment in the two sources, except in the case of plantations, point to the reliability of the applied methodology in the first National Forest Inventory in Serbia.

Basically, from the aspect of current effects, it is evident that production capacity in coppice forests is used about 51%, compared to the volume in high forests, and from the aspect of increment, about 55%. The loss in production, in the cumulative sense, is 1,540,000 $m^3$ per year.

From the above, it is easy to recognise and define the basic strategic issues regarding the origin of state forests:

- The dominant percentage of coppice forests results in the decreased production effects by about 26% on the total area;
- Because of a considerable percentage of artificially established stands in which silvicultural and protection operations are urgent, and because of the unfavourable age structure, the adequate economic effects are not achieved.

### 6.3.2. Private forests

In the total growing stock of private forests, coppice stands dominate with 79.4%, high stands cover 16.9% of the total forest area, and the percentage of plantations and artificially regenerated stands is low and accounts for 3.7% (Table 2.7, Appendix 2).

A somewhat more favourable situation characterises the standing volume and volume increment. High stands account for 28.1% of the total volume,

coppice stands - 68.9% and artificially regenerated stands - 3.0%. In the total volume increment, high forests account for 24.6%, coppice 68.9%, and artificially regenerated stands 6.5%.

Stand density by categories of private forests is higher than that in state forests, because of the already mentioned reasons. In high natural stands, it is 646 trees per *ha*, in coppice forests 1,087 trees per *ha*, and in artificially established stands 1,047 trees per *ha*.

Naturally regenerated high stands are characterised by a substantial volume per unit area, but somewhat lower than that in the same category of state forests. This is caused, inter alia, by the more unfavourable altitudinal position of private forests, which are most often below the belt of state forests and occupy smaller complexes. Average volume in high forests is 222 $m^3 \cdot ha^{-1}$, in coppice forests 116 $m^3 \cdot ha^{-1}$, and in artificially regenerated stands 108 $m^3 \cdot ha^{-1}$.

Average value of current volume increment in naturally regenerated high stands is 5.1 $m^3 \cdot ha^{-1}$, in coppice forests 3.0 $m^3 \cdot ha^{-1}$, and in artificially established stands 6.1 $m^3 \cdot ha^{-1}$. Increment percentage is somewhat higher than in state forests and accounts for 2.3% in high stands, 2.6% in coppice stands and 5.6% in artificially established stands.

Production capacity in relation to actual production effect in coppice forests is about 52% of the volume and about 59% of the volume increment in high forests. This results in the production loss of about 1,765,000 $m^3$ annually, with the evident loss in quality at the present production level.

The strategic problems defined in state forests regarding the dominant percentage of coppice forests are even greater in private forests.

## 6.4. Forests by naturalness

Naturalness is a significant indicator of the attitude to total forest potentials in forest areas. A high degree of naturalness is a real indicator of bioecological stability and biodiversity conservation in the evaluated areas, and it is an indicator of sustainability maintenance, bearing in mind the modern aspect of this imperative.

According to the internationally adopted definition, all forests are divided in three categories of naturalness: forests without anthropogenic interventions (virgin forests), which cover only the area of 0.1% (1,200 *ha*), but which are, by all means, considerably larger in our conditions, if we take into account the total area of the stands included in the strict reserves, semi-natural forests, which cover 92.1% of the forest area, and artificially established soft broadleaf stands and plantations, which cover 7.8% of the total area under forests (Table 4, Appendix 2).

The lowest density, i.e. the number of trees per hectare, was measured in the first category (255 *trees*$\cdot ha^{-1}$), probably because of the development stage at the moment of measurement. The other two forest categories are considerably denser (896-943 *trees*$\cdot ha^{-1}$), which is conditioned, primarily, by the unfavourable age and unfavourable regeneration method.

Natural forests are characterised by a relatively high average volume of 556 $m^3 \cdot ha^{-1}$, semi-natural forests by medium volume of 163 $m^3 \cdot ha^{-1}$, and the lowest average volume was measured in artificially established stands and plantations of soft broadleaves - 136 $m^3 \cdot ha^{-1}$. Also, the average value of current volume increment is the highest in natural stands and amounts to 7.9 $m^3 \cdot ha^{-1}$, in artificially established stands and plantations it is 7.1 $m^3 \cdot ha^{-1}$, and in semi-natural stands it is relatively low and amounts to 3.8 $m^3 \cdot ha^{-1}$. Increment percentage is relatively high and amounts to 5.2% in artificially established stands and plantations, in semi-natural stands 2.3%. In natural stands, this value is low and attains only 1.4%, primarily thanks to the development stage of these forests.

## 6.5. Forests by preservation status

Total area of well-preserved forests in Serbia accounts for 70.6%. Their density is considerable and amounts to 1,222 trees per *ha*. The percentage of this forest category in total volume is 69.7%, and in volume increment 78.4% (Table 5, Appendix 2).

Total area of insufficiently stocked forests in Serbia amounts to 608,000 *ha* or 27% of the total forest area. The average number of trees in these forests is far below the average of well-preserved forests and amounts to 277 *trees*$\cdot ha^{-1}$. The percentage of this forest category in total volume is 29.1%, and in the total

volume increment it is considerably lower and amounts to 20.7%. Average volume increment, with the reserve regarding its assessment, is lower by 1.4 $m^3 \cdot ha^{-1}$ or 31.1% than in well-preserved forests, and increment percentage is lower by 35.7%.

Devastated forests in Serbia cover the area of 55,200 *ha*, or 2.4% of the total covered area. The average number of trees in these forests is far below the values in well-preserved and insufficiently stocked forests and amounts to 74 trees per *ha*. The percentage of devastated forests in total volume and increment is low and amounts to 1.2% of volume and 0.9% of total volume increment. Compared to well-preserved stands, devastated forests use only about 30% of the production potential. The other adverse effects of degradation should not be neglected, especially regarding the sites and the stands.

### *High forests*

One of the basic problems in Serbia's forests is the medium level of preservation, primarily regarding the stand density. In high forests, the preservation status is moderate. Well-preserved high stands cover 54.3% of total forest area, insufficiently stocked high forests 43.1% and devastated high stands account for 2.6% or 16,400 *ha* (Table 3.1, Appendix 2).

Stand density differs by the above categories and in well-preserved high stands there are 889 trees per *ha*, 259 *trees*$\cdot ha^{-1}$ in insufficiently stocked high forests and 74 *trees*$\cdot ha^{-1}$ in devastated stands. In the assessment, the structural characteristics and age in even-aged forests should be taken into account.

The value of average volume does not agree with the previous statement, because it is 253 $m^3 \cdot ha^{-1}$ in well-preserved stands, and 260 $m^3 \cdot ha^{-1}$ in insufficiently stocked stands, which is an anomaly if observed one-sidedly. Consequently, in this assessment, it is necessary also to analyse the other attributes. In devastated forests, the average volume is 152 $m^3 \cdot ha^{-1}$.

**Figure 23**

Average value of current volume increment in high forests is 6.4 $m^3 \cdot ha^{-1}$, in insufficiently stocked forests 4.4 $m^3 \cdot ha^{-1}$, and 2.1 $m^3 \cdot ha^{-1}$ in devastated forests. If the increment in well-preserved forests is assigned index 100, insufficiently stocked forests use 69% of the production potential, and devastated forests use only 33%. The problem of insufficiently stocked forests to some extent elucidates also the values of increment percentage by the above categories. Namely, according to classical studies in the past period, increment percentage lower than 2% signalises the unfavourable phenomena in the productivity, and potentially also in any other sense (stability, health, etc.).

### *Coppice forests*

Coppice stands are also classified in three categories by preservation status. Well-preserved coppice stands cover 76.3% of forest area, insufficiently stocked coppice stands occupy 21.3%, and devastated coppice stands 2.4%. This is supported by the significant difference in stand density. In well-preserved coppice stands, average density is 1,344 trees per *ha*, in insufficiently stocked coppice stands 293 *trees*$\cdot ha^{-1}$, and in devastated coppice forests, it is only 75 *trees*$\cdot ha^{-1}$ (Table 3.6, Appendix 2).

Average volume in well-preserved coppice forests in Serbia amounts to 133 $m^3 \cdot ha^{-1}$, in insufficiently stocked coppice forests 103 $m^3 \cdot ha^{-1}$ and in devastated

coppice forests only 42 $m^3 \cdot ha^{-1}$. Compared to well-preserved coppice forests, production effect in insufficiently stocked forests is about 77%, and in devastated coppice forests about 32%.

Average value of current volume increment amounts to 3.5 $m^3 \cdot ha^{-1}$ in well-preserved coppice forests, 1.8 $m^3 \cdot ha^{-1}$ in insufficiently stocked coppice forests, and 0.7 $m^3 \cdot ha^{-1}$ in devastated coppice forests. In insufficiently stocked coppice forests, production effect is by about 49% lower than in well-preserved forests, and in devastated stands it is lower by 80%. This is supported by the data on increment percentage in the above forest categories, as well as by their differences.

***Artificially established stands***

The most favourable state from the aspect of preservation is assessed in artificially established stands. Well-preserved stands cover 80.6%, insufficiently stocked forests 16.9%, and devastated forests 2.5% of the area of this forest category (Table 3.11, Appendix 2).

The differences in density are similar to those in coppice forests. In well-preserved stands, density is 1,054 trees per *ha*, in insufficiently stocked forests 267 *trees*$\cdot ha^{-1}$, and in devastated forests 64 *trees*$\cdot ha^{-1}$.

Compared to the differences in density, the differences in volume are lower. The volume in well-preserved artificially established forests amounts to 138 $m^3 \cdot ha^{-1}$, 130 $m^3 \cdot ha^{-1}$ in insufficiently stocked forests, and 99 $m^3 \cdot ha^{-1}$ in devastated forests. The reason for this, *inter alia*, can be the age difference.

Average current volume increment is also different. It is high in well-preserved forests in which it amounts to 7.6 $m^3 \cdot ha^{-1}$, in insufficiently stocked forests - 4.9 $m^3 \cdot ha^{-1}$ and in devastated forests - 4.3 $m^3 \cdot ha^{-1}$. High values of increment percentage, which on average amounts to 5.2%, were assessed in all three categories.

**Figure 24**

## 6.5.1. State forests

All forests in the National Forest Inventory are classified by density in three categories: well-preserved stands which cover 67.3%, insufficiently stocked stands with the density at the level of critical density with 29.9% and devastated stands which occupy 2.8% of the state forest area (Table 2.2, Appendix 2).

Average density of well-preserved stands is favourable and amounts to 1,177 trees per *ha*, average density of insufficiently stocked forests is considerably lower and amounts to 271 *trees*$\cdot ha^{-1}$, and the density of devastated stands is far below the critical minimum and amounts to 74 *trees*$\cdot ha^{-1}$. It should be taken into account that the parameters, such as the age structure of these forests, were not included in this evaluation. Average volume is the following: 181 $m^3 \cdot ha^{-1}$ in well stocked stands, 203 $m^3 \cdot ha^{-1}$ in insufficiently stocked stands and 103 $m^3 \cdot ha^{-1}$ in devastated stands.

Average value of current volume increment in well-preserved stands is 5.0 $m^3 \cdot ha^{-1}$, in insufficiently stocked stands 3.6 $m^3 \cdot ha^{-1}$, and in devastated stands 1.8 $m^3 \cdot ha^{-1}$. Volume increment percentage in well-preserved stands is 2.8%, in insufficiently stocked stands 1.8% and in devastated stands 1.8%.

As. in simple terms, the average volume in insufficiently stocked forests is illogically somewhat higher than in well-preserved forests, the production

relations can be elucidated by the increment and increment percentage, as their values are, quite logically, considerably lower in insufficiently stocked forests.

The final evaluation should take into account the fact that, compared to well-preserved stands, production loss per year in insufficiently stocked and devastated forests is 608,000 $m^3$. This should also be supported by the ecological aspect of the bioecological (in)stability which is directly proportional to stand density, taking into account also the negative connotation of the previous assessment of the unfavourable degree. The problem of insufficiently stocked forests is associated with weeding problem and, in this sense, also the more difficult and sometimes also impossible natural regeneration.

The presence of insufficiently stocked stands on one third of the area of state forests is also one of the basic, long-term problems of state forest management.

### 6.5.2. Private forests

Well-preserved stands cover 74.3%, insufficiently stocked stands, whose density is at the level of critical density, cover 23.7%, and devastated stands cover 2.0% of private forest area (Table 2.8, Appendix 2).

Average density of well-preserved stands is somewhat more favourable than that in state forests and amounts to 1,268 trees per *ha*, probably because of the more dominant coppice stands. In insufficiently stocked forests, it is considerably lower and amounts to 285 $trees \cdot ha^{-1}$. The density of devastated stands is far below the critical minimum - 73 $trees \cdot ha^{-1}$.

Average volume in well-preserved forests is 136 $m^3 \cdot ha^{-1}$, 132 $m^3 \cdot ha^{-1}$ in insufficiently stocked stands, and only 44 $m^3 \cdot ha^{-1}$ in devastated stands. The reason of the lower average volumes in all three forest categories compared to state forests should be, in addition to more dominant coppice stands, also a greater age difference in favour of state forests.

**Figure 25**

Current volume increment shows the regularities observed in state forests. It is 3.9 $m^3 \cdot ha^{-1}$ in well-preserved stands, 2.4 $m^3 \cdot ha^{-1}$ in insufficiently stocked stands and only 0.8 $m^3 \cdot ha^{-1}$ in devastated stands. Increment percentage is relatively high in well-preserved stands and amounts to 2.9%, 1.8% in insufficiently stocked stands, and 1.8% in devastated stands. The real loss in productivity, considering the difference in density, is about 443,000 $m^3$ annually, with other negative consequences already noted for state forests. Obviously, the significant under-stocking of private forests is one of the long-term strategic problems of forest management.

## 6.6. Forests by mixture

According to the definition applied at the national level, in mixed stands, the percentage of the volume of one or more other tree species is above 10%. However, according to international criteria, this proportion is far stricter, so mixed stands are the stands in which the percentage of other species in total volume exceeds 25%.

All forests in Serbia are classified into five categories as follows: pure broadleaf stands dominate with 59,0%, mixed broadleaf stands cover 29.3%, pure coniferous stands cover 8.7%, mixed broadleaf and coniferous stands cover 2.4% and mixed stands of conifers cover only 0.6% of the total forest area. Stand density is

uniform by individual categories and ranges from 854 trees per *ha* in pure broadleaf stands to 1,127 *trees·ha*$^{-1}$ in mixed broadleaf stands (Table 6, Appendix 2). The percentage of broadleaves in the total growing stock by volume is 87.7%, and conifers 12.3% (Table 7, Appendix 2). This ratio in some European countries is the following: Austria 18.1:81.9, Bosnia and Herzegovina 44.1:55.9, Bulgaria 59.5:40.5, Croatia 86.3:13.7, France 64.2:35.8, Slovenia 50.2:49.8 and Poland 20.8:79.2 (2000).

***High forests***

High forests are classified into five categories of forest mixture. The most represented category is high pure broadleaf stands which cover 64.5% of the area covered with high forests. Significant and, at the same time, equal percentages of 14.7%, occur in pure coniferous stands and high mixed broadleaf stands. The percentage of mixed forests of broadleaves and conifers is small and, compared to the natural potential, insufficient - 4.6%, particularly the percentage of mixed coniferous stands which is 1.5% (Table 3.2, Appendix 2).

Thirty-eight tree species are identified in high forests in Serbia (Table 3.3, Appendix 2.). The base of the growing stock consists of autochthonous tree species: broadleaves - beech, different oaks, narrow-leaved ash and hornbeam, and conifers - spruce, fir, Austrian pine and Scots pine. Introduced species occurring in high forests in minimum are black locust and Douglas-fir.

Average density of natural high forests is 596 *trees·ha*$^{-1}$, and it ranges from 538 *trees·ha*$^{-1}$ in pure broadleaf stands to 785 *trees·ha*$^{-1}$ in mixed stands of conifers.

The average volume is relatively high and, compared to the average value in high forests of 254 $m^3 \cdot ha^{-1}$, it ranges from 217 $m^3 \cdot ha^{-1}$ in mixed broadleaf stands to 336 $m^3 \cdot ha^{-1}$ in mixed stands of conifers. It can be claimed with sufficient reliability that the average volume in mixed forests of broadleaves and conifers of 299 $m^3 \cdot ha^{-1}$ is insufficient, considering the site potential of these forests. It can also be concluded that the obtained volume is real, because similar values were measured in the stand inventory in beech-fir forests (308 $m^3 \cdot ha^{-1}$). In mixed spruce, fir and beech forests, it is somewhat higher and amounts to 353 $m^3 \cdot ha^{-1}$ in state forests (Medarević *et al.*, 2005).

Volume increment in high forests is relatively high and amounts to 5.5 $m^3 \cdot ha^{-1}$. It ranges from 4.5 $m^3 \cdot ha^{-1}$ in high mixed broadleaf stands to 9.4 $m^3 \cdot ha^{-1}$ in mixed stands of conifers. Increment percentage is relatively high and amounts to 2.2% at the level of high forests. Only in high pure broadleaf forests it is somewhat lower than 2.0% and amounts to 1.9%.

***Coppice forests***

The state of coppice forests is far more unfavourable. They are logically composed of only three mixture types: pure broadleaf stands with 60.4%, mixed broadleaf stands with 38.9%, and mixed broadleaf and coniferous stands with 0.7% of the area covered with coppice forests (Table 3.7, Appendix 2).

Average density of coppice forests is 1,090 trees per *ha*, which is twice higher than that in high forests. It is rather uniform in coppice pure broadleaf stands (1,020 *trees·ha*$^{-1}$) and in coppice mixed broadleaf stands (1,189 *trees·ha*$^{-1}$).

The average volume in the above mixture types of coppice forests is also equal and ranges 114-135 $m^3 \cdot ha^{-1}$. The values of current volume increment are also uniform, i.e. 3.2 $m^3 \cdot ha^{-1}$ in coppice pure broadleaf forests, 2.9 $m^3 \cdot ha^{-1}$ in coppice mixed broadleaf forests and somewhat higher in coppice mixed forests of broadleaves and conifers, amounting to 4.4 $m^3 \cdot ha^{-1}$.

***Artificially established stands***

Artificially established stands (plantations) are also classified into five mixture categories. Logically, pure stands of conifers are the most represented ones and occupy 59.8% of the area, then pure broadleaf stands, which occupy 27.5% of the area, mixed broadleaf and coniferous stands - 8.9%, mixed stands of conifers - 2.7% and mixed broadleaf stands - 1.1% of the area (Table 3.12, Appendix 2). It should be noted that pure broadleaf stands also include 39,200 *ha* or 22.4% of intensive poplar and willow plantations (Table 3.14 Appendix 2), which are actually not this category and represent a special stand type.

Thanks to, inter alia, high degree of preservation, artificially established stands are characterised by high density which ranges from 1,044-1,494 *trees·ha*$^{-1}$, except in pure broadleaf stands where intensive poplar

and willow plantations are dominant, and their density is only 445 *trees·ha*$^{-1}$.

Volume of artificially established mixed stands is relatively low and ranges 115-155 $m^3 \cdot ha^{-1}$, except in mixed stands of conifers, where the average volume is relatively high and amounts to 195 $m^3 \cdot ha^{-1}$.

Average current volume increment compared to other forest categories is high and ranges from 5.0-8.6 $m^3 \cdot ha^{-1}$. Current volume increment in intensive poplar plantations in Vojvodina, where they are the dominant category of pure broadleaf stands, is 11.0 $m^3 \cdot ha^{-1}$ (Tomović *et al.*, 2007). Increment percentage is very high and ranges from 4.2-5.4%.

## 6.6.1. State forests

State forests in Serbia consist of all five mixture types: pure broadleaf stands which cover 60.2%, pure coniferous stands 12.3%, mixed broadleaf stands 23.0%, mixed broadleaf and coniferous stands 3.6%, and mixed stands of conifers which cover 0.9% of the area of state forests (Table 2.3, Appendix 2). The dominant type is pure broadleaf stand which is considered as bioecologically more instable than mixed forests.

Density in mixed broadleaf stands is 1,138 trees per *ha*, mixed broadleaf and coniferous stands 992 *trees·ha*$^{-1}$, pure coniferous stands 866 *trees·ha*$^{-1}$, pure broadleaf stands 770 *trees·ha*$^{-1}$ and mixed stands of conifers 803 *trees·ha*$^{-1}$. As a rule, mixed forests are denser than pure forests, which is, inter alia, thanks to their good social characteristics from the aspect of spatial relations of trees.

Average volume is the highest in mixed stands of conifers and amounts to 316 $m^3 \cdot ha^{-1}$, followed by mixed broadleaf and coniferous stands - 233 $m^3 \cdot ha^{-1}$, pure broadleaf stands - 198 $m^3 \cdot ha^{-1}$ and pure coniferous stands - 183 $m^3 \cdot ha^{-1}$, and it is the lowest in mixed broadleaf stands, where it is 142 $m^3 \cdot ha^{-1}$. So it can be concluded that the average volume in mixed forests of broadleaves and conifers is insufficient if it is taken into account that they are mixed forests of fir, spruce and beech.

**Figure 26**

Average value of current volume increment by individual forest categories is the following: it is the highest in mixed stands of conifers and amounts to 9.3 $m^3 \cdot ha^{-1}$, in pure coniferous stands 7.3 $m^3 \cdot ha^{-1}$, in mixed broadleaf and coniferous stands 6.1 $m^3 \cdot ha^{-1}$, in pure broadleaf stands 4.3 $m^3 \cdot ha^{-1}$, and it is the lowest in mixed broadleaf stands and amounts to 3.2 $m^3 \cdot ha^{-1}$. Increment percentage is relatively high and ranges from 2.2% in pure broadleaf stands to 4.0% in pure coniferous stands.

In this context, another strategic issue of forests in Serbia should be defined. It is the domination of pure stands, as ecologically, functionally, and even productively inferior stand forms, wherefore the presence and forcing of individual trees of other tree species in them is of particular management significance.

## 6.6.2. Private forests

Private forests consist of the same mixture types as state forests, but with different relative proportions. Pure broadleaf stands are also the most represented stands by area and cover 57.6%, then mixed broadleaf stands 36.5%, pure coniferous stands 4.6%, mixed broadleaf and

coniferous stands 1.0% and mixed stands of conifers, which cover only 0.3% of the area of private forests (Table 2.9, Appendix 2). The domination of broadleaf stands is logical, because private forests, as already mentioned, occupy somewhat lower positions.

The densest private forests are mixed stands of conifers in which the density is 1,253 trees per *ha*, mixed broadleaf stands 1,119 *trees·ha*$^{-1}$, pure broadleaf stands 952 *trees·ha*$^{-1}$, mixed broadleaf and coniferous stands 907 *trees·ha*$^{-1}$, and pure coniferous stands 902 *trees·ha*$^{-1}$. In general, it can be concluded with sufficient reliability that in private forests, broadleaf stands are denser than coniferous stands.

Average volume by individual mixture categories is lower than that in state forests. The highest average volume was assessed in mixed stands of conifers - 174 $m^3 \cdot ha^{-1}$ , in pure coniferous stands - 170 $m^3 \cdot ha^{-1}$, in mixed broadleaf and coniferous stands - 153 $m^3 \cdot ha^{-1}$, in pure broadleaf stands - 140 $m^3 \cdot ha^{-1}$ and in mixed broadleaf stands - 118 $m^3 \cdot ha^{-1}$.

Average current volume increment in mixed stands of conifers is high and amounts to 8.4 $m^3 \cdot ha^{-1}$. In pure coniferous stands, the productivity per year is also high and amounts to 7.6 $m^3 \cdot ha^{-1}$, in mixed forests of broadleaves and conifers it is somewhat lower than in the same category of state forests and amounts to 4.4 $m^3 \cdot ha^{-1}$, it is 3.4 $m^3 \cdot ha^{-1}$ in pure broadleaf stands, and it is 3.0 $m^3 \cdot ha^{-1}$ in mixed broadleaf stands. Increment percentage is high in all the above forest categories and ranges from 2.4-4.8%.

## 6.7. Forests by tree species

According to the National Forest Inventory, 49 tree species are identified in Serbia. Broadleaf species (40) dominate over coniferous species (9). The presence of the identified tree species in the total growing stock is not uniform. The dominant species is beech and its percentage in total volume is 40.5%, and in volume increment 30.6%. It is followed by Turkey oak which accounts for 13.0% of volume and 11.4% of volume increment, sessile oak with 5.9% of volume and 6.1% of increment, Hungarian oak - 5.8% of volume and 5.7% of volume increment, hornbeam with 4.2% of volume and 3.7% of volume increment, black locust - 3.1% of volume and 5.7% of volume increment, common oak - 2.5% of volume and 1.7% of increment and narrow-leaved ash - 1.6% of volume and 1.7% of current volume increment. The most represented coniferous species is spruce. Its percentage accounts for 5.2% of volume and 6.7% of volume increment, Austrian pine and Scots pine account for 4.5% of total volume and 9.8% of volume increment. Fir accounts for 2.3% of volume and 2.2% of volume increment. The share of the clones of Euramerican poplars is 1.7% of volume and 3.7% of volume increment. The percentage of other tree species is 1% or less than 1% and therefore their sustainability in the growing stock requires caution from the management aspect (Table 7, Appendix 2). In general, although the relative percentage of introduced species (8) in the growing stock of Serbia is significant, their presence is not a problem of strategic character, but it is necessary to control the potential spreading of introduced and other species in Serbian forests and the previous experience in this field is very important.

In natural high forests there are 38 tree species, of which only two are allochthonous. As expected, the most represented species is beech accounting for 57.1% of total volume and 49.6% of volume increment. Other tree species individually account for less than 10% of the growing stock of high forests in Serbia, and only 10 species account for more than 1% (Table 3.3, Appendix 2).

Coppice forests consist of 47 tree species, including also conifers, which could be considered as illogical. However, conifers were introduced at some localities to the undergrowth of coppice forests, or are autochthonous in the units where, due to the absence of regular tending measures, they reoccupied the forest space which belonged to them in the past. In coppice forests, the proportion of individual species is somewhat more uniform than that in high forests. Beech is also the dominant species accounting for 31.3% of total volume and 24.6% of total volume increment, but also the percentage and Turkey oak is considerable with 22.4% of volume and 20.5% of volume increment. Individual percentage of other tree species is less than 10%. Total presence of conifers in these forests is 0.2% of volume and 0.6% of volume increment (Table 3.8, Appendix 2).

If different poplar clones and cultivars, which are raised in intensive plantations under the common name Euramerican poplars are excluded, as they are actually a special stand entity, artificially established

stands (plantations) consist of 36 tree species. Coniferous tree species dominate and account for 83.1% of total volume and 88.7% of current volume increment, i.e.: Austrian pine 44.2% of volume and 51.7% of volume increment, spruce 18.2% of volume and 18.1% of volume increment, Scots pine 14.4% of volume and 14.3% of current volume increment and Weymouth pine and Douglas-fir together - 4.7% of volume and 3.7% of volume increment. The most represented broadleaf species is black locust with 3.7% of volume and 3.3% of volume increment (Table 3.13, Appendix 2).

Intensive poplar plantations account for 1.7% of volume of the total forest area in Serbia and 3.7% of volume increment (Table 7, Appendix 2.).

## 6.7.1. State forests

According to the National Forest Inventory, there are 46 identified tree species in state forests (Table 2.4, Appendix 2), but according to the previous works on stand inventory, started in mid 19th century, the number of identified tree species was 68, of which 7 (15) are allochthonous species. In the total growing stock of state forests, allochthonous species account for 4.4% by volume (0.41% according to stand inventory), which can be kept under control at the national level by planned measures. It is obvious that this condition is even more favourable in private forests, if it is borne in mind that this forest category has been more extensively utilised. At the same time, it can be concluded that only 14 (10) tree species of the identified 46 (68) in state forests in Serbia account for almost 90% of the growing stock by volume. These species, without major limitations and without major negative effects on diversity, can be utilised according to plans of commercial felling. They are: beech, sessile oak, Turkey oak, common oak, hornbeam, Hungarian oak, narrow-leaved ash, silver lime, black locust, Austrian pine, Scots pine, spruce and fir. Different poplar clones and cultivars should, by all means, be added to this list and the more liberal harvesting regime also refers to other introduced species, except if they are endangered at the global level. By all means, the wider, multiple-use concept should be taken into account in planning the sustainable forest management. Other tree species, because of their minimal percentage in the growing stock, should be preserved and first of all protected, and only then harvested under very controlled and limited regimes in the classical harvesting sense.

**Figure 27**

The values of current volume increment are similar to those of volume. Namely, 14 tree species account for 85.0% of the total production per year. The percentage of the dominant beech in the production is lower (36.3%) than its percentage in the total volume (47.7%). The percentage of conifers in volume increment (24.4%) is higher than in total volume (15.9%). Increment percentage of all tree species is relatively high and exceeds 2%, except for beech (some of the reasons are its very wide ecological amplitude and a considerable percentage of insufficiently stocked forests), common oak (mostly because of unfavourable age structure and insufficiently stocked forests), lime and white ash. Relatively high values of increment percentage indicate, inter alia, also the biological stability of forests in Serbia.

According to the experience in stand inventory and practical forest management planning, the number of introduced tree

species in Serbia amounts to 27 (including the clones). Their relatively modest percentage in the total growing stock, expressed by area and volume, can be evaluated as favourable, except in the case of soft broadleaf plantations which account for 2.6% of the total forest area and volume and 6.0% of current volume increment in Serbia. The number of introduced tree species is certainly far greater if we take into account the parks, arboreta and other nonforest areas, in which these species enhance the amenity value and increase the recreation facilities.

However, it should be emphasised that some of the introduced species by their aggressiveness (expansion) are becoming a serious threat to natural regeneration and survival of native tree species, especially ailanthus, black locust and amorpha.

## 6.7.2. Private forests

An identical number of tree species (46) was also identified in private forests, of which 40 tree species are autochthonous and only 6 are introduced (allochthonous) species.

As for the total volume, the percentage of individual species is not uniform, which is conditioned, primarily, by the biological characteristics of tree species regarding the site and the previous land use. The most represented tree species is beech with 29.2%, Turkey oak with 21,0%, Hungarian oak with 11.0%, sessile oak with 6.7%, black locust with 6.0%, and common hornbeam with 5,1%, and the conifers: Austrian pine with 2.9%, spruce with 2.7% and fir with 0.6% of the total volume of private forests. Other tree species have minimal individual percentages, below 2.0%. 34 tree species account for less than 1% and together they account for 8.2% of the total volume of private forests (Table 2.10, Appendix 2).

The domination of beech is less expressed in private forests, particularly compared to individual oaks, which is conditioned primarily by the differences in altitudinal belts in which private and state forests occur. Of allochthonous species, only the presence of black locust is considerable and the percentage of other 5 species in volume is low, so generally they do not present a special management problem.

Tree species whose percentage in total volume individually exceeds 1%, participate in the total volume increment with 89.9%. Just as in state forests, it was observed that beech participation in total production per year is lower (22.3%) than in total volume. In private forests, the percentage of conifers in total increment (11.4%) is higher than that in total volume (6.7%). Increment percentage in private forests is relatively high in almost all tree species (only willow and mountain ash there are increment percentage lower than 2.0%).

The suggestions presented in the analysis of the state by tree species in state forests regarding the harvesting regime are equally valid for private forests, but here a special problem is the definition of the above regime by the laws and legal regulations.

## 6.7.3. Endangered species of forest trees and shrubs

According to the IUCN categorisation, species are critically endangered if they are facing an extremely high risk of extinction in the wild in the near future. Protection of biodiversity, as an imperative in the sustainable forest utilisation and management, must be paid attention to in planned management of all other ecological, economic and social goals. In this sense, it is necessary to know which species of flora and fauna, their sites and populations, particularly individual tree species, belong to the categories of relic, endemic, rare and endangered species (Table 3).

**Table 3.** Relic, endemic, rare and endangered species of forest trees and shrubs (2000)

| № | Tree and shrub species | Category |
|---|---|---|
| 1. | Sticky alder - *Alnus glutinosa* | rare, endangered |
| 2. | White poplar - *Populus albae* | rare, endangered |
| 3. | Gray poplar - *Populus canestens* | rare |
| 4. | Common walnut - *Juglans regia* | rare, endangered |
| 5. | Wild cherry - *Prunus avium* | at risk |
| 6. | Wild pear - *Pyrus pyraster* | at risk |
| 7. | Wild apple - *Malus silvestris, Pyrus malus* | rare, endangered |
| 8. | Italian plum - *Prunus pseudoarmeniaca* | rare, endangered |
| 9. | Wild service tree - *Sorbus torminalis* | at risk |
| 10. | Mountain ash - *Sorbus aucuparia* | rare |
| 11. | Common whitebeam - *Sorbus aria* | at risk |
| 12. | Aspen - *Populus tremula* | at risk |

**Table 3.** Relic, endemic, rare and endangered species of forest trees and shrubs (2000)

| № | Tree and shrub species | Category |
|---|---|---|
| 13. | Birch - *Betula pendula* | rare, endangered |
| 14. | Turkish hazel - *Corylus colurna* | Tertiary relic |
| 15. | White ash - *Fraxinus excelsior* | rare, endangered |
| 16. | Pubescent oak - *Quercus pubescens* | rare, endangered |
| 17. | Vergilius's oak - *Quercus virgiliana* | rare, endangered |
| 18. | French maple - *Acer monspesulanum* | rare |
| 19. | Italian maple - *Acer optusatum* | subendemic |
| 20. | Norway maple - *Acer platanoides* | rare, endangered |
| 21. | Balkan maple - *Acer intermedium* | endemic |
| 22. | Balkan maple - *Acer heldreichii* | endemic |
| 23. | Serbian spruce - *Picea omorica* | relic, endemic |
| 24. | Macedonian pine - *Pinus peuce* | endemic |
| 25. | White-bark pine - *Pinus heldreichii* | endemic |
| 26. | Mountain pine - *Pinus mugo* | at risk |
| 27. | Yew - *Taxus baccata* | Tertiary relic |
| 28. | Smooth-leaved elm - *Ulmus minor* | rare, endangered |
| 29. | Wych elm - *Ulmus montana* | rare |
| 30. | European white elm - *Ulmus effusa* | rare, endangered |
| 31. | European hackberry - *Celtis australis* | endemic |
| 32. | Spurge laurel - *Daphne laureola* | relic |
| 33. | Holly - *Ilex aquifolium* | relic |
| 34. | Hop hornbeam - *Ostrya carpinifolia* | relic |
| 35. | Laurel cherry - *Prunus laurocerasus* | relic |
| 36. | Bladdernut - *Staphylea pinnata* | relic |
| 37. | Caucasian lime - *Tilia caucasica* | relic |
| 38. | Oriental plane - *Platanus orientalis* | rare |

Table 3 indicates clearly the great abundance of tree species which, by their individual presence, enrich the growing stock in Serbia, and which are simultaneously in these categories. The analysis shows that, of the total number of species (38), 12 species are rare and threatened, 5 rare, 9 relic, 6 endemic and 6 species are at risk.

The planning and management attitude to the above species and their sites should be extremely cautious and balanced, in harmony with their position in the concrete forest ecosystems, from the social aspect. Their status should be identified by legal regulations which widely define the policy to forest and to sustainable utilisation of total forest potentials in forest areas.

## 6.8. Forests by stand categories

All forests, according to the National Forest Inventory Manual, differ also by stand categories, defined according to the principal tree species in the stand, regardless of the percentage of other species.

Pursuant to this criterion, the National Forest Inventory has identified 20 stand categories in Serbia, from the belt of (line) willow forests in the riparian areas to the belt of spruce forests at the upper limit of forest communities.

The dominant category by this indicator are also forests of beech, which cover 29.4%, followed by Turkey oak forests with 15.3%, forests of black locust, aspen and birch with 9.9%, sessile oak forests with 7.7%, Hungarian oak forests with 7.1%, hornbeam forests with 5.3%, pine forests with 5.6% and spruce forests with 3.8% of the total forest area. Alder forests have a minor percentage of only 0.3% (Table 8, Appendix 2).

According to inventory values, the highest density was assessed in forests of oriental hornbeam, hop hornbeam and flowering ash with 1,490 trees per *ha*, followed by common hornbeam forests with 1,477 $trees \cdot ha^{-1}$, which is logical if site conditions and bioecological characteristics of these tree species are taken into account. The density of other forest categories is also rather high, except in forests of typical heliophytes (willow, poplar and common oak). A somewhat higher density in forests of other heliophytes is conditioned by their unfavourable (coppice) origin and age structure.

The above forest categories are also present in similar relative proportions in total volume and current volume increment. In this sense, beech forest domination in the growing stock is still greater with 42.4% of total volume and 32.3% of volume increment, followed by Turkey oak forests with 13.7% of volume and 12.8% of volume increment, forests of sessile oak with equal percentage of 6.0% in volume and increment,

common oak forests with 2.8% of volume and 2.0% of increment, spruce forests - 5.2% of volume and 6.7% of increment, pine forests - 4.5% of volume and 9.8% of volume increment.

***High forests***

Natural high forests are composed of 12 stand categories, with the logical domination of beech forests which cover 56.5% of the area, while the percentage of other categories is far lower, more uniform, and ranges from 0.7% covered by forests of ash and maple, to 8.7% covered by spruce forests.

Average density by individual categories of high forests is generally uniform, but still it ranges from 476 trees per *ha* in common oak forests to 846 $trees \cdot ha^{-1}$ in forests of black locust, birch and aspen. The dominant density is 600-800 trees per *ha* (Table 3.4, Appendix 2).

Average volume by individual categories of high forests differs considerably and ranges from 72 $m^3 \cdot ha^{-1}$ in forests of black locust, aspen and birch to 390 $m^3 \cdot ha^{-1}$ in fir forests.

Average current volume increment also differs by individual categories of high forests and ranges from 3.5 $m^3 \cdot ha^{-1}$ in high forests of maple and white ash to 8.9 $m^3 \cdot ha^{-1}$ in fir forests. Increment percentage has relatively high values and it is mostly above 2%, except in high common oak forests, in which it is 1.7% and in high beech forests, in which it is 1.9%.

***Coppice forests***

Coppice forests in Serbia consist of 16 stand categories, with somewhat more uniform proportions of area percentage. The most represented forest categories by area are Turkey oak forests with 22.4%, beech forests with 21.3%, black locust (aspen and birch) forests with 13.5 %, Hungarian oak forests with 9.7%, sessile oak forests with 8.8% and hornbeam forests with 7.8%. Six stand categories have individual percentage by area lower than 1% (Table 3.9, Appendix 2).

Coppice forests are relatively well stocked, and average density in most stand categories is above 1,000 trees per *ha* (1,007-1,490 $trees \cdot ha^{-1}$). Exceptions are willow forests with 403 $trees \cdot ha^{-1}$, poplar with 513 $trees \cdot ha^{-1}$, common oak with 739 $trees \cdot ha^{-1}$, alder with 754 $trees \cdot ha^{-1}$ and beech forests with 953 $trees \cdot ha^{-1}$.

Average volume can be considered as high in coppice forests of lime, where it is 202 $m^3 \cdot ha^{-1}$, beech forests with 192 $m^3 \cdot ha^{-1}$ and narrow-leaved ash forests with 195 $m^3 \cdot ha^{-1}$. In other coppice forest categories, average volume is low to medium, and ranges from 55-136 $m^3 \cdot ha^{-1}$.

Average current volume increment in coppice forests in Serbia amounts to 1.5-5.9 $m^3 \cdot ha^{-1}$, generally it is low to medium, but the value of increment percentage is rather high, thanks to the age structure of these forests.

***Artificially established stands***

Apart from poplar forests, which are mostly intensive plantations, artificially established stands consist of 8 stand categories with high domination of pine forests, spruce forests and black locust forests. The above condition changes the proportions in Table 3.14 in Appendix 2, so that pine forests cover the area of 61.8%, spruce forests 23.3%, and black locust forests 5.5%.

The density of most stand categories, expressed by the average number of trees per *ha*, can be considered as dense. Average density ranges from 925-1,360 $trees \cdot ha^{-1}$, except in forests of other broadleaves (364 $trees \cdot ha^{-1}$) and willow forests (593 $trees \cdot ha^{-1}$).

Volume by unit area is low to medium and ranges from 77 $m^3 \cdot ha^{-1}$ in black locust forests to 273 $m^3 \cdot ha^{-1}$ in fir plantations, which is very much conditioned also by unfavourable age structure.

Current volume increment ranges from 2.4 $m^3 \cdot ha^{-1}$ in forests of other broadleaves to 8.1 $m^3 \cdot ha^{-1}$ in forests of other conifers (Douglas-fir, Weymouth pine, etc.). Increment percentage in these forest categories is very high and ranges from 2.6-5.5%.

Average density of intensive poplar plantations is 289 $trees \cdot ha^{-1}$, average volume 175 $m^3 \cdot ha^{-1}$, current increment 9.5 $m^3 \cdot ha^{-1}$, and increment percentage is 5.4%.

## 6.8.1. State forests

State forests in Serbia are classified into 20 stand categories. The most widespread are beech forests, as expected, considering the previous knowledge on the growing stock in Serbia. In broadleaf forests, beech forests cover 37.3% of the total covered area, Turkey oak forests 9.7%, sessile oak forests 7.5%, hornbeam forests 4.9%, Hungarian oak forests 3.6%,

common oak forests 1.7%, poplar forests 3.4%, forests of oriental hornbeam and flowering ash 4.5%. In conifer forests, pine forests cover 7.4% of the total covered area, spruce forests 5.8% and fir forests 1.9%. The percentages of other forest categories are much lower but, in general, they complement the diversity of these categories (Table 2.5, Appendix 2).

Average density of individual forest categories, i.e. the number of trees by unit area, ranges widely (from 337 *trees·ha*$^{-1}$ in poplar forests and 386 *trees·ha*$^{-1}$ in common oak forests up to 1,569 *trees·ha*$^{-1}$ in hornbeam forests).

Average values of the main production indicators differ depending on forest categories. The highest value was measured in fir forests (394 $m^3 \cdot ha^{-1}$), in common oak forests (341 $m^3 \cdot ha^{-1}$), and much lower (but still relatively high) volume was measured in narrow-leaved ash forests 294 $m^3 \cdot ha^{-1}$, lime forests 248 $m^3 \cdot ha^{-1}$, beech forests 247 $m^3 \cdot ha^{-1}$ and in spruce forests 220 $m^3 \cdot ha^{-1}$. Medium value of volume was measured in poplar plantations (167 $m^3 \cdot ha^{-1}$). The volume was low in other forest categories, and ranged from 53 $m^3 \cdot ha^{-1}$ to 154 $m^3 \cdot ha^{-1}$. Average volume of state beech forests obtained by stand inventory 1994-2004 was 217 $m^3 \cdot ha^{-1}$ (Medarević *et al*., 2003, 2004, 2005). Average volume of sessile oak forests obtained by the National Forest Inventory was 136 $m^3 \cdot ha^{-1}$, and the volume obtained by stand inventory 1995-2005 was 117 $m^3 \cdot ha^{-1}$ (Medarević *et al*., 2007).

The values of current volume increment also differ by forest categories. The highest current volume increment was measured in poplar forests and it amounts to 9.1 $m^3 \cdot ha^{-1}$, then in fir forests 8.9 $m^3 \cdot ha^{-1}$, in forests of other conifers 8.2 $m^3 \cdot ha^{-1}$, in narrow-leaved ash forests 7.9 $m^3 \cdot ha^{-1}$, in spruce forests 7.1 $m^3 \cdot ha^{-1}$, in pine forests 6.8 $m^3 \cdot ha^{-1}$, in common oak forests 5.6 $m^3 \cdot ha^{-1}$. The average increment of other forest categories is lower than 5.0 $m^3 \cdot ha^{-1}$. The average increment of beech forests is 4.6 $m^3 \cdot ha^{-1}$, and according to stand inventory data, it is 4.55 $m^3 \cdot ha^{-1}$ (Medarević *et al*., 2005). Volume increment of sessile oak forests is 3.3 $m^3 \cdot ha^{-1}$, and by stand inventory data, it is 2.66 $m^3 \cdot ha^{-1}$ (Medarević *et al*., 2007). Increment percentage is relatively high, most often above 2.0%, except in beech forests (1.9%), common oak forests (1.6%) and lime forests (1.8%).

### 6.8.2. Private forests

Private forests also consist of 20 stand categories but, compared to state forests, with different area percentage. The dominant categories are Turkey oak forests with 21.6%, but beech forests with 20.4% and black locust forests with 15.5% are very close, followed by Hungarian oak forests 11.1%, sessile oak 7.9%, hornbeam 5.7%, oriental hornbeam, hop hornbeam and flowering ash 3.1%, and pine forests with 3.5%. The percentage of other forest categories is minimal (Table 2.11, Appendix 2).

Average density by individual forest categories ranges from 397 trees per *ha* in poplar forests to 1,836 *trees·ha*$^{-1}$ in forests of other conifers.

The values of other cruising indicators also differ by forest categories. The highest average volume in private forests is found in fir forests 319 $m^3 \cdot ha^{-1}$, in common oak forests 261 $m^3 \cdot ha^{-1}$, spruce forests 216 $m^3 \cdot ha^{-1}$, beech forests 204 $m^3 \cdot ha^{-1}$ and in narrow-leaved ash forests 200 $m^3 \cdot ha^{-1}$. In other forest categories average volume is far lower and ranges from 59-146 $m^3 \cdot ha^{-1}$.

Average current volume increment in coniferous forests is far above the values in broadleaf forests, e.g.: 8.0 $m^3 \cdot ha^{-1}$ in fir forests, 7.5 $m^3 \cdot ha^{-1}$ in pine forests, 6.7 $m^3 \cdot ha^{-1}$ in spruce forests, 7.6 $m^3 \cdot ha^{-1}$ in forests of other conifers, 4.4 $m^3 \cdot ha^{-1}$ in poplar forests, 4.1 $m^3 \cdot ha^{-1}$ in beech forests, and in other forest categories it is below 4.0 $m^3 \cdot ha^{-1}$. Increment percentage in almost all forest categories is high (above 2.0%).

## 6.9. Forests by structural form

All forests in Serbia are classified in four categories by structural form. Even-aged stands dominate with 91.6% of the total forest area, followed by uneven-aged stands with 7.5%, selection stands with 0.8% and virgin forests with 0.1%. Average density is the highest in even-aged forests and amounts to 979 trees per *ha*, in selection forests it is 691 *trees·ha*$^{-1}$, in uneven-aged forests 481 *trees·ha*$^{-1}$ and in virgin forests it is 254 *trees·ha*$^{-1}$. Average volume is the highest in virgin forests and amounts to 556 $m^3 \cdot ha^{-1}$, in selection forests 431 $m^3 \cdot ha^{-1}$, in uneven-aged forests 312 $m^3 \cdot ha^{-1}$, and in even-aged forests is 146 $m^3 \cdot ha^{-1}$.

Volume increment shows somewhat different proportions: in selection forests 9.6 $m^3 \cdot ha^{-1}$, in virgin forests 7.9 $m^3 \cdot ha^{-1}$, in uneven-aged forests 6.2 $m^3 \cdot ha^{-1}$ and in even-aged forests 3.8 $m^3 \cdot ha^{-1}$ (Table 9, Appendix 2).

The dominant part of the growing stock of even-aged stands is covered by coppice stands with 70.6%. The percentage of high forests is 20.9% and artificially established stands 8.5% by area (Table 9.1, Appendix 2). The percentage of insufficiently stocked stands in the total area of even-aged forests is significant and it is 24.8%, and devastated stands account for 2.4% (Table 9.2, Appendix 2). In even-aged forests, pure stands are dominant and cover 66.2% of the area, while mixed stands occupy 33.8% (Table 9.3, Appendix 2). Even-aged structure is found in all stand categories surveyed by the National Forest Inventory (Table 9.5, Appendix 2), with the domination of even-aged beech forests (517,600 *ha*), which is in agreement with their domination in the total growing stock.

Regarding the age, high even-aged forests are dominantly middle-aged with the percentage 54.8% by area, mature stands occupy 25.6%, sapling stands occupy 16.6%, and seedling stage covers 3.0% (Table 10, Appendix 2). This structure is conditioned by the intensive logging and spontaneous felling, primarily of beech forests, in the first half of the last century in Serbia (felling in the aim of survival after World Wars I and II), wherefore the dominant age of even-aged forests is 60-90 years.

A part of the growing stock of uneven-aged stands is covered by high, naturally regenerated stands. In this forest category, insufficiently stocked stands prevail and cover 53.0% of the area, and devastated stands occupy 3.0% (Table 9.8, Appendix 2). In uneven-aged forests, pure stands dominate with 87.9% of the area, and mixed stands cover only 12.1% (Table 9.9, Appendix 2). Uneven-aged forests most often consist of beech which is, as a hemi-sciophyte, equally well adapted also in this structural category and accounts for 83.7% by area and 76.2% by volume. Spruce is in the second place, with the percentage of 14.7% by area and 16.5% by volume. The percentage of all other tree species (22) is insignificant (Table 9.10 and 9.11, Appendix 2).

**Figure 28**

Selection stands are located in the mountainous belt in Serbia, and depending on the altitude, they are composed of fir/beech, fir/spruce/beech and fir/spruce. These stands cover a relatively small area of 18,800 *ha*. Based on the stand inventory of state forests in Serbia, selection stands cover 36,914 *ha* (Medarević *et al.*, 2004). All selection forests are logically high forests. A significant part of the inventory of selection forests is insufficiently stocked (29.7%), consequently production loss is about 25,000 $m^3$ annually. Selection stands are predominantly mixed stands. The stands characterised as virgin forests are predominantly high stands.

A long-term strategic problem which results from the above analysis is the need to break up the homogeneity resulting from dominant even-agedness and its structure, to the extent that limits the bioecological characteristics of the species, site characteristics and goals of forest management.

Insufficiently stocked forests by individual structural forms will be analysed

at the level of stand categories. Here, we have to emphasise that it is a problem of equal significance as the previous one.

## 6.10. Forests by diameter classes

An important parameter for the assessment of forest qualitative structure is also the tree and volume distribution by the main diameter classes. For this reason, total volume is presented by 20 *cm* diameter class intervals.

***High forests***

The state of the total growing stock of high forests in Serbia is favourable, which is confirmed by the volume proportion of small-diameter, medium-diameter and large-diameter trees. It is uniform in broadleaves (29.48%:39.16%:31.36%) and in conifers the volumes of medium-diameter and small-diameter trees are greater, with still a significant percentage of large-diameter trees. The above ratio in coniferous tree species in relative amounts is 36.58%:45.38%:18.04%. These ratios are conditioned, primarily, by volume distribution of the main (the most represented) tree species, i.e.: beech, where distribution is 24.59%:38.40%:37.01%, common oak 13.95%:51.45%:34.60%, sessile oak 34.56%: 43.66%:21.78%, spruce 33.35%:46.22%:20.43%, fir 35.84%:41.93%:22.23% and pines 46.22%:48.09%: 5.79%. From the aspect of multifunctional use, the presented state can be evaluated as favourable, at least for the time being (Table 3.5, Appendix 2).

It can be concluded that beech, common oak, sessile oak, maple and spruce in Serbian forests attain the sizes of above 90 *cm*, narrow-leaved ash, Hungarian oak, sycamore maple, fir and Austrian pine attain 90 *cm*, the majority of other species attain 70 *cm*, and

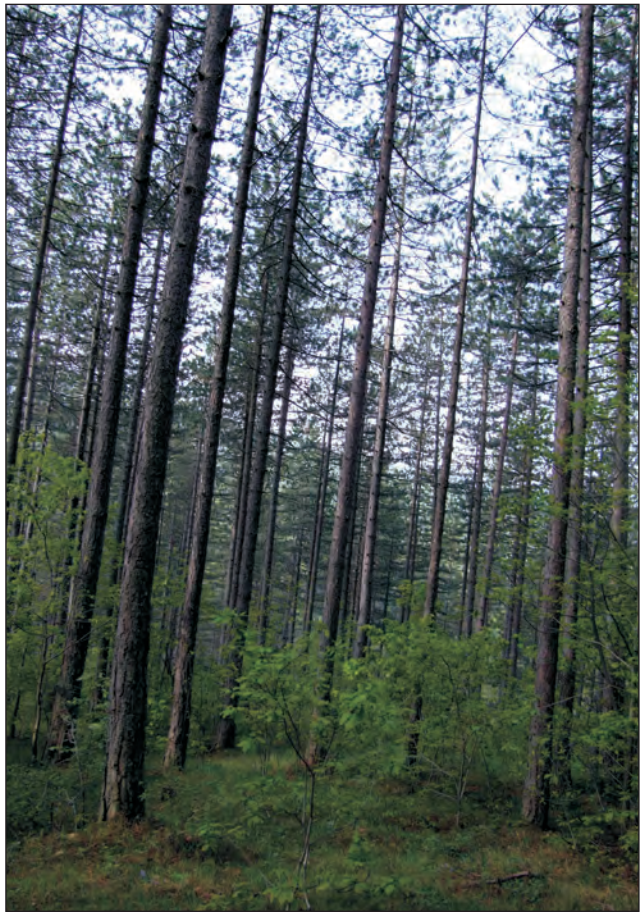


**Figure 29**

aspen, birch, black locust, smooth-leaved elm, flowering ash, hop hornbeam and wild service tree reach 50 *cm*. In addition to the significance of this data from the aspect of intraspecific diversity, the measured sizes are a test of dimensions attained by the above species in Serbian forests.

***Coppice forests***

Volume structure in coppice forests is considerably more unfavourable than in high forests. The ratio of small-diameter, medium-diameter and large-diameter trees in coppice forests in Serbia is 66.86%:22.04%:11.10%. This ratio is most favourable in beech 48.21%:29.76%:22.03%, sessile oak 67.39%:22.60%:10.01%, hornbeam 80.30%: 12.75%:6.96%, Turkey oak 74.08%:20.81%:5.12% and Hungarian oak 86.18%:12.06%:1.76% (Table 3.10, Appendix 2). From the aspect of logging, qualitative structure of these forests is much more unfavourable than that in high forests, because of the dominance of small-diameter trees. This is, by all means, made worse because of the difference in technical quality of the trees of the same tree species and the same sizes.

In coppice forests, in addition to beech, Turkey oak, sessile oak, and hornbeam, large-leaved lime willow, black poplar and pubescent oak also attain the sizes above 90 *cm*. For the first four species and pubescent oak, this could be explained by mixed origin of a part of the inventory in which coppice trees prevail. The sizes up to 90 *cm* in coppice forests are attained by Hungarian oak and common oak, and the greatest number of species attains up to 70 *cm*. The lowest

sizes of up to 30 *cm* in coppice forests in Serbia are reached by ash-leaved maple, white ash, wild service tree and European white elm.

The above facts determine the volume structure of coppice forests and point to their lower potential regarding the diversity within tree species.

***Artificially established stands***

The distribution of volume by diameter categories is most unfavourable in artificially established stands, which is conditioned primarily by their age structure, and partly also by poor sites on which they were established as pioneer forests. Apart from Euramerican poplars, the dominant amount of volume originates from small-diameter trees 85.5%, and the remaining 14.5% belongs to medium-diameter trees.

The same ratio by individual categories is found in Austrian pine stands 83.7% (volume of small-diameter trees):16.3% (volume of medium-diameter trees); in spruce stands it is still more unfavourable and the ratio is 96.5%:3.5% (Table 3.15, Appendix 2).

In intensive plantations of poplar clones, the ratio is much more favourable 14.4%:48.5%:37.1%. It should be noted that the clones attain the sizes up to 90 *cm* by the age of 25 years.

The present volume structure of plantations, particularly coniferous plantations, points to the limited potentials of wood utilisation, primarily as technical wood. As the percentage of plantations in the total growing stock is significant, their further utilisation is limited by the adaptation of technology to the actual state.

## 6.10.1. State forests

In the total growing stock, small-diameter trees have the dominant volume share - 38.3%. This also includes the trees below 10 *cm* accounting for 5.8%, which is altogether 44.1%. Volume of medium-diameter trees accounts for 33.2%, and large-diameter trees (*d*>50 *cm*) account for 22.7%, which is a very significant percentage. In the category of large-diameter trees, the percentage of the diameter class 51-70 *cm* is 17.7%, 71-90 *cm* 3.5% and above 90 *cm* 1.5%.

This fact supports the need to conserve biodiversity within the species, regarding the distribution by diameter. On the other hand, from the classical aspect, regarding the forest productivity, a high percentage of large-diameter trees also points to the structure of forest economic maturity (Table 2.6, Appendix 2).

**Figure 30**

Compared to the previous general evaluation, volume structure by tree species differs, partly depending on their social status (biological characteristics). Equally wide distribution by diameter classes is shown by beech, Turkey oak, sessile oak, common oak, hornbeam, maple, pubescent oak and spruce. Volume distribution by diameter classes of beech is 31.2%:35.5%:33.3%, sessile oak 49.3%:33.5%:17.2%, common oak 13.7%: 55.7%:30.6%, spruce 45.3%: 38.4%:16.3%, Austrian pine 68.4%:28.5%:3.1% and fir 34.6%:43.6%:21.8%.

This structure of the main tree species indicates clearly the approximate percentage of mature wood in the total volume, as well as the potential production, both by quantity and by quality.

### 6.10.2. Private forests

Broadleaves account for 93.3% and conifers for 6.7% of the total volume of private forests. Distribution of volume by diameter classes in private forests is far more unfavourable than in state forests. Although the volume is distributed up to the largest diameter classes, volume ratio of small-diameter, medium-diameter and large-diameter trees is completely in favour of the small-diameter class and in relative indicators it is 62.4%:24.9%:12.7%. Trees with diameters ranging from 51-70 *cm* account for 9.1%, trees with diameters of 71-90 *cm* account for 2.3% and trees *d*>91 *cm* 1.3%. Such a diameter interval variation, and also volume distribution, is significant because it indicates a great diversity of forest communities.

Volume distribution by individual tree species is diverse, from species with the distribution similar as above, to species with a far narrower distribution of volume. The most represented tree species have the following structure of individual diameter categories (small-diameter:medium-diameter:large-diameter trees) by volume: beech 40.1%:34.1%:25.8%, Turkey oak 71.8%:23.7%:4.5%, Hungarian oak 81.3%:16.6%:2.1%, sessile oak 64.7%:25.2%:10.1%, followed by black locust 88.0%:10.8%:1.2%, hornbeam 83.5%:12.7%:3.8%, spruce 42.4%:39.5%:18.1%, Austrian pine 73.7%:23.5%:2.8% and fir 46.4%:30.0%:23.6%.

A greater percentage of Turkey oak compared to beech, the more unfavourable percentage of conifers and the more unfavourable diameter structure (lower quantity of mature wood) compared to state forests, make private forests less valuable from the economic standpoint.

## 6.11. Forests by stand categories

### 6.11.1. Alder forests

Alder forests most often occur in the community with common oak in the belt of alluvial-hygrophilous types, but also as pure stands and line forests along the rivers, rising as high as Sjenička Visoravan and along the upper courses of the high-mountainous rivers (Mt. Golija). Their percentage in the growing stock of Serbia is low - 6.400 *ha*, of which 50.0% is in state forests. All stands are coppice-regenerated (Table 8.1, Appendix 2), with a considerable density of 754 trees per *ha*, thanks to the specific pyramidal habit of this tree species.

**Figure 31**

Alder forests are characterised by relatively low volume and volume increment ($V$=105 $m^3 \cdot ha^{-1}$; $I_v$=3.0 $m^3 \cdot ha^{-1}$; $p_{iv}$=2.9%).

Insufficiently stocked stands occupy 31.2% of the total area of these forests with the density of 320 $trees \cdot ha^{-1}$ (Table 8.2, Appendix 2). One part of alder forests consists of mixed stands, which occupy 37.5% of the covered area. It should be noted that they are considerably more insufficiently stocked than pure stands (452 $trees \cdot ha^{-1}$ compared to 936 $trees \cdot ha^{-1}$ in pure stands (Table 8.3, Appendix 2).

Here we can conclude that mixed stands are simultaneously also more insufficiently stocked stands. Ten tree species are identified in alder forests which, except hornbeam, are typical associate species. Their percentage in the volume (compared to alder) is low and together they account for 20.7% (Table 8.4, Appendix 2).

In Serbia, alder attains large diameters (up to 70 *cm*), but 64.5% of the volume

are the trees of small-diameter sizes. Taking into account its easy regeneration, high technical and aesthetic value, alder is an unjustifiably neglected tree species in Serbian landscapes and forest areas.

### 6.11.2. Willow forests

Several forest types have been designated in the belt of willow forests (Banković, Medarević, 2003), but it has not been completely covered from the typological aspect:

- grey sallow forest (*Salicetum cinareae*) on α and α/β-gley;
- white willow forest (*Salicetum albae*) on β-gley;
- white willow forest (*Salicetum albae*) on recent, moist and layered alluvial deposits;
- white willow forest with bramble (*Rubeto-Salicetum albae*) on γ-gley;
- white willow forest (*Salicetum albae typicum*) on marsh gley soils (eugley) and humogleys with ecological characteristics of γ-gley;
- white willow forest with sedge (*Carici-Salicetum albae*) on marsh-gley soil (eugley) and pseudogley-gley with ecological characteristics of β-β/γ-gley;
- white willow forest with cardoon (*Salicetum albae roriposum apphybiae*) on marsh-gley soil (eugley) with ecological characteristics of α/β-β-gley.

Willow forests occupy the area of 22,400 *ha*, of which 58.9% are state forests. Willow stands are dominantly coppice-regenerated (83.9%), and 16.1% of the covered area are intensive willow plantations (Table 8.5, Appendix 2). The average number of trees per unit area (stand density) amounts to 434 $trees \cdot ha^{-1}$. Artificially established plantations are much denser than spontaneously regenerated stands. Average values of the main cruising indicators in willow forests are rather low. Namely, average volume in willow coppice stands amounts to 89 $m^3 \cdot ha^{-1}$, volume increment is 2.0 $m^3 \cdot ha^{-1}$, and in artificially established forests, these values are almost double. In both cases, increment percentage is relatively high. 44.6% of the total area is covered by well-preserved stands, 42.9% by insufficiently stocked stands and 12.5% by devastated stands, which is the consequence of unplanned harvesting. Compared to well-conserved stands, production potential in devastated willow stands is used only about 30% (Table 8.6, Appendix 2). The domination of pure stands in willow forests is conditioned also by the specific, limited site, which is often flooded. Pure stands cover 69.6% of the area, and mixed stands 30.4%. Density in these two categories is equal, and also the average volume and volume increment (Table 8.7, Appendix 2). Willow forests support another 14 tree species, but willows make up about 80% of the volume. Other tree species which occur in willow forests are site-specific, except black locust and white ash. Individual willow trees attain diameters above 90 *cm*, and volume ratio by diameter categories is 45.9% (small-diameter):32.5% (medium-diameter):21.6% (large-diameter) (Table 8.8, Appendix 2).

Willow forests are a significant part of the forest inventory of Serbia, primarily from the ecological aspect: they occupy extremely wet sites, stabilise the riparian areas and river banks, they are a significant element of the waterfowl habitats, of forest ecosystem biodiversity and riparian landscape, with an undisputed significance in wood (particularly chemical) processing.

The significance of willow forests, and also their rarity, dictates the special attitude from the aspect of protection, as well as sustainable utilisation.

### 6.11.3. Poplar forests

Poplar forests in Serbia, according to the research, occur as the following forest types:

- white poplar forest (*Populetum albae*) on recent deposit;
- white poplar and black poplar forest (*Populetum albo-nigrae*) on alluvial deposit;
- white poplar and black poplar forest (*Populetum albo-nigrae*) on semigley soils - humofluvisols (fluviative meadow soils);
- poplar forest on humogleys and fossil humogleys;
- poplar forest on alluvial semigley and fluvisol;
- poplar forest on meadow black soils and fossil meadow black soils (semigleys).

Poplar forests cover the area of 48,000 *ha*, of which 83.3% are state forests. The stands of these tree species are predominantly artificially established (intensive plantations, plantations 74.2%), and a smaller part of the area are coppice semi-natural stands (25.8%) (Table 8.9, Appendix 2). Density of poplar

plantations is planned in advance and 289 trees per *ha* were recorded by this inventory, which is close to 6×6 *m* planting space. The density of natural coppice stands is almost double and amounts to 513 *trees·ha*$^{-1}$. Average volume in this forest category is medium (163 *m*$^3$*·ha*$^{-1}$) and it is somewhat higher in poplar plantations, where it amounts to 175 *m*$^3$*·ha*$^{-1}$, which is primarily conditioned by the age (age class proportions) of these forests. Volume increment in plantations is very high and amounts to 9.5 *m*$^3$*·ha*$^{-1}$. In our conditions, it is also high in poplar coppice forests, in which it is 4.8 *m*$^3$*·ha*$^{-1}$, which is followed by the high increment percentage in both cases. All three categories of forest preservation status can be found: well-preserved stands cover 60.9%, insufficiently stocked stands 28.3%, and devastated stands cover 10.8% of the covered area (Table 8.10, Appendix 2).

Stand density by preservation categories is logically different: in well-preserved forests, it is 438 trees per *ha*, in insufficiently stocked forests 257 *trees·ha*$^{-1}$ and in devastated forests 68 *trees·ha*$^{-1}$. Probably thanks to age structure, average volume is considerably higher in insufficiently stocked stands and amounts to 250 *m*$^3$*·ha*$^{-1}$, in well-preserved stands 130 *m*$^3$*·ha*$^{-1}$, in devastated stands 107 *m*$^3$*·ha*$^{-1}$. Taking into account a relatively small number of trees, a significant volume in devastated stands is probably conditioned by the special form of large-diameter poplar trees in Podunavlje, Posavlje and Pomoravlje. Volume increment has equal values in both well-preserved and insufficiently stocked poplar stands and it is high (above 8.5 *m*$^3$*·ha*$^{-1}$), and in devastated stands it is almost twice lower. Increment percentage in insufficiently stocked stands points more clearly to the effects of insufficiently stocked stands. Poplar stands are predominantly pure 90% (Table 8.11, Appendix 2).

In mixed poplar forests, the density is higher and amounts to 918 trees per *ha*, and volume and volume increment are significantly lower. Apart from the dominant presence of poplar (clones), there are 11 tree species, 4 of which are allochthonous, and white ash can be considered as local invasive species. The percentage of other tree species in the total forest volume barely exceeds 6% (Table 8.12, Appendix 2). A modest mixture is conditioned primarily by the establishment of poplar plantations, and also by the extreme, frequently flooded sites. The largest diameter sizes are attained by black poplar (*d*>90 *cm*), poplar clones attain up to 90 *cm*, white poplar attains 70 *cm*, and individual willow and common oak trees in these forests attain diameters of up to 70 *cm*. Volume structure ratio of small-diameter, medium-diameter and large-diameter trees is as follows: poplar clones 14.2%:48.0%:37.8%, black poplar 9.4%:39.1%:51.5%, and white poplar 33.5%:33.4%:33.1%.

**Figure 32**

Some of the conclusions drawn in the analysis of willow forests also apply to poplar forests. Poplar forests are also a significant element of the riparian stability, particularly of major rivers. They are composed of the species that tolerate extreme and frequent flooding. Because of the dimensions attained by individual trees, they are a significant element of the diversity within the species, and they are also a characteristic landscape element of the complex of alluvial-hygrophilous forest types.

It is necessary to define our attitude to the plantations of poplar clones. Actual area of clonal plantations, established primarily to the detriment of natural poplar stands, has not yet endangered the sustainability of natural stands on their natural site, in the context of diversity. Actual area under natural poplar stands should be taken as the required minimum in the aim of their protection, and it must not be endangered by further spreading of the area under intensive plantations.

The plantations should be evaluated and managed in agreement with the principles and criteria of forest certification. An important principle is the planned fragmentation of these forests in order to break up the homogeneity of monocultures. A part of the actual areas under plantations should be left to spontaneous invasion by native tree species, primarily narrow-leaved ash.

## 6.11.4. Narrow-leaved ash forests

Narrow-leaved ash is typologically registered in:

- narrow-leaved ash with grey sallow forest (*Salicetum cinereae-Fraxinetum angustifoliae*) on α/β-β-gley, but it is also an edificator of a series of common oak forest types mentioned under 6.11.5.

Narrow-leaved ash forests in Serbia cover the area of 25,200 *ha*, of which 39.7% are state forests. The percentages of high stands (50.8%) and coppice stands (49.2%) are uniform. The density of high stands amounts to 707 trees per *ha*, and it is considerably lower than the density of coppice stands, where it is 1,167 $trees \cdot ha^{-1}$. Despite the above, the average volume of high forests is greater amounting to 278 $m^3 \cdot ha^{-1}$, and average volume of coppice forests is 195 $m^3 \cdot ha^{-1}$. Similarly, volume increment in narrow-leaved ash high forests amounts to 7.0 $m^3 \cdot ha^{-1}$, and in coppice forests to 5.9 $m^3 \cdot ha^{-1}$. Increment percentage is higher in coppice forests and amounts to 3.0%, while in natural high forests it is 2.5% (Table 8.13, Appendix 2).

The preservation status of ash forests is somewhat more favourable than that of willow and poplar forests. Well-preserved stands cover 73.0% of the forest area, insufficiently stocked stands 25.4%, and the percentage of devastated stands is insignificant and amounts to 1.6% (Table 8.14, Appendix 2). The preservation status differs depending on stand density and the number of trees, which in well-preserved forests amounts to 1,162 $trees \cdot ha^{-1}$, in insufficiently stocked forests to 330 $trees \cdot ha^{-1}$ and in devastated stands it amounts to 92 $trees \cdot ha^{-1}$. This regularity does not apply to average volume, because it is somewhat higher in insufficiently stocked stands (244 $m^3 \cdot ha^{-1}$) than in well-preserved stands (239 $m^3 \cdot ha^{-1}$), probably because of the more favourable age structure in favour of the former. The volume in devastated stands is minimal and amounts to 54 $m^3 \cdot ha^{-1}$. The difference in average volume increment is logical: in well-preserved forests it is 7.1 $m^3 \cdot ha^{-1}$, in insufficiently stocked forests 5.0 $m^3 \cdot ha^{-1}$, and in devastated forests only 1.6 $m^3 \cdot ha^{-1}$. This regularity is also supported by the difference in increment percentage between dense stands and insufficiently stocked stands.

It should be taken into account that on the moistest sites on which it occurs, narrow-leaved ash shows a pronounced differentiation in the earliest youth, and the spontaneous development can accompany the insufficiently stocked stand state. Narrow-leaved ash forests are dominantly pure stands (60.3%) mixed stands account for 39.7%. Average values of tree density, volume and volume increment are rather uniform (Table 8.15, Appendix 2).

**Table 4.** Age structure of narrow-leaved ash forests

| Forest ownership and origin | *P* | Age classes [%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *ha* | I | II | III | IV | V | VI | VII | VIII |
| State forests | | | | | | | | | |
| High | 5,200 | 7.69 | 30.77 | 23.08 | 7.69 | 23.08 | 7.69 | --- | --- |
| Coppice | 4,800 | --- | --- | 16.68 | 8.33 | 33.33 | 33.33 | 8.33 | --- |
| Private forests | | | | | | | | | |
| High | 7,600 | --- | 26.32 | 21.04 | 26.32 | 10.53 | 10.53 | 5.26 | --- |
| Coppice | 7,600 | --- | 10.53 | 47.37 | 21.05 | 5.26 | --- | 5.26 | 10.53 |

Narrow-leaved ash forests contain 10 tree species, whose percentage in the total volume is 25%. Significant minor species are common oak and smooth-leaved elm. Narrow-leaved ash attains large diameters (up to 90 *cm*). Narrow-leaved ash volume structure and distribution is in favour of small-diameter and medium-diameter trees (53.6%:31.5%:14.9%). Age structure (proportion of age classes) of narrow-leaved ash forests, by ownership, and regeneration method, is presented in Table 4.

Narrow-leaved ash forests are a significant link in the chain between soft broadleaf forests and common oak forests and it is one of the few species that tolerate flooding. Relatively small area and simultaneously good technical characteristics classify it as a rare and valuable wood species. Its ecological significance is reflected in the biotope conservation of avian fauna in flooded areas, and translucent ash forests are a valuable part of the habitat of large game, particularly deer. Narrow-leaved ash, as an obligatory heliophyte, makes special aesthetic landscapes, both as pure stands or as more valuable mixed stands, with willows and poplars in the moister sites, i.e. with common oak and hornbeam in the drier conditions.

At the sites where narrow-leaved ash was substituted with clonal poplars and on which, due to the changed flooding regime, ash spontaneously suppresses poplar plantations and re-invades its former areas in swamp ecosystems, this re-invasion should be supported by planned management procedures.

## 6.11.5. Common oak forests

Common oak is, within the complex of alluvial-hygrophilous forest types, present in a great number of forest types, either by itself as an edificator, or as a member of two- and poly-dominant communities. Its first two accessory species are narrow-leaved ash and common hornbeam in different combinations. Common oak forest types in the above complex are the following (Banković, Medarević, 2003):

- ash and common oak forest (*Fraxineto-Quercetum typicum*) on moderately moist humogleys;
- ash and common oak forest (*Fraxuneto-Quercetum typicum*) on drier variants of humogleys;
- ash and common oak forest with *Deschampsia caespitosa* (*Deschampsio-Fraxineto-Quercetum roboris*) on lessivé pseudogley;
- ash and common oak forest with field maple and Tartar maple and a rich shrub layer (*Fraxineto-Quercetum roboris aceretosum*) in the unflooded part of Gornji Srem on the driest variants of humogleys and on meadow black soils (semigleys) with the signs of lessivage;
- ash and common oak forest in the occasionally flooded part of Gornji Srem (*Fraxineto Quercetum roboris subinundatum*) on semigleys (meadow black soils) and alluvial pararendzinas;
- common oak forest with *Deschampsia caespitosa* (*Deschampsio-Quercetum roboris*) on lessivé pseudogley meadow black soil (semigley);
- common oak and ash forest with *Alopecurus pratensis* (*Fraxino-Quercetum roboris alopecuretosum*) on saline lowland pseudogley;
- common oak and ash forest without hygrophytes (*Fraxino-Quercetum crassiusculae*) on gleyed chernozem;
- common oak and ash forest (*Fraxino-Quercetum roboris typicum*) on humogleys;
- common oak, hornbeam and ash forest (*Carpino-Fraxino-Quercetum roboris inundatum*) on meadow black soils (semigleys) in flooded area;
- common oak, hornbeam and ash forest (*Carpino-Fraxino-Quercetum roboris inundatum*) on alluvial brown soil in flooded area;
- common oak, hornbeam and ash forest (*Carpino-Fraxino-Quercetum roboris caricetosum remotae*) on meadow black soils (semigleys) in unflooded area;
- common oak, hornbeam and ash forest (*Carpino-Fraxino-Quercetum roboris typicum*) on eutric cambisol in unflooded area;
- common oak, hornbeam and ash forest, sometimes with Turkey oak (*Carpino-Fraxino-Quercetum roboris typicum*) in unflooded area on lessivé eutric cambisols - lessivé pseudogley soils;
- common oak and hornbeam forest (*Carpino-Quercetum crassiusculae-roboris*) on eutric (base-saturated) brown soil on alluvial deposit and lowland pseudogley;

- common oak and hornbeam forest (*Carpino-Quercetum roboris*) on non-calcareous meadow black soil (semigley) in flooded area;
- common oak and hornbeam forest (*Carpino-Quercetum roboris*) on non-calcareous meadow black soil (semigley) in unflooded area;
- common oak and hornbeam forest (*Carpino-Quercetum roboris*) on eutric cambisol to lessivé eutric cambisol in unflooded area;
- common oak, hornbeam and Turkey oak forest (*Carpino-Quercetum roboris cerretosum*) on lessivé to pseudogley meadow black soils (semigleys);
- common oak, hornbeam and Turkey oak forest with rich ground flora storey (*Carpino-Quercetum roboris cerretosum*) on eutric cambisol - lessivé eutric cambisol;
- common oak, hornbeam and Turkey oak forest with lime (*Carpino-Quercetum roboris tilietosum*) on eutric cambisol to lessivé eutric cambisol;
- common oak, hornbeam and Turkey oak forest with Hungarian oak (*Carpino-Quercetum roboris farnetosum*) on eutric cambisol to lessivé pseudogley eutric cambisol;
- common oak and hornbeam forest in terrestrial conditions outside the riparian area (*Tilio-Carpino-Quercetum roboris*) in the valleys on diluvium;
- common oak, hornbeam and Turkey oak forest with limes (*Tilio-Carpino-Quercetum robori-cerris pauperum*) on pararendzina, eutric-pararendzina and humus brown forest soil;
- common oak, hornbeam and Turkey oak forest with mesophilous accessory species (*Carpino-Quercetum crassiusculae-cerridis typicum*) on typical lessivé soil and lessivé pseudogley;
- common oak, hornbeam and Turkey oak forest with hygrophilous accessory species (*Carpino-Quercetum crassiusculae-cerridis fraxinetosum*) on lessivé and gleyed chernozem;
- common oak, hornbeam and Turkey oak forest with limes in the valleys at higher altitudes (*Tilio-Carpino-Quercetum robori-cerris collinum*) on diluvium;
- common oak forest with lily of the valley (*Convallarieto-Quercetum roboris*) on pararendzinas on sand;
- common oak forest with mahaleb cherry (*Pruno-Quercetum roboris*) on deep pararendzinas on loess and diluvium.

Common oak forests in Serbia cover the area of 32,400 *ha*, of which 64.2% is in state forests. They occur in Sremski, Severno-Bački, and fragmentarily also in Južno-Bački, Banatski and Posavsko-Podunavski forest districts, as well as in Mačva and Pomoravlje. In the total growing stock of this forest category, high forests dominate covering 88.9% of the area, and coppice stands account for 11.1%. Density of common oak natural high stands is medium and amounts to 476 trees per *ha*, and in coppice forests, it is 739 $trees \cdot ha^{-1}$. Average volume in common oak high forests is relatively high and amounts to 337 $m^3 \cdot ha^{-1}$, in coppice forests it is low and amounts to 117 $m^3 \cdot ha^{-1}$. Volume increment is 5.7 $m^3 \cdot ha^{-1}$ in high forests and 4.0 $m^3 \cdot ha^{-1}$ in coppice forests, which is explained by a considerable productivity of these forests. Increment percentage in high stands is low, primarily because of their advanced age and a considerable degree of small-diameter trees, particularly in Sremski District (Table 8.17, Appendix 2).

**Table 5.** Age structure of common oak forests

| Forest ownership and origin | *P* | Age classes [%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *ha* | I | II | III | IV | V | VI | VII | VIII |
| State forests | | | | | | | | | |
| High | 19,600 | 2.04 | 4.09 | 4.08 | 6.12 | 44.90 | 24.49 | 8.16 | 6.12 |
| Coppice | 1,200 | 33.33 | --- | --- | --- | --- | --- | --- | 66.67 |
| Private forests | | | | | | | | | |
| High | 9,200 | --- | 17.39 | 17.39 | 4.35 | 13.04 | 39.13 | 8.70 | --- |
| Coppice | 2,400 | 16.67 | 16.67 | 33.32 | --- | --- | --- | 16.67 | 16.67 |

In common oak forests, insufficiently stocked stands are in slight domination and occupy 55.6% of the area, conserved forests cover 42.0%, and devastated forests occupy 2.4%. There is a difference in stand density related to the preservation status: 870 trees per *ha* in well-preserved stands, 248 trees per *ha* in insufficiently stocked stands, and only 75 trees per *ha* in devastated stands. Only thanks to age difference in favour of insufficiently stocked forests, their average volume is somewhat higher and amounts to 332 $m^3 \cdot ha^{-1}$, it is 296 $m^3 \cdot ha^{-1}$ in well-preserved stands, and 153 $m^3 \cdot ha^{-1}$ in devastated stands. Volume increment is considerably in favour of well-preserved stands in which it amounts to 6.3 $m^3 \cdot ha^{-1}$, it is 5.0 $m^3 \cdot ha^{-1}$ in insufficiently stocked forests, and 2.3 $m^3 \cdot ha^{-1}$ in devastated stands. Based on the actual indicators of productivity, about 30,000 $m^3$ of wood is lost per year only because of insufficiently stocked forests (Table 8.18, Appendix 2).

In common oak forests, pure stands dominate with 69.1% by area (partly because of a significant area of artificially regenerated stands), mixed forests cover 30.9%. The values of other cruising indicators are uniform in pure and mixed stands (Table 8.19, Appendix 2). Eleven tree species which are dominantly autochthonous are identified in common oak forests, primarily narrow-leaved ash, hornbeam, Turkey oak, field maple and white poplar and only black locust, as an introduced species (Table 8.20, Appendix 2). Common oak at its natural sites attains diameter above 90 *cm*. Volume distribution by diameter categories is 15.8% (small-diameter):50.7% (medium-diameter):33.5% (large-diameter). The proportion of age classes in common oak forests can be seen in Table 5.

Common oak forests are some of the most valuable forests in Serbia, particularly in the complex of alluvial-hygrophilous forest types. Common oak forests have a high technical and economic value, they are the habitats of most valuable species of big game and avian fauna in the riparian areas, and simultaneously they are a significant valuable element of landscape, occurring in different forms with other tree species, most often with narrow-leaved ash and common hornbeam. Smooth-leaved elm, as a species in the list of rare and endangered species, is admixed individually. Limiting factors are the relatively small area of common oak forests, an abnormal real proportion of age classes (with the domination of the areas of middle-aged and maturing stands). In a part of the area, the composition of these forests is unfavourably changed in favour of common hornbeam. There is a considerable presence of insufficiently stocked stands (in that proportion, they are also bioecologically more instable) and in some situations there is an unfavourable ratio of common oak and accessory species in polydominant communities.

## 6.11.6. Common hornbeam forests

In Serbia, common hornbeam occurs as an admixed tree species in forest types which are defined in the complex of common oak forests, in forest types of Hungarian oak and Turkey oak belt, sessile oak belt, up to the forest types in beech belt.

In Serbia forests of common hornbeam cover the area of 118,800 *ha*, of which 49.5% are state forests. Coppice forests are dominant and occupy 95.6% of the area, and high forests only 4.4%. Hornbeam forests occur from the belt of alluvial-hygrophilous forest types, to the upper boundary of mesophilous belt of montane beech forests. Frequently, anthropogenically conditioned, they are a compensation for primary species on whose sites they are found. They are characterised by high density of 1,507 trees per *ha* in coppice forests and 814 trees per *ha* in high forests. The density of these forests is partly conditioned also by lower dimensions which this tree species attains. The values of the main indicators of these forests are expectedly low to medium. Average volume in coppice stands is 109 $m^3 \cdot ha^{-1}$, and in high stands 176 $m^3 \cdot ha^{-1}$, current volume increment is 2.5 $m^3 \cdot ha^{-1}$ in coppice forests, and 3.6 $m^3 \cdot ha^{-1}$ in high stands (Table 8.21, Appendix 2). Increment percentage is medium and at the total level it amounts to 2.2%.

Regarding density, well-preserved stands dominate in hornbeam forests and cover 85.5%, insufficiently stocked forests 13.8% and devastated forests 0.7% area. The favourable state is conditioned by hornbeam biological vigour and fast regeneration by coppicing. The effects of different degrees of preservation are presented in the comparative analysis in Table 8.22, Appendix 2.

The mixture of common hornbeam forests can be considered as favourable. Mixed broadleaf stands, dominate on 63.3% of the area, mixed broadleaf and coniferous stands cover 0.7%, and pure stands cover

**Table 6.** Age structure of common hornbeam forests

| Forest ownership and origin | *P* | Age classes [%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *ha* | I | II | III | IV | V | VI | VII | VIII |
| State forests | | | | | | | | | |
| High | 1,600 | --- | 25.00 | --- | --- | 25.00 | 50.00 | --- | --- |
| Coppice | 57,200 | 1.40 | 9.10 | 30.06 | 21.68 | 16.08 | 9.79 | 4.20 | 7.69 |
| Private forests | | | | | | | | | |
| High | 3,600 | --- | 11.11 | 44.45 | 33.33 | 11.11 | --- | --- | --- |
| Coppice | 56,400 | 3.55 | 7.09 | 30.50 | 34.04 | 11.34 | 7.80 | 2.84 | 2.84 |

36.0%. Excluding mixed broadleaf and coniferous stands, the values of the main production indicators are the same in other two categories (Table 8.23, Appendix 2).

Thanks to the mixture and wide ecological amplitude, hornbeam forests also contain 28 other species, of which 14 are in the list of relic, rare and endangered species. Most frequent accessory species are beech, Turkey oak, sessile oak, flowering ash, field maple, Hungarian oak and lime. Although it has already been noted that common hornbeam has an unpretentious production potentials, individual trees attain more than 90 *cm*. Volume structure depending on diameter classes is 77.1% (small-diameter):14.4% (medium-diameter):8.5% (large-diameter), which can be evaluated as an expected but unfavourable state, bearing in mind the assessment of the technical values of the potential wood yield (Table 8.24, Appendix 2).

Age structure of hornbeam forests is not uniform. In state forests and high forests, the greatest area is occupied by age classes between 81-120 years, and young stands are also significant. Age classes between 21-50 years prevail in coppice forests, the second, sixth and the eighth age classes are significant, the first and the seventh age classes are insufficient (Table 6).

In Serbia, forests of hornbeam, generally, present a forestry problem. Dominant coppice origin, aggressiveness and invasion to the sites of other, multiply more valuable tree species (common oak, sessile oak, Hungarian oak, beech, etc.) leading to their complete stifling and forcing out of some sites, are the problems of long-term character that must be adequately addressed and solved by forestry profession in Serbia.

### 6.11.7. Turkey oak forests

Turkey oak forests are identified in numerous forest types, both under this heading and in the forest types of Hungarian oak, sessile oak, pubescent oak and other tree species. Only some of Turkey oak forest types will be mentioned here:

- Turkey oak with flowering ash forest (*Quercetum cerris ornetosum*) on the soils from pararendzina on loess to humus eutric cambisols (on the slopes);
- Turkey oak forest on plateaus (*Quercetum cerris typicum*) on chernozem and eutric cambisol to lessivé eutric cambisol;
- different oaks with flowering ash forest (*Orno-Polyquercetum*) on poorly developed soils on limestones and basic siliceous rocks;
- different oaks with flowering ash forest (*Orno-Polyquercetum*) on acid brown soils;
- Turkey oak and Vergilius's oak forest on plateaus (*Quercetum cerris-virgilianae typicum*) on the soils from deep pararendzina on loess to shallower lessivé eutric cambisols;
- Turkey oak and Vergilius's oak forest on the slopes (*Quercetum cerris-virgilianae xerophyllum*) on the soils from pararendzina on loess to rendzina and shallower brown soils on marls, marly limestones and dolomites;
- Turkey oak and pubescent oak forest (*Quercetum cerris virgilianae*) on eutric brown soils (eutric cambisols and brown soils) on loamy sediments;
- Turkey oak and Vergilius's oak forest (*Quercetum cerris virgilianae serpentinicum*) on brownised and brown soils on serpentinite.

Turkey oak forests are among the most widespread forests in Serbia. They occupy 345,200 *ha*, of which is 33.6% are state forests. Similar to hornbeam forests, coppice stands are dominant and cover 94.3%

**Table 7.** Age structure of Turkey oak forests

| Forest ownership and origin | *P* | Age classes [%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *ha* | I | II | III | IV | V | VI | VII | VIII |
| State forests | | | | | | | | | |
| High | 9,200 | --- | --- | 30.43 | 30.43 | 30.43 | 8.71 | --- | --- |
| Coppice | 106,800 | 0.75 | 2.25 | 19.48 | 25.47 | 19.48 | 16.84 | 8.99 | 6.74 |
| Private forests | | | | | | | | | |
| High | 10,400 | --- | 3.85 | 34.62 | 38.45 | 19.23 | 3.85 | --- | --- |
| Coppice | 218,800 | 1.65 | 4.94 | 22.48 | 25.23 | 18.83 | 13.89 | 7.13 | 5.85 |

of the total covered area, which is conditioned by their extensive utilisation. The percentage of high forests, compared to coppice, is relatively low - 5.7%. Stand density is higher in coppice forests and amounts to 1,007 trees per *ha*, and in high forests it is 765 trees per *ha*. Nevertheless, average volume and volume increment are high, i.e. they are greater in high forests. Average volume in high forests is 264 $m^3 \cdot ha^{-1}$, and it is twice lower in coppice forests and amounts to 136 $m^3 \cdot ha^{-1}$. Current volume increment in high forests is 5.2 $m^3 \cdot ha^{-1}$, and in coppice forests 3.3 $m^3 \cdot ha^{-1}$. Increment percentage is somewhat higher in coppice forests and amounts to 2.4%, in natural high forests it is 2.0% (Table 8.25, Appendix 2).

The preservation status of Turkey oak forests is good. In the total growing stock of these stands, well-preserved forests cover 74.4% of the area, insufficiently stocked stands occupy 23.8%, and devastated forests occupy a relatively small area of 1.8% (Table 8.26, Appendix 2). This assessment is supported by the data on density, which is high in well stocked stands and amounts to 1,239 trees per *ha*, 295 trees per *ha* in insufficiently stocked Turkey oak forests, and 93 trees per *ha* in devastated forests. Average volume in well-preserved stands is 165 $m^3 \cdot ha^{-1}$, in insufficiently stocked stands 84 $m^3 \cdot ha^{-1}$, and in devastated stands only 28 $m^3 \cdot ha^{-1}$. Average volume increment is in harmony with the above values and it is 4.0 $m^3 \cdot ha^{-1}$ in well-preserved stands, 1.5 $m^3 \cdot ha^{-1}$ in insufficiently stocked stands and 0.5 $m^3 \cdot ha^{-1}$ in devastated stands. Only for this reason the annual loss is about 227,000 $m^3$ of wood.

In Turkey oak forests, pure stands occupy a somewhat larger area of 53.7%, while mixed stands occupy 46.3%. The presence of mixed forests of broadleaves and conifers is insignificant. Stand density is equal in pure and mixed forests, except in the forests of broadleaves and conifers, which have a small area and in which the density is 1,978 trees per *ha*. Average volume is somewhat higher in Turkey oak pure stands, where it amounts to 157 $m^3 \cdot ha^{-1}$, compared to 129 $m^3 \cdot ha^{-1}$ in mixed forests. Volume increment is relatively low and uniform, and it is 3.6 $m^3 \cdot ha^{-1}$ in pure stands, and 3.0 $m^3 \cdot ha^{-1}$ in mixed stands. Increment percentage is uniform and accounts for 2.3% (Table 8.27, Appendix 2).

Turkey oak forests support 32 tree species, among which the most frequent species are Hungarian oak, sessile oak, hornbeam, beech, flowering ash and field maple. Turkey oak forests are significant sites of tree species which are in the list of relic, endemic, rare and endangered species, such as: pubescent oak, smooth-leaved elm, hop hornbeam, white ash, maple, common walnut, aspen, birch, cherry and wild service tree. The presence of other species in the total volume is 25.8%, i.e. Hungarian oak 9.1%, sessile oak 4.5%, hornbeam 3.3% and beech 1.8%.

Turkey oak in these forests attains the diameter sizes above 90 *cm*. Diameter structure of Turkey oak is unfavourable, with a high dominance of the volume of small-diameter trees, which is 71.1%, medium-diameter trees - 23.1%, and large-diameter trees - 5.8%. This is expected, because of the dominant coppice origin, as well as the age structure of Turkey oak forests (Table 8.28, Appendix 2). Volume structure of Hungarian oak, as the most frequent accessory species of Turkey oak, is 84.7%:14.3%:1.0%.

High Turkey oak forests owned by state are characterised by a high presence of the stands of III, IV and V age classes. In coppice forests the dominant age is 21-60 years, the percentage of the stands in the seventh age class is significant, and the percentage of the youngest stand categories is minimal. Similar age

structure of high forests and coppice forests is also observed in private Turkey oak forests (Table 7).

Turkey oak forests are a significant part of the growing stock in Serbia. Their high percentage by area is partly also anthropogenically conditioned, especially in private forests in the climatogenic belt of Hungarian oak and Turkey oak. Turkey oak, as a biologically vigorous and comparatively more vigorous species than many other species which grow in the same belt and on the same sites, has forced out or reduced to minimum some of the primary, economically more valuable tree species, first of all Hungarian oak and sessile oak. Therefore, the substitution at least of a part of the Turkey oak inventory by autochthonous accessory species is a long-term strategic problem. On the other hand, the dominant coppice origin is an equally severe problem, so the conversion of a part of the inventory of Turkey oak forests is also one of the significant tasks of forestry profession in Serbia.

## 6.11.8. Hungarian oak forests

In Serbia, Hungarian oak grows most frequently in the climate-zonal community with Turkey oak, as it can be seen from the list of forest types identified in these forests in Serbia. It is often found in mixture with common oak and Turkey oak in the belt next to the alluvial-hygrophilous complex, with sessile oak and Turkey oak, with common hornbeam and Turkey oak on more mesophilous sites, and with flowering ash and Turkey oak on drier sites. Some of the forest types identified in Hungarian oak forests are:

- Hungarian oak and Turkey oak forest with common oak (*Quercetum frainetto cerris quercetosum robori*) on lessivé pseudogley chernozem;
- Hungarian oak and Turkey oak forest (*Quercetum frainetto-cerris*) on deep eutric brown soils (brown soils on loamy sediments, brown soils on serpentinite and eutric cambisols);
- Hungarian oak and Turkey oak forest with common oak (*Quercetum frainetto cerris quercetosum robori*) on eutric cambisol;
- Hungarian oak and Turkey oak forest (*Quercetum frainetto-cerris*) on pararendzina (on mixture of loess and loamy sediments);
- Hungarian oak and Turkey oak forest with hornbeam (*Carpino-Quercetum frainetto-cerris*) on deep eutric brown soils (eutric cambisols, brown soils on loamy sediments and brown soils on serpentinite);
- Hungarian oak and Turkey oak forest with flowering ash (*Orno-Quercetum frainetto-cerris*) on pararendzinas (on the mixture of loess and loamy sediments) and shallow eutric cambisols and shallow brown soils on serpentinite;
- Hungarian oak and Turkey oak forest with flowering ash (*Orno-Quercetum frainetto-cerris*) on deep eutric brown soils (eutric cambisols, brown soils on loamy sediments and brown soils on serpentinite);
- Hungarian oak and Turkey oak forest (*Quercetum frainetto-cerris*) on acid brown to lessivé acid brown soils.

Although significantly less than Turkey oak, Hungarian oak forests occupy a significant area of 159,600 *ha* in the growing stock of Serbia, of which is 26.6% are state forests. The dominant categories are coppice forests which cover 88.7%; the percentage of high forests is 11.3% of the area. Stand density of Hungarian oak coppice forests is higher and amounts to 1,160 trees per *ha*, and in high forests it is 769 trees per *ha*. Average volume is far lower in coppice forests and amounts to 124 $m^3 \cdot ha^{-1}$, in high forests it is medium to high and amounts to 192 $m^3 \cdot ha^{-1}$. Similarly, volume

**Table 8.** Age structure of Hungarian oak forests

| Forest ownership and origin | *P* | Age classes [%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *ha* | I | II | III | IV | V | VI | VII | VIII |
| State forests | | | | | | | | | |
| High | 5,200 | --- | --- | 61.54 | 23.08 | 7.69 | --- | 7.69 | --- |
| Coppice | 37,200 | --- | 1.08 | 20.43 | 22.58 | 24.73 | 13.98 | 12.90 | 4.30 |
| Private forests | | | | | | | | | |
| High | 12,800 | 3.12 | 9.38 | 40.63 | 25.00 | 3.12 | 12.50 | 6.25 | --- |
| Coppice | 104,400 | 3.45 | 4.21 | 18.00 | 31.42 | 22.99 | 12.26 | 4.60 | 3.07 |

increment is 4.2 $m^3 \cdot ha^{-1}$ in high Hungarian oak forests, and 3.2 $m^3 \cdot ha^{-1}$ in coppice forests. Actual productivity in coppice forests is by about 24% lower than in high forests, and there is also the difference in quality. Increment percentage is somewhat higher in coppice forests, which is primarily caused by the age structure (Table 8.29, Appendix 2).

Well-preserved stands dominate in Hungarian oak forests and cover 84.0% of the area. Insufficiently stocked stands occupy 14.8% of the area, and devastated forests occupy only 1.2% of the area. The difference in density is high and ranges from 1,275 trees per ha in well-preserved forests to 91 trees per *ha* in degraded forests. Average volume in Hungarian oak forests is relatively low and amounts to 132 $m^3 \cdot ha^{-1}$, it is 140 $m^3 \cdot ha^{-1}$ in well-preserved forests, and 98 $m^3 \cdot ha^{-1}$ in insufficiently stocked forests. The difference in volume increment is even higher: 3.7 $m^3 \cdot ha^{-1}$ in well-preserved stands, 1.7 $m^3 \cdot ha^{-1}$ in insufficiently stocked stands and 0.4 $m^3 \cdot ha^{-1}$ in devastated stands. For this reason, the loss in wood production is about 54,000 $m^3$ of wood per year (Table 8.30, Appendix 2).

In Hungarian oak forests, mixed forests are somewhat more represented (53.6%) than pure forests (46.4%). There are no major differences in the values of the basic cruising indicators in the above categories (Table 8.31, Appendix 2). Hungarian oak forests consist of another 18 tree species, most frequently Turkey oak. Some of them are in the list of relic, rare and endangered species (cherry, aspen, alder, pubescent oak and white ash), and only black locust is an allochthonous species. The percentage of the above species in the growing stock of Hungarian oak forests accounts for 28.3%, Turkey oak 19.1%, which is logical, as these two species most frequently occur together in our forests (Table 8.32, Appendix 2). Hungarian oak in these forests attains the sizes of up to 90 *cm*. Volume distribution by the main diameter classes is in favour of smaller-diameter trees (82.0%), volume of medium-diameter trees is 16.0%, and large-diameter trees - 2.0%.

In high Hungarian oak forests owned by state, dominant stands are in the third age class, and the percentage of stands in the fourth age class is also high. There are no stands in the first, second, sixth and eighth age class, and the areas of other age classes are minimal. In coppice forests, the age of dominant stands is 21-70 years. The youngest stand categories are absent, and the percentage of the terminal age class is minimal (Table 8).

Hungarian oak forests are a distinguished element of submontane areas in Serbia, particularly Šumadija. At the same time, they are a significant element of the habitats of the main species of game for hunting and other wildlife. The basic problems of these forests are conditioned by their dominant coppice origin. For this reason the priority, long-term and strategic goal is the conversion of a greater part of Hungarian oak forests into high forests. Another task is the conservation of mixed Hungarian oak forests with favourable composition, because Turkey oak, as its most frequent accessory species, is a biologically more vigorous species regarding the parallel development,. On the other hand, Hungarian oak forests and the sites which they occupy, because of the vicinity of settlements throughout Serbian hills, are under intensive pressure of the local population and they are readily sacrificed for building infrastructure and different purposes.

### 6.11.9. Pubescent oak forests

Pubescent oak and Vergilius's oak range over a considerably smaller area, in more thermophilous and less productive sites. The following types in this forest complex are identified in Serbia:

- forest of different oaks and hornbeam (*Carpino-Polyquercetum typicum*) on soil interval from deep pararendzina on loess to lessivé eutric cambisols;
- forest of different oaks with flowering ash (*Orno-Polyquercetum*) on poorly developed soils on limestones and basic siliceous rocks;
- forest of different oaks with flowering ash (*Orno-Polyquercetum*) on acid brown soils;
- pubescent oak and Vergilius's oak forest (*Orno-Quercetum pubescentis-virgilianae typicum*) on the soils from pararendzina on loess and marls to brown soils on marls and marly limestones;
- pubescent oak and Vergilius's oak forest with bladdernut (*Orno-Quercetum pubescentis-virgilianae staphylosum*) on moister pararendzinas on loess;
- Vergilius's oak forest (*Quercetum virgilianae*) on pararendzinas and brownised pararendzinas on loess and marls;

- Vergilius's oak forest (*Rhamneto-Quercetum virgilianae*) on syrozem on sand, to initial and medium stages of organogenic pararendzina;
- Vergilius's oak forest (*Rhamneto-Quercetum virgilianae*) on the terminal stage of pararendzina and pararendzina on sand;
- flowering ash and pubescent oak forest (*Orno-Quercetum virgilianae*) on rendzinas, xero-rendzinas and xero-pararendzinas.

In Serbia, forests of pubescent oak occur fragmentarily in a relatively small area of 10,400 *ha*, of which 76.9% are state forests. All forests are of coppice origin. They are characterised by relatively high density which amounts to 1,207 trees per *ha*. Average value of the main indicators is low: average volume amounts to 87 $m^3 \cdot ha^{-1}$, and volume increment 2.6 $m^3 \cdot ha^{-1}$ (Table 8.33, Appendix 2).

Regarding stand density, the state of pubescent oak forests by preservation status is medium: well-preserved stands cover 76.9%, insufficiently stocked stands 19.3% and devastated stands 3.8% of the area of pubescent oak forests. This is reflected also on the average values of the main production indicators: volume amounts to 102 $m^3 \cdot ha^{-1}$ in well-preserved stands, 43,4 $m^3 \cdot ha^{-1}$ in insufficiently stocked stands, and only 5,9 $m^3 \cdot ha^{-1}$ in devastated stands. Current volume increment in well-preserved stands is 3.2 $m^3 \cdot ha^{-1}$, 1.0 $m^3 \cdot ha^{-1}$ in insufficiently stocked stands and 0,2 $m^3 \cdot ha^{-1}$ in devastated stands (Table 8.34, Appendix 2).

The percentage of mixed and pure stands is equal, the density is somewhat higher in mixed forests, and the values of the main production indicators are low and uniform (Table 8.35, Appendix 2). In pubescent oak forests, there are 15 other tree species. In addition to pubescent oak, hop hornbeam, Turkish hazel and wild cherry are also in the list of relic, rare or endangered tree species.

Pubescent oak attains significant sizes, but most frequently not above the diameter of 50 *cm*. Other species identified in pubescent oak forests, except Turkey oak, do not exceed the diameter of 30 *cm*, which is primarily conditioned by the extremely unfavourable sites on which these forests occur (Table 8.36, Appendix 2).

Pubescent oak forests, because of their rarity, deserve the status of protected forests. Because of the extreme sites on which they grow, they have the protection function and this status should be permanently taken into account in the planning of their utilisation.

### 6.11.10. Forests of oriental hornbeam, hop hornbeam and flowering ash

Two forest types are identified in the forest complex of oriental hornbeam, hop hornbeam and flowering ash, which mainly cover the poorer sites, skeletal and shallow soils:

- hop hornbeam, flowering ash and lilac forest (*Fraxineto-Carpinetum syringetum*) on skeletal soils on limestone;
- hop hornbeam and flowering ash forest (*Fraxineto-Carpinetum*) on skeletal soils on limestone.

Forests of oriental hornbeam, hop hornbeam and flowering ash grow on extremely unfavourable xerothermic sites, most frequently in gorges, canyons and rocky terrains. They cover 87,200 *ha*, of which 61.9% are state forests. Often by their qualitative characteristics, they do not deserve to be classified as forests. They are stand forms of high density, with average 1,490 trees per *ha*, characterised by very low production potential and actual production effect. Average volume is 55 $m^3 \cdot ha^{-1}$, and volume increment 1.5 $m^3 \cdot ha^{-1}$ (Table 8.37, Appendix 2).

Although insufficient stocking in these forests is not so significant as in the most important economic categories, the stands differ in density, so there are 1,941 trees per *ha* in well-preserved stands, and only 286 trees per *ha* in insufficiently stocked forests (Table 8.38, Appendix 2). In these forests, the percentage of pure and mixed stands is uniform, but mixed forests are somewhat more productive (Table 8.39, Appendix 2). In addition to three principal species, these forests also consist of 18 other tree species, which is perhaps the greatest value of these forests, in addition to the protection function on extreme sites on which they grow.

Most frequent stem sizes attained by these species are up to 30 *cm* with rather low heights, although there are individual trees which attain the diameter up to 70 *cm* (Table 8.40, Appendix 2).

## 6.11.11. Lime forests

In Serbia, limes occur as secondary species at the sites of other tree species, so the minimal number of identified types of these forests is understandable:

- lime forest with white ash (*Tilieto-Fraxinetum excelsioris*) on acid brown soils.

Lime forests range over a relatively small area in the total growing stock of Serbia (30,400 *ha*), of which 57.9% are state forests. Most frequently as secondary, but biologically strong species (particularly in regenerative sense), limes usurp the sites of other tree species. All lime stands are coppice-regenerated. These forests are characterised by significant density, i.e. 1,005 *trees*·*ha*$^{-1}$ and a significant actual productivity, average volume is 202 $m^3 \cdot ha^{-1}$, and volume increment is 4.0 $m^3 \cdot ha^{-1}$ (Table 8.41, Appendix 2).

Lime forests include all three categories of preservation status: well-preserved stands cover 69.8%, insufficiently stocked stands 28.9% and devastated stands 1.3% of the area. This is confirmed by average density, which is 1,315 trees per *ha* in well-preserved stands, 301 tree per *ha* in insufficiently stocked stands and 95 trees per *ha* in devastated stands. Still, average volume is considerably greater in insufficiently stocked lime forests (probably because of the more favourable age structure) and amounts to 246 $m^3 \cdot ha^{-1}$; it is 187 $m^3 \cdot ha^{-1}$ in well-preserved stands, and 12 $m^3 \cdot ha^{-1}$ in devastated forests. Current increment is 4.2 $m^3 \cdot ha^{-1}$ in well-preserved lime forests, 3.5 $m^3 \cdot ha^{-1}$ in insufficiently stocked forests and 0.2 $m^3 \cdot ha^{-1}$ in devastated forests (Table 8.42, Appendix 2).

Lime forests are predominantly mixed stands which cover 56.6%, pure stands occupy 43.4% of the area. Stand density is higher in pure stands, except on the minimal area of mixed broadleaf and coniferous stands. Average volume and increment values are uniform in both forest categories, except in mixed forests of broadleaves and conifers, where the values are higher (Table 8.43, Appendix 2). In lime forests, in addition to 3 species of autochthonous limes, there are 24 other tree species, 11 of which are in the list of relic, endemic, rare and endangered species, and only black locust is an introduced species. The percentage of limes in the total growing stock of this forest category is 67.8%.

The largest diameters are attained by large-leaved lime (above 90 *cm*); silver lime, small-leaved lime and the majority of other species in this complex reach 70 *cm*, and minor species reach 50 *cm* (Table 8.44, Appendix 2).

Lime forests, because of their low percentage in the growing stock, are not generally a major management problem. In the areas where they occur, they are a significant element of the landscape and a significant raw-material potential in pharmacology and honey production. However, at the local level, lime can be an invasive species and a problem due to uncontrolled and unprofessional management, because it is biologically stronger than the species with which it grows in mixed stands, particularly at better sites of beech, sessile oak, common oak, etc.

## 6.11.12. Sessile oak forests

Sessile oak, despite its rather intensive degradation, taking into account the relatively wide ecological range, is the edificator of numerous forest types. A greater number of types are presented in the following list:

- forest of different oaks and hornbeam with beech (*Carpino-Polyquercetum fagetosum*) on the soils from pararendzina on loess and marl to humus eutric cambisols and brown soils on marls;
- sessile oak, hornbeam and Turkey oak forest (*Carpino-Quercetum petraeae-cerris typicum*) on the soils from pararendzina on loess and marl to lessivé eutric cambisols;
- sessile oak, hornbeam and Turkey oak forest (*Carpino Quercetum petraeae-cerris pauperum*) on lessivé acid brown soil;
- sessile oak, hornbeam and Turkey oak forest (*Carpino-Quercetum petraeae-cerris hygrophyllum*) on eutric cambisol to lessivé eutric cambisol and lessivé brown soil on serpentinite;
- sessile oak and hornbeam forest with asperule (*Querco-Carpinetum asperulosum*) on eutric cambisol to lessivé eutric cambisol and lessivé brown soil on serpentinite;
- sessile oak and hornbeam forest with common oak (*Robori-Querco-Carpinetum*) on deep and very deep eutric brown soils (eutric cambisols and brown soils) on loamy sediments;

- sessile oak and hornbeam forest with bladdernut (*Querco-Carpinetum staphyletosum*) on acid brown to lessivé acid brown soil;
- sessile oak and hornbeam forest (*Querco-Carpinetum*) on serpentinite diluvium;
- sessile oak and hornbeam forest at low altitudes (*Querco-Carpinetum hygrophyllum*) on different soils;
- sessile oak and flowering ash forest (*Orno-Quercetum petraeae*) on shallow acid soils;
- sessile oak and Vergilius's oak forest (*Quercetum petraeae-virgilianae*) on the soils from rendzina and pararendzina to shallower lessivé eutric cambisols;
- sessile oak and Turkey oak forest with a rich shrub storey (*Quercetum petraeae-cerris galietosum*) on rendiznas, pararendzinas, brownised pararendzinas, shallow eutric brown soils and eutric cambisols;
- sessile oak and Turkey oak forest (*Quercetum petraeae-cerris pauperum*) on acid brown soils and lessivé acid brown soils;
- sessile oak and Turkey oak forest with Hungarian oak (*Quercetum petraeae-cerris farnetosum*) on lessivé acid brown soils;
- sessile oak and Turkey oak forest (*Quercetum petraeae-cerris typicum*) on lessivé eutric cambisols and non-calcareous diluvium;
- sessile oak and Turkey oak forest (*Quercetum petraeae-cerris*) on lessivé brown soils on limestone and serpentinite;
- sessile oak and beech forest (*Querco-Fagetum moesiacae montanum serpentinicum*) on humus-siliceous soils on serpentinite;
- sessile oak forest (*Quercetum montanum typicum*) on acid brown soil;
- sessile oak forest (*Quercetum montanum typicum*) on acid brown and lessivé acid brown soils;
- sessile oak forest (*Quercetum montanum typicum*) on acid, sometimes eutric, brown soils;
- sessile oak forest (*Quercetum montanum caricetosum pilosae*) on eutric cambisol to lessivé eutric cambisol;
- sessile oak forest (*Quercetum montanum serpentinicum*) on lessivé brown soil on serpentinite;
- sessile oak forest with woodrush (*Quercetum montanum luzuletosum*) on medium deep to deep skeletal acid brown soils;
- sessile oak with white lime forest (*Quercetum montanum tilietosum tomentosae*) on moderately skeletal, predominantly deep acid brown soils;
- sessile oak with hornbeam forest (*Quercetum montanum carpinetosum betuli*) on eutric brown soils on meta-gabbroids;
- sessile oak with moss forest (*Musco-Quercetum montanum*) on eroded, skeletal, very acid brown soils;
- sessile oak forest at higher altitudes (*Quercetum montanum serpentinicum*) on humus-siliceous soils on serpentinite;
- oriental hornbeam forest with oaks (*Carpino orientalis-Polyquercetum*) on the soils ranging from pararendzina on loess to shallower drier eutric cambisols;
- pubescent oak with oriental hornbeam forest (*Querco-Carpinetum orientalis*) on skeletal soil on serpentinite;
- oriental hornbeam with oaks forest (*Carpino orientalis-Polyquercetum*) on skeletal brown soil.

**Table 9.** Age structure of sessile oak forests

| Forest ownership and origin | *P* | Age classes [%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *ha* | I | II | III | IV | V | VI | VII | VIII |
| State forests | | | | | | | | | |
| High | 29,200 | 1.37 | 2.74 | 26.03 | 23.29 | 10.95 | 20.55 | 12.33 | 2.74 |
| Coppice | 60,400 | 0.66 | 5.30 | 6.62 | 15.89 | 31.13 | 18.54 | 7.95 | 13.91 |
| Private forests | | | | | | | | | |
| High | 15,600 | 5.13 | 2.56 | 5.13 | 23.08 | 17.94 | 30.77 | 5.13 | 10.26 |
| Coppice | 68,000 | 0.59 | 3.53 | 17.06 | 18.24 | 25.87 | 20.00 | 7.65 | 7.06 |

Sessile oak is one of the most significant tree species in Serbia and occupies 173,200 *ha*, of which 51.7% are state forests. Sessile oak forests are dominantly coppice and cover 74.1%, high forests occupy 25.9% of the area. Stand density is expectedly higher in coppice forests where it amounts to 1,047 trees per *ha*, and in high forests it is 646 trees per *ha*. Average values of the basic production indicators are higher in high stands, where volume amounts to 183 $m^3 \cdot ha^{-1}$, and current volume increment is 4.0 $m^3 \cdot ha^{-1}$, while in coppice forests they are 104 $m^3 \cdot ha^{-1}$, i.e. 2.8 $m^3 \cdot ha^{-1}$ respectively. Increment percentage is considerably higher in the latter (Table 8.45, Appendix 2). Starting from this fact, it can be concluded that actual production effect is by 30% lower in coppice forests than in high forests and that annual loss is about 150,000 $m^3$ of wood volume. It should be noted that the inventory and productivity values are insufficient also in high forests.

Sessile oak forests are characterised by high diversity of preservation: 73.7% are well-preserved stands, 23.3% are insufficiently stocked stands, and devastated stands cover 3.0% of the area. Average density amounts to 1,190 $trees \cdot ha^{-1}$ in dense well-preserved stands, 277 $trees \cdot ha^{-1}$ in insufficiently stocked stands and 60 $trees \cdot ha^{-1}$ in devastated forests. The differences in the basic production indicators (volume and volume increment) are in harmony with density (Table 8.46, Appendix 2).

Pure stands cover 57.5%, and mixed stands occupy 42.5% of the total area of sessile oak forests. Density is somewhat higher in the latter category, and the values of basic production indicators in pure and mixed forests are close (Table 8.47, Appendix 2). In addition to sessile oak, its forests contain also 24 additional tree species, 11 of which are in the list of relic, rare, endemic and endangered species, and only black locust is an allochthonous species. The percentage of sessile oak in the growing stock of these forests is 72.5%, and the most frequent accessory species are Turkey oak, hornbeam, beech, flowering ash, lime, Hungarian oak and field maple (Table 48, Appendix 2).

In Serbia, sessile oak can attain the diameter above 90 *cm*. Volume structure is 55.0% (small-diameter):29.9% (medium-diameter):15.1% (large-diameter) and it can be evaluated as averagely favourable.

In state-owned high forests, the dominant age classes are middle-aged, maturing and mature stands (III, IV, VI, the seventh age classes). Coppice forests consist of all age classes above 30 years, except The seventh age class, and the youngest forest categories are almost absent. Similar age structure also characterises the private sessile oak forests. The differences are reflected in the presence of high stands in higher age classes in which the dominant areas are in the sixth age class. In coppice forests, the age of dominant stands ranges from 21 to 60 years (Table 9).

Sessile oak forests in Serbia are a significant landscape link between the belt of climatogenic forests of Hungarian oak and Turkey oak and the belt of mesophilous forests of beech. The wide distribution of sessile oak forests makes them significant at the country level, so they are, *inter alia*, a valuable resource of the diversity of tree species and a significant habitat for the main game species. From the economic aspect, sessile oak wood is one of the most valuable woods in our conditions, but its technical value is limited by the dominant coppice origin of sessile oak forest.

The strategic problems of long-term character are the conversion of coppice sessile oak forests into high forests, aiming at the more complete utilisation of the site production potentials, the increase of the growing stock in high forests and the conservation of mixed stands by forcing and sustaining sessile oak as the principal species versus the secondary accessory species, primarily Turkey oak, hornbeam, flowering ash and lime.

### 6.11.13. Black locust, birch and aspen forests

These forests cover a significant area in Serbia (223,200 *ha*), of which 26.5% are state forests, and the dominant percentage is that of black locust. Black locust was previously introduced to the sites of almost all tree species up to the belt of broadleaves and conifers, and the largest homogeneous areas are located on the Sands Deliblatska Peščara and Subotička Peščara and fragmentarily at different sites, especially those under erosion risk. Birch and aspen occur as pioneer accessory species in our forests, most frequently in the smaller homogeneous groups of several ares, except in burned areas and larger denuded areas.

All three regeneration forms are present, coppice forests dominate and cover 88.4% of the area,

**Table 10.** Age structure of black locust, birch and aspen forests

| Forest ownership | *P* | Age classes [%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *ha* | I | II | III | IV | V | VI | VII | VIII |
| State forests | 59,200 | 10.14 | 17.57 | 29.73 | 16.21 | 14.86 | 9.46 | 1.35 | 0.68 |
| Private forests | 164,000 | 12.44 | 14.63 | 37.32 | 14.88 | 11.96 | 4.63 | 1.95 | 2.19 |

natural high stands occupy 8.2% and artificially established stands 3.4%. Stand density is the highest in artificially established stands in which it amounts to 1,360 trees per *ha*, in high forests it is 846 trees per *ha*, and in coppice forests 1,109 trees per *ha*. These forests are characterised by relatively low values of the main production indicators with average volume of 60 $m^3 \cdot ha^{-1}$ and volume increment 2.8 $m^3 \cdot ha^{-1}$, but still their significance in the reclamation of areas under erosion risk and their pioneer function in site rehabilitation, is indisputable (Table 8.49, Appendix 2).

The dominant part of the inventory are well-preserved stands (81.2%), insufficiently stocked forests cover 17.0%, and devastated forests cover 1.8% of the area. The qualitative difference by the above categories is also supported by the difference in the values of the main production indicators (Table 8.50, Appendix 2). Pure stands cover 74.2% area, and mixed stands cover 25.8%. Average volume and volume increment are higher in pure stands (Table 8.51, Appendix 2).

In addition to black locust, birch and aspen, there are 28 additional species: These forests are significant for the protection of biodiversity, because 14 species are in the list of relic, endemic, rare and endangered species (Table 8.52, Appendix 2).

Black locust trees attain individually the diameters of up to 70 *cm*, but 89.2% of total volume consists of small-diameter wood, therefore black locust is, taking into account the technical characteristics, a significant species as small technical timber and timber for village purposes.

Taking into account the five-year age class intervals, it can be concluded that in black locust state forests the dominant stand ages are 1-30 years. The structure of age classes is also similar in private black locust forests, the age of the dominant stands is 1-25 years (Table 10).

The significance of black locust in our forests has already been emphasised. However, the problem is that it is mainly left to spontaneous regeneration, often without taking care of the number of generations. For this reason, after several production cycles, the species loses the initial properties, particularly regarding the productivity by quantity and quality.

Birch and aspen, with their indisputable pioneer function, as valuable landscape elements and as rare tree species in the growing stock of Serbia, require the change of the attitude in management planning.

## 6.11.14. Ash and maple forests

Forests of sycamore maple and white ash, in typological sense, have been identified in a small number of forest types:

- maple and white ash forests (*Aceri-Fraxinetum excelsioris*) on deep brown soils (at the level of ecological unit);
- montane forest of beech with noble broadleaves (*Fagetum moesiacae montanum aceretosum*) on diluvium;
- beech and hornbeam forest with noble broadleaves (*Fagetum moesiacae carpinetosum betuli*) on acid brown soils.

These are some of the least represented forests in Serbia and cover 12,800 *ha*, of which 62.5% are state forests. They occur most frequently at some transitory sites and particularly valuable ecological niches, but also as admixed species with other tree species, especially in belt beech. All three basic methods of regeneration are present, coppice forests are dominant and cover 59.4%, high forests occupy 34.4 %, and artificially established stands occupy 6.2% of the area. High values of production indicators are measured in artificially established stands, in which for the density of 925 $trees \cdot ha^{-1}$ average volume is 250 $m^3 \cdot ha^{-1}$, and volume increment 7.0 $m^3 \cdot ha^{-1}$. Productivity in high forests is medium, with the volume of 154 $m^3 \cdot ha^{-1}$; in coppice forests it is low, with the volume of 93 $m^3 \cdot ha^{-1}$. In harmony with the volume, the values of current volume increment are also low (Table 8.53, Appendix 2). Well-preserved stands cover 75.0%, insufficiently stocked stands cover 18.8% and devastated stands

6.2%. Average volume in all three categories is uniform, and the differences in density and volume increment are obvious and logical (Table 8.54, Appendix 2).

Mixed stands dominate with 62.5% by area, and the percentage of pure stands is 37.5%. The density of mixed forests is lower (884 *trees·ha*$^{-1}$), but the average volume is considerably higher, volume increment is equal in both categories (Table 8.55, Appendix 2). Although the area of ash and maple forests is small, they contain additional 18 tree species, ten of which are in the list of relic, rare and endangered species. Sycamore maple in these forests individually attains the diameter sizes above 90 *cm*, and white ash up to 70 *cm* (Table 8.56, Appendix 2).

Bearing in mind the value and the rarity of ash and maple forests in Serbia, they deserve special attention in management treatment. In addition to the imperative of ash and maple saving and protection at the sites where they are found, they should be a part of the reproduction potential in future re/afforestation of denuded areas and in the substitution of the existing forests of poor quality.

## 6.11.15. Beech forests

The greatest number of forest types in Serbia is logically designated in beech forests:

- beech and sessile oak forest (*Querco-Fagetum typicum*) on eutric cambisol to lessivé eutric cambisols and eutric brown to lessivé eutric brown soils;
- beech and sessile oak forest (*Querco-Fagetum typicum*) on acid brown and lessivé acid brown soil;
- beech and sessile oak forest (*Querco-Fagetum caricetosum silvaticae*) on non-calcareous diluvium;
- beech and sessile oak forest (*Querco-Fagetum*) on deep, moderately skeletal, dystric, eutric brown soils and diluvium,
- beech with flowering ash forest (*Fagetum moesiacae submontanum ornetosum*) on acid brown soils;
- submontane beech forest with noble broadleaves (*Fagetum moesiacae submontanum aceretosum*) on deep eutric brown soils;
- submontane forest of beech with fescue grass (*Fagetum moesiacae submontanum drymetosum*) on shallow and skeletal brown soil on limestone;
- submontane beech forests (*Fagetum moesiacae submontanum typicum*) on acid brown soil to lessivé acid brown soil;
- submontane beech forest with maples (*Fagetum moesiacae submontanum aceretosum*) on diluvium;
- submontane beech forest (*Fagetum moesiacae submontanum-dentarietosum bulbiferae*) on deep and very deep brown soils on limestone;
- submontane beech forest with fescue grass (*Fagetum moesiacae submontanum drymetosum*) on shallow and skeletal brown soil;
- submontane beech forest (*Fagetum moesiacae submontanum typicum*) on deep brown soils on serpentinite;
- montane beech forest (*Fagetum moesiacae montanum typicum*) on diluvium;
- montane beech forest (*Fagetum moesiacae montanum typicum*) on deep dystric (sometimes eutric) brown soils;
- montane beech forest with hornbeam (*Fagetum moesiacae montanum carpinetosum betuli*) on rankers (humus-siliceous soils);
- montane beech forest on peaks and crests (*Fagetum moesiacae montanum typicum*) on dystric rankers (orographically conditioned);
- montane beech forest with poorly developed herbaceous cover (*Fagetum moesiacae montanum nudum*) on medium deep and deep skeletal acid brown soils;
- montane beech forest at higher altitudes (*Fagetum moesiacae altimontanum*) on dystric rankers (altitudinally conditioned);
- montane beech forest (*Fagetum moesiacae montanum aceretosum heldreichii*) on humus acid brown soil;
- montane beech forest with fescue grass (*Fagetum moesiacae montanum drymetosum*) on shallow and skeletal brown soil;
- montane beech forest with fescue grass (*Fagetum moesiacae montanum drymetosum*) on shallow and skeletal brown soils on limestone;
- montane beech forest (*Fagetum moesiacae montanum-dentarietosum bulbiferae*) on deep and very deep brown soils on limestone;

- montane beech forest (*Fagetum moesiacae montanum*) on different soils on serpentinites;
- montane beech forest with limes (*Fagetum moesiacae montanum tilietosum*) on dystric and eutric brown soils;
- montane beech forest (*Fagetum moesiacae montanum typicum*) on eutric brown soil;
- montane beech forest with fescue grass (*Fagetum moesiacae montanum drymetosum*) on eutric humus-siliceous soils on serpentinite (rigolic and colluvial);
- montane beech forest with fescue grass (*Fagetum moesiacae montanum drymetosum*) on medium deep (sometimes skeletal) eutric brown soils on serpentinite;
- montane beech forest with noble broadleaves (*Fagetum moesiacae montanum aceretosum*) on diluvium;
- montane beech forest with noble broadleaves (*Fagetum moesiacae montanum aceretosum*) on deep acid brown soils;
- montane beech forest at higher altitudes with noble broadleaves (*Fagetum moesiacae altimontanum aceretosum*) on dystric rankers (altitudinally conditioned);
- beech and hornbeam forest with noble broadleaves (*Fagetum moesiacae carpinetosum betuli*) on acid brown soils;
- montane beech forest with facies of herbaceous plants (*Fagetum moesiacae montanum herbosum*) on predominantly skeletal acid brown soils;
- beech and hornbeam forest (*Fagetum moesiacae montanum carpinetosum betuli*) on humus-siliceous soils (rankers);
- beech and hornbeam forest (*Fagetum moesiacae montanum carpinetosum betuli*) on eroded, shallow, skeletal eutric brown soil;
- montane beech forest with ferns (*Fagetum moesiacae montanum filecetosum*) on eutric humus-siliceous soil;
- montane beech forest with sesleria (*Fagetum moesiacae montanum seslerietosum*) on eutric diluvium and brownised rendzina;
- montane beech forest (*Fagetum moesiacae montanum*) on rendzina;
- acidophilous forest of beech with woodrush (*Luzulo-Fagetum moesiacae montanum*) on acid brown soils;
- acidophilous forest of beech with mosses (*Musco-Fagetum*) on very acid brown soils;
- acidophilous forest of beech with blueberry (*Veccinio-Fagetum moesiacae montanum*) on extremely acid brown soils;
- acidophilous forests of beech with woodrush (*Luzulo-Fagetum moesiacae montanum*) on podzolised acid brown soil;
- montane beech forest with facies of herbaceous plants (*Fagetum moesiacum montanum*) on predominantly skeletal acid brown soils;
- beech and hop hornbeam forest (*Ostryo-Fagetum*) on rendzina;
- montane beech forest with wood rush (*Fagetum moesiacae montanum luzuletosum*) on eutric humus-siliceous soils and eutric brown soils;
- beech forest in hollows (*Fagetum moesiacae montanum dentarietosum glandulosae*) on diluvium;
- subalpine beech forest (*Fagetum moesiacae subalpinum*) on eutric brown soils on conglomerates and brown soils on limestone;
- subalpine beech forest (*Fagetum moesiacae subalpinum*) on acid brown soil;
- subalpine beech forest (*Fagetum moesiacae subalpinum typicum*) on black soils (rendzinas) and varieties of humus-siliceous and acid brown soils.

Beech is also the edificator species in some forest types listed under fir forests and spruce forests.

Beech forests are the most widespread forests in Serbia and cover 660,400 *ha* or 29.3% of the total forest area, and 67.4% are state forests. They are the base of the vertical ecological column of forest communities and they range over the altitudes of 100-1,700 *m*, at different sites (soils) from very acid and neutral to ultra basic. High, naturally regenerated stands cover 53.1% of the area and coppice beech forests occupy 46.9%.

The density is greater in coppice stands and amounts to 953 trees per ha and 530 *trees·ha*$^{-1}$ in high forests. Average volume in high beech forests is very much higher and amounts to 269 $m^3 \cdot ha^{-1}$, it is also significant in coppice forests and amounts to 192 $m^3 \cdot ha^{-1}$. Volume increment in high forests is 5.0 $m^3 \cdot ha^{-1}$, and in

**Table 11.** Age structure of beech forests

| Forest ownership and origin | *P* | Age classes [%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *ha* | I | II | III | IV | V | VI | VII | VIII |
| State forests | | | | | | | | | |
| High | 156,000 | 2.05 | 4.62 | 20.77 | 19.49 | 10.00 | 36.67 | 5.64 | 0.77 |
| Coppice | 172,800 | 0.46 | 0.69 | 7.87 | 14.35 | 21.06 | 20.37 | 15.51 | 19.68 |
| Private forests | | | | | | | | | |
| High | 52,000 | 2.31 | 7.69 | 18.46 | 20.77 | 15.38 | 29.23 | 3.85 | 2.31 |
| Coppice | 136,800 | 0.29 | 0.88 | 7.89 | 17.54 | 21.64 | 19.88 | 12.28 | 19.59 |

coppice 3.8 $m^3 \cdot ha^{-1}$. Increment percentage is medium and uniform in both forest categories, in high forests it is limited by insufficient stocking, and in coppice forests by age structure. Taking into account the differences in productivity (production potential in coppice forests is about 75% lower than in high forests) in beech forests, annual loss in production is about 370,000 $m^3$ of wood, and the differences in product quality are also very significant (Table 8.57, Appendix 2).

In beech forests in Serbia, well-preserved stands occupy 59.8%, insufficiently stocked 37.4% and devastated 2.8% of the area. This fact is documented by major differences in stand density which amounts to 1,049 $trees \cdot ha^{-1}$ in dense and well-preserved stands to 74 $trees \cdot ha^{-1}$ in devastated stands. Thanks to a more favourable age structure, average volume is somewhat higher in insufficiently stocked forests than in dense forests and amounts to 254 $m^3 \cdot ha^{-1}$, and it is 153 $m^3 \cdot ha^{-1}$ in devastated stands. The differences in volume increment and increment percentage in favour of well-preserved stands elucidate the qualitative relationship of the above categories by preservation status (Table 8.58, Appendix 2).

In the largest part of the area, beech grows in pure stands, which cover 86.3%, while the area of mixed forests is relatively small - 13.7%. Density is somewhat higher in mixed stands, but it is also considerable in pure stands. Values of the main production indicators differ by mixture categories. Average volume is the greatest in mixed forests of beech and conifers in which it amounts to 346 $m^3 \cdot ha^{-1}$, but it is insufficient compared to the normal volume (selection forests) which in these forests amounts to 400-550 $m^3 \cdot ha^{-1}$. Average volume in pure beech forests is rather high (especially if it is taken into account that it is limited by the presence of coppice forests) and amounts to 239 $m^3 \cdot ha^{-1}$, and it is medium (180 $m^3 \cdot ha^{-1}$) in mixed forests of beech and other broadleaves. Volume increment is high in mixed forests of beech and conifers and amounts to 7.4 $m^3 \cdot ha^{-1}$, it is 4.5 $m^3 \cdot ha^{-1}$ in pure beech forests, and it is 3.8 $m^3 \cdot ha^{-1}$ in mixed forests of beech and other broadleaves (Table 8.59, Appendix 2).

The belt of beech forests supports additional 32 tree species, which is expected, considering the range of beech forests. 17 tree species are in the list of relic, endemic, rare and endangered species, and only black locust is an introduced species, but its percentage in the total growing stock is insignificant. Beech accounts for 91.5% of the timber supply in beech forests, and the share of other species is 8.5%, of which conifers account for 1.1%, which emphasises beech domination in this belt. Beech attains diameters above 90 *cm*, and the majority of other admixed species in its forests reach 70 *cm*. Volume structure compared to diameter can be considered as favourable, as the volume ratio of small-diameter, medium-diameter and large-diameter wood is 33.3%:35.1%:31.6% (Table 8.60, Appendix 2).

In state-owned high even-aged beech forests, the dominant age classes are the third, fourth and sixth age classes, considerable but also insufficient is the percentage of the second, fifth and the seventh age classes. Stands in the first age class are almost absent. The percentage of older forest categories depends on the rotation period. In beech coppice forests, the dominant stand age is 31-80 years. Age structure of private beech forests is similar, but in high forests, the percentage and the area of the fifth age class are significant (Table 11).

Beech forests and beech trees are recognisable elements of forest landscapes of submontane and

montane Serbia. Considering their wide range, beech forests are a rich source of biodiversity, particularly regarding tree species, but the mixture is unfavourable, in favour of beech.

Beech forests are also a significant habitat of fauna, particularly of hunting game, the most valuable species of big game (deer, roe deer, wild boar), and predators and birds of prey are not rare. Finally, beech forests are a significant source of wood raw material, because now about 46,000,000 $m^3$ is in the category of mature wood.

Long-term strategic problems of beech forests are, first of all, the conversion of coppice forests in high forests, the increase in density, i.e. the decrease in the percentage of insufficiently stocked forests in the growing stock of pure forests and even more in mixed forests of beech and conifers, and the increase of the percentage of other tree species in beech belt, according to the directives of biodiversity conservation, site characteristics and management goals, which would contribute significantly to environmental quality in general.

## 6.11.16. Pine forests

Pine forests grow in thermophilous site conditions and on a series of basic soils. Forest types identified in this complex are:

- Goč Austrian pine forest (*Potentillo-Pinetum nigrae gočensis*) on evolution-genetic series of soils on peridotites and serpentinites;
- Austrian pine forest (*Pinetum nigrae ostryetosum*) on initial soils on limestone;
- Austrian pine forest (*Pinetum nigrae*) on brown skeletal soils on limestone;
- Scots pine forest (*Erico-Pinetum silvestrae serpentinicum*) on humus-siliceous soil on serpentinite;
- Austrian pine and Scots pine forest (*Pinetum nigrae-sylvestris serpentinicum*) on humus-siliceous soil on serpentinite.

The number of ecological units which include these forests in Serbia is much greater.

Forests of Austrian pine and Scots pine cover a relatively small area of 126,000 *ha* and they account for 5.6% of the total growing stock in Serbia, of which 70.5% are state forests. The dominant stands of these species are artificially regenerated stands with 68.3% of the area, and natural high stands cover 31.7%. Natural stands cover the xerothermic sites, and artificially established stands occur at the sites of other species, and they are often pioneer species. Density is higher in artificially regenerated stands in which it amounts to 1,058 trees per *ha*, and 792 trees per *ha* in natural stands. Average volume is low and uniform in both forest categories. Volume increment is relatively high and also uniform in both forest categories. The reasons are the age structure of artificially established stands, i.e. the extreme site conditions and previous utilisation (insufficient stocking) of natural stands (Table 8.61, Appendix 2).

In pine forests, dense well-preserved stands cover 80.6% of the area, insufficiently stocked forests cover 17.8% and devastated forests 1.6%. All production indicators differ by the above categories and it can be concluded that the production potential in insufficiently stocked forests is used about 32% compared to well-stocked forests (Table 8.62, Appendix 2).

In pine forests, pure stands dominate with 84.8% by area, mixed forests of pines and broadleaves cover 10.5%, and mixed forest of conifers cover 4.7%. Stand density in the above categories is uniform, but there are significant differences in volume

**Table 12.** Age structure of pine forests

| Forest ownership and origin | *P* | Age classes [%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *ha* | I | II | III | IV | V | VI | VII | VIII |
| State forests | | | | | | | | | |
| High natural stands | 26,400 | 3.03 | 28.79 | 36.36 | 24.24 | 3.03 | 3.03 | --- | 1.52 |
| Plantations | 62,400 | 2.56 | 16.67 | 39.74 | 24.36 | 10.27 | 2.56 | 2.56 | 1.28 |
| Private forests | | | | | | | | | |
| High natural stands | 13,600 | --- | 38.24 | 32.35 | 14.71 | 5.88 | 8.82 | --- | --- |
| Plantations | 23,600 | 5.08 | 22.03 | 44.07 | 18.65 | 8.48 | 1.69 | --- | --- |

and volume increment. Relatively good productivity is assessed in mixed forests of conifers in which volume is 184 $m^3 \cdot ha^{-1}$, and volume increment 8.1 $m^3 \cdot ha^{-1}$. Increment percentage in all three forest categories is very high (Table 8.63, Appendix 2).

In pine forests there are also 20 other tree species which are autochthonous, except black locust. The most frequent coniferous accessory species is spruce, and of broadleaves sessile oak, beech and Turkey oak. Seven species are in the list of relic, endemic, rare and endangered species. Other species participate in total volume of pine forests by 8.1%. Austrian pine attains diameter up to 90 *cm*, Scots pine up to 70 *cm*. Volume structure regarding the diameter categories small-diameter:medium-diameter:large-diameter is 73.8%:24.3%:1.9%, i.e. it is considerably in favour of small-diameter wood (Table 8.64, Appendix 2).

Pine forests in Serbia, as regards age structure, can be assessed as predominantly young. In state-owned high natural forests, the dominant ages are from the second to the fourth age classes, and the percentage of other age categories (up to 160 years) is lower. Artificially established pine stands (plantations) are with dominant age up to 50 years, while the percentage of older stands, up to 80 years, is insignificant. The age structure of private pine forests is similar (Table 12).

Pine forest in Serbia are significant valuable landscape elements of the mountainous massifs and by their presence, they contribute to the beauty of the nature and the landscape. Simultaneously, thanks to their minimal site requirements, they are significant pioneer species and species which are seriously depended on in the reclamation of erosive regions. Even in such conditions, pines reach significant production results. As the fragment of nature in the crags, pine forests are the habitats of different, often rare species of fauna, which live in such quiet and often virgin landscapes.

Regarding the time aspect and long-term goals of forest management, strategic problems of pine forests are, primarily, their protection, especially against fire. Management problems are conditioned by large homogeneous units of artificially established pine stands (cultures) which are often established on unfavourable sites of other species (too good for its demands), at unfavourable altitude, and one of the main problems is the real determination of rotation. A part of the inventory of insufficiently stocked stands should be converted into well-stocked stand categories by repair planting and by supporting the natural regeneration processes. Finally, special problems refer to the sale and consumption of wood from these forests, obtained by cutting because of dominantly unfavourable tree sizes.

### 6.11.17. Fir forests

In Serbian forests, fir is seldom found on its own, most frequently it occurs in two and poly-dominant communities with beech, beech and spruce, and more rarely with admixed sessile oak or pines. The following forest types, in which fir is one of the edificators, are identified in Serbia:

- fir and beech forest (*Abieti-Fagetum typicum*) on deep to very deep acid brown soils on granodiorites and quartz-diorites;
- fir and beech forest (*Abieti-Fagetum typicum*) on medium deep acid brown soils on granodiorites and quartz-diorites;
- fir and beech forest with fescue grass (*Abieti-Fagetum drymetosum*) on skeletal acid brown soils on granodiorites and quartz-diorites;
- fir and beech forest (*Abieti-Fagetum typicum*) on diluvium (along the streams);
- fir and beech forest (*Abieti-Fagetum pauperum*) on deep to very deep acid brown soils on schists and metamorphic rocks;
- fir and beech forest with fescue grass (*Abieti-Fagetum drymetosum*) on humus siliceous and shallow acid brown soils on schists and metamorphic rocks;
- fir and beech forest (*Abieti-Fagetum pauperum*) on medium deep eutric and dystric brown soils;
- fir and beech forest (*Abieti-Fagetum luzuletosum*) on extremely acid and podzolised acid brown soils on quartzites;
- fir and beech forest with fescue grass (*Abieti-Fagetum moesiacae drymetosum*) on rendzina;
- fir and beech forest (*Abieti-Fagetum moesiacae rubosum*) on eutric brown soil;
- fir and beech forest (*Abieti-Fagetum serpentinicum caricetosum silvaticae*) on deep brown to lessivé brown soils on serpentinites;

- fir and beech forest (*Abieti-Fagetum serpentinicum typicum*) on typical brownised and on skeletal brown soils on serpentinites;
- fir and beech forest (*Abieti-Fagetum quercetosum daleschampii*) on skeletal brown soils on serpentinites;
- spruce, fir and beech forest (*Piceo-Abieti-Fagetum moesiacae typicum*) on brown podzolised soil;
- spruce, fir and beech forest (*Piceo-Abieti-Fagetum moesiacae typicum*) on acid brown soil;
- spruce, fir and beech forest with woodrush (*Piceo-Abieti-Fagetum moesiacae luzuletosum*) on podzolised acid brown soil and brown podzolised soil;
- spruce, fir and beech forest with mosses (*Piceo-Abieti-Fagetum moesiacae hylocomietosum*) on brown podzolised soil;
- spruce, fir and beech forests (*Piceo-Abieti-Fagetum serpentinicum*) on medium deep brown soils on serpentinite;
- spruce, fir and beech forest (*Piceo-Abieti-Fagetum typicum*) on deep to medium deep brown soils on limestone;
- spruce, fir and beech forest (*Piceo-Abieti-Fagetum drymetosum*) on shallow and skeletal brown soils on limestone;
- spruce, fir and beech forest (*Piceo-Abieti-Fagetum*) on skeletal rocky soils on limestone;
- spruce, fir and beech forests with fescue grass (*Piceo-Abieti-Fagetum drymetosum*) on eutric humus-siliceous soil and on eutric brown soils;
- spruce, fir and beech forest with fescue grass (*Piceo-Abieti-Fagetum drymetosum*) on eutric humus-siliceous soil and on eutric brown soil on serpentinite;
- spruce, fir and beech forest with blueberry (*Piceo-Abieti-Fagetum vaccinietosum*) on eutric siliceous humus soil;
- spruce, fir and beech forest with blueberry (*Piceo-Abieti-Fagetum vaccinietosum*) on eutric humus-siliceous soils on serpentinite;
- spruce, fir and beech forest with asperule (*Piceo-Abieti-Fagetum asperulosum*) on rendzinas and eutric brown soils;
- spruce, fir and beech forest with asperule (*Piceo-Abieti-Fagetum asperulosum*) on rankers and eutric brown soil on serpentinite;
- spruce, fir and Scots pine forest (*Piceo-Abieti-Pinetosum silvestrae*) on shallow skeletal brown soils on limestone.

Fir forests cover a relatively small area of 25,600 *ha*, 87.5% of which are state forests. Natural stands dominate with 95.3%, and artificially established stands cover 4.7% of the area. The density of natural stands is considerable and reflects the most frequently uneven-aged (selection) structure. The values of almost all main production indicators are high. Average volume in natural stands is 390 $m^3 \cdot ha^{-1}$, in artificially established 273 $m^3 \cdot ha^{-1}$. Current volume increment in natural regenerated stands is 8.9 $m^3 \cdot ha^{-1}$, and 7.2 $m^3 \cdot ha^{-1}$ in artificially established stands (Table 8.65, Appendix 2).

A large part of the area of fir forests (34.4%) is covered by insufficiently stocked stands in which density and the average values of volume and volume increment are lower. Production potential in these forests is by 50% lower than in well-preserved, well stocked forests (Table 8.66, Appendix 2).

In fir forests, the percentage of mixed stands by area is somewhat higher, i.e. 51.6%. Stand density is the lowest in pure stands, but the values of the main production indicators are higher in pure forests than in mixed forests. Average volume in pure stands amounts to 400 $m^3 \cdot ha^{-1}$, volume increment 9.6 $m^3 \cdot ha^{-1}$, and in mixed stands of conifers (fir and spruce) volume is 346 $m^3 \cdot ha^{-1}$ and volume increment 8.8 $m^3 \cdot ha^{-1}$ (Table 8.67, Appendix 2).

In fir forests there are also 9 other autochthonous tree species. Fir dominates in the growing stock with volume percentage of 70.7%. Most frequent accessory species are spruce and beech, and they are characterised by selection structure. Fir in these forests attains the diameter to 90 *cm*. Volume structure as per the diameter categories is 36.5%:40.3%:23.2% (Table 8.68, Appendix 2).

Fir is one of the most valuable conifers in Serbia. It is insufficiently represented our forests taking into account its potentials. Consequently, fir introduction is a strategic task in forest areas in which it is possible, particularly in the belt of beech forests. Where it is already present, its vertical amplitude should extended. Because of the very insufficient stocking in fir forests, the growing stock should be economised and

the process of repair planting should be intensified in order to create dense, mixed stands with sustainable selection structure.

## 6.11.18. Spruce forests

In addition to the types listed under fir forests, in Serbia spruce is the edificator species also in the following forest types:

- beech and spruce forest with asperule (*Piceeto-Fagetum asperulosum*) on acid brown soil and brown podzolised soil;
- beech and spruce forest with fescue grass (*Piceeto-Fagetum drymetosum*) on dystric ranker and acid brown soil;
- beech and spruce forest with blueberry (*Piceeto-Fagetum vaccinietosum*) on brown podzolised soil;
- beech and spruce forest (*Fago-Piceetum*) on rendzina;
- spruce and fir forest with asperule (*Abieti-Piceetum asperulosum*) on eutric brown soil;
- spruce and fir forest with fescue grass (*Abieti-Piceetum drymetosum*) on eutric brown soil on serpentinite;
- spruce and fir forest with wood sorrel (*Abieti-Piceetum oxalidetosum*) on brown podzolised soil;
- spruce and fir forest with blueberry (*Abieti-Piceetum vaccinietosum*) on brown podzolised soil;
- spruce and fir forest with fescue grass (*Abieti-Piceetum drymetosum*) on medium deep podzolised soil;
- spruce forests with wood sorrel (*Piceetum excelsae oxalidetosum*) on brown podzolised soil;
- montane spruce forest (*Piceetum excelsae serbicum luzuletosum*) on acid humus-siliceous soil and brown podzolised soil;
- montane spruce forest (*Piceetum excelsae serbicum drymetosum*) on acid brown soil, brownised dystric humus-siliceous soil and brown podzolised soil;
- montane spruce forest with mosses (*Piceetum excelsae serbicum hylocomietosum*) on acid humus-siliceous soil and brown podzolised soil;
- spruce forests with blueberry (*Piceetum excelsae vaccinietosum*) on acid brown and brown podzolised soil;
- spruce and mountain ash forest (*Piceetum excelsae sorbetosum*) on organogenic colluvial humus-siliceous soil;
- subalpine spruce forest (*Piceetum excelsae serbicum subalpinum*) on brown podzolised soils and humus-ferruginous podzols.

Spruce forests are considerably more represented in the growing stock in Serbia than fir. They cover the area of 86,400 *ha*, 79.6% of which are state forests. They occupy the top of the ecological column in the altitudinal zone to which they belong. They cover the extreme sites and grow in various extreme conditions. The dominant stands in spruce forests are naturally regenerated stands covering 62.5% by area. Plantations cover 37.5%. Stand density is considerably higher in plantations and amounts to 1,045 trees per *ha*, and it is 605 trees per *ha* in natural high stands. Values of the main production indicators in high naturally regenerated forests are relatively high: average volume is 285 $m^3 \cdot ha^{-1}$, and current volume increment 8.0 $m^3 \cdot ha^{-1}$. In artificially established stands, these values are low: volume is 109 $m^3 \cdot ha^{-1}$ and volume increment is 5.4 $m^3 \cdot ha^{-1}$, primarily because of their age structure (dominant stands I-III age classes to the age of 30 years) (Table 8.69, Appendix 2).

**Table 13.** Age structure of spruce forests

| Forest ownership and origin | *P* | Age classes [%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *ha* | I | II | III | IV | V | VI | VII | VIII |
| State forests | | | | | | | | | |
| High natural stands | 22,800 | 3.51 | 15.79 | 28.07 | 28.07 | 17.54 | 7.02 | --- | --- |
| Plantations | 26,800 | 2.99 | 32.84 | 31.34 | 25.37 | 5.97 | --- | --- | 1.49 |
| Private forests | | | | | | | | | |
| High natural stands | 6,400 | --- | 25.00 | 43.75 | 18.75 | 6.25 | 6.25 | --- | --- |
| Plantations | 5,600 | 28.57 | 42.86 | 14.29 | 7.14 | --- | 7.14 | --- | --- |

Spruce forests are characterised by all three categories of preservation, with the dominant percentage of well-preserved stands (by density) of 66.2%. The percentage of insufficiently stocked stands of 31.5% is rather high and limiting, and the percentage of devastated stands is relatively low and amounts to 2.3% by area. The differences in stand density affect the stocking. The average volume in well-preserved stands and insufficiently stocked stands is uniform thanks to more favourable age structure of the latter. The differences in volume increment are evident and they are 8.0 $m^3 \cdot ha^{-1}$ in well-preserved stands, 5.5 $m^3 \cdot ha^{-1}$ in insufficiently stocked stands, and 1.8 $m^3 \cdot ha^{-1}$ in devastated stands. Only on this basis, annual loss in production is about 80,000 $m^3$ (Table 8.70, Appendix 2).

In spruce forests, pure stands are dominant with the percentage of 83.3% by area, mixed stands cover 16.7%. Average values of volume and volume increment are considerably higher in mixed forests of spruce, fir and pines. Average volume in these stand categories amounts to 374 $m^3 \cdot ha^{-1}$, and current volume increment is 10.4 $m^3 \cdot ha^{-1}$. Volume in mixed spruce, fir and beech forests is low and amounts to 175 $m^3 \cdot ha^{-1}$, volume increment 5.3 $m^3 \cdot ha^{-1}$ (Table 8.71, Appendix 2).

In spruce forest inventory, there are 17 other tree species. Only Douglas-fir is an introduced species, but its percentage in the growing stock of these forests is minimal. Five of the above tree species are in the list of relic, rare and endangered species.

Spruce in spruce forests in Serbia attains the diameter above 90 *cm*, and other accessory species most frequently reach up to 70 *cm*, i.e. 50 *cm*. In spruce forests, the volume ratio of small-diameter, medium-diameter and large-diameter trees is 45.2%:38.0%: 16.8%, which can be considered medium favourable and largely conditioned by age structure, i.e. by the significant presence of juvenile forests (Table 8.72, Appendix 2). The real proportion of age classes in spruce forests is presented in Table 13.

Spruce forests, despite the relatively modest percentage, enhance the growing stock in Serbia. They are a significant element of high-mountain landscapes. The emphasised characteristics of spruce forests point to the strategic, long-term problems which are reflected in the need of repair planting in understocked stands to improve their bioecological stability, the need of tending the juvenile stands so as to ensure in time the sufficient area of active assimilation potentials, and the need of increasing the mixture and uneven-agedness so as to reduce the potential effects of instability of these forest ecosystems.

## 6.11.19. Forests of other broadleaves

This category includes the forests which, due to the applied typification, could not be included in any of the above analysed stand categories. They occupy the area of 53,600 *ha*. The dominant part of the area is occupied by coppice stands (95.5%); artificially established stands occupy 4.5%. Although stand density in coppice forests is considerably higher, the values of the main production indicators are uniform and low at the same time (Table 8.73, Appendix 2).

In these forests also, the percentage of insufficiently stocked stands is considerable (29.9%), and their values of the main production indicators are twice lower than in well-preserved stands (Table 8.74, Appendix 2). The proportion of pure and mixed stands by area is equal, but the values of the main cruising indicators are higher in mixed stands (Table 8.75, Appendix 2).

In the inventory of forests of other broadleaves there are 31 tree species, so they are a significant element of diversity. The most represented in the growing stock is field maple. 13 species are in the list of relic, endemic, rare and endangered species, and 5 species are introduced. The greatest number of tree species in these forests attains the diameter up to 50 *cm* (Table 8.76, Appendix 2).

The main management problem in forests of other broadleaves is the dominant coppice origin and insufficient stocking, so the establishment of good-quality stands with the favourable composition and structure should be ensured by the conversion of a part of the area, and by long-term strategic goals.

## 6.11.20. Forests of other conifers

Forests of other conifers in Serbia cover the area of 5,200 *ha*. They are artificially established stands (plantations) of conifers with a considerable density of 1,149 trees per *ha*, average volume 203 $m^3 \cdot ha^{-1}$ and current volume increment of 8.1 $m^3 \cdot ha^{-1}$ (Table 8.77, Appendix 2).

Insufficiently stocked stands cover 15.4% of the above area and the percentage of mixed stands is the same. The main tree species are Douglas-fir, Weymouth pine and larch with, for the time being, low sizes, conditioned by the age. This forest complex also contains 10 autochthonous species of broadleaves and 3 species of conifers which should be supported in the mixture (Table 8.78-8.80, Appendix 2). This forest category is also almost always characterised by silvicultural neglect.

In general, the area percentage of introduced coniferous species is not a significant problem, primarily regarding the diversity, but the above species should be introduced under stricter control, taking fully into account the worldwide principles (certification and other principles).

## 6.12. Dead wood

A very significant indicator of forest condition and the attitude to the principle of sustainable forest management, pursuant to Criterion 4, is the amount of dead wood in the forests in Serbia (Table 14, Appendices 2, 3 and 4).

Total volume of dead wood in forests in Serbia amounts to 16,260,414 $m^3$. Average standing volume of dead trees amounts to 4.05 $m^3 \cdot ha^{-1}$, and dead lying wood and coarse woody debris is 3.17 $m^3 \cdot ha^{-1}$, i.e. total concentration of dead wood in our forests is 7.22 $m^3 \cdot ha^{-1}$, in central Serbia 7.18 $m^3 \cdot ha^{-1}$, and in Vojvodina 7.75 $m^3 \cdot ha^{-1}$, which is considerably above the required standard of 23 $m^3 \cdot ha^{-1}$. This quantity of dead wood enables the continuity and sustainability of the sites (biotopes), particularly for avian fauna and insect fauna inhabiting our forests, as their habitats are sometimes limited to small pieces of dead wood of the particular species. Simultaneously, the part of forest products that is left in a forest is a significant renewable resource regarding the conservation of the production potential of the site in general.

**Figure 33**

## 6.13. Carbon stock in forests of Serbia

Forests are a significant component of global carbon cycling. They affect the climate, but the climate change also affects the forests, so forest management or forest degradation will have a significant role on global warming in the 21st century. Forest devastation during the eighties of the last century explains one fourth of the total anthropogenic carbon emissions. Forests are the most significant type of vegetation as regards carbon net sources, sequestration and retention.

Forest ecosystems together with the soil have a great capacity both of accumulating carbon and of releasing carbon. For this reason, the effects of global climate change on forests and their effect on carbon balance are of prime significance. The origin of carbon stock in the forest wood volume of the Republic of Serbia is presented in Table 14 based on the data of the National Inventory. The amount of carbon which is retained in forest ecosystems is conditioned by numerous factors, among which the most important are those which affect biomass increment. The changes or, in general, forest conditions are the result of different factors (changes of area under forest, commercial felling, forest fires,

climate extremes, air pollution, land use changes, soil erosion, insect attacks, pathogenic fungi, etc.).

**Table 14.** Carbon stock related to forest origin

| Forest origin | *P* | *V* | *C* |
|---|---|---|---|
| | *ha* | $m^3$ | *t* |
| High natural stands | 621,200.0 | 157,511,262.8 | 50,411,688.6 |
| Coppice stands | 1,456,400.0 | 181,188,914.2 | 63,733,764.2 |
| Artificially established stands | 174,800.0 | 23,787,240.6 | 6,091,897.6 |
| TOTAL | **2,252,400.0** | **362,487,417.6** | **120,237,350.4** |

Forest management should be analysed also in the function of carbon emission reductions and carbon sinks. The conservation of carbon accumulated in the forests is an exceptional potential of the management system.

Flexible economic mechanisms of Kyoto Protocol and Marrakesh Accords enable the engagement in the sense of economic feasibility, energy, and environment safety, simultaneously taking care of the social-economic consequences (Kadović *et al.*, 2007). In the total area under forest, carbon stock amounts to 53.38 $t \cdot ha^{-1}$. Carbon stock in the wood volume of the principal (most represented) tree species is presented in Table 15.

**Table 15.** Carbon stock in the most represented tree species

| Tree species | *V* | *C* |
|---|---|---|
| | $m^3$ | *t* |
| Beech | 146,850,828 | 50,663,535.6 |
| Common oak | 9,242,373 | 2,865,135.6 |
| Sessile oak | 21,542,890 | 7,109,153.7 |
| Hornbeam | 15,157,240 | 5,982,645.1 |
| Turkey oak | 46,980,446 | 18,322,373.9 |
| Hungarian oak | 20,986,465 | 7,030,465.8 |
| Silver lime | 1,779,096 | 435,755.5 |
| Black locust | 11,243,944 | 4,160,259.1 |
| Euramerican poplar | 6,137,862 | 1,288,951.1 |
| Spruce | 18,810,547 | 4,015,583.1 |
| Fir | 8,304,924 | 1,702,509.3 |
| Scots pine & Austrian pine | 16,434,457 | 4,765,992.4 |
| TOTAL | **323,471,072** | **108,342,360.2** |

## 6.14. Growing stock of the AP Kosovo and Metohija

The Tables present some of the characteristics (land use, ownership, origin and volume and current volume increment per tree species) of the growing stock of the Autonomous Province of Kosovo and Metohija.

Due to the objective circumstances, as it has already been stated, the first National Forest Inventory in Serbia could not be realised on the territory of this Province, so the presented data, without any analytic or critical explanation, have been taken from NFG, which carried out the inventory in the area of the AP Kosovo and Metohija in the period 2003-2005. Taking into account the methodological differences in the inventory and the impossible access to the data base and the control of its reliability, the presented data have not been included in the account of the state of the growing stock of Serbia (Appendix 2), so their character is orientational and illustrative.

**Table 16.** Area structure by land use

| Land use | Area | |
|---|---|---|
| | *ha* | % |
| Forest | 460,800 | 42.1 |
| Other wooded land | 28,200 | 2.6 |
| Barren land | 23,400 | 2.1 |
| Agricultural land | 342,400 | 31.3 |
| Meadows and pastures | 153,200 | 14.0 |
| Built-up land | 40,000 | 3.7 |
| Inland water | 4,600 | 0.4 |
| Unclassified | 41,600 | 3.8 |
| TOTAL | **1,094,200** | **100.0** |

**Table 17.** Forests by ownership

| Ownership | Area | |
|---|---|---|
| | *ha* | % |
| State | 187,600 | 40.7 |
| Private | 155,400 | 33.7 |
| Other | 117,800 | 25.6 |
| TOTAL | **460,800** | **100.0** |

**Table 18.** Forests by origin

| Stand origin | Area | |
|---|---|---|
| | *ha* | % |
| Forest land | 32,200 | 7.0 |
| High forests | 173,400 | 37.6 |
| Coppice forests and forests of mixed origin | 173,600 | 37.7 |
| Unknown origin | 81,600 | 17.7 |
| **TOTAL** | **460,800** | **100.0** |

**Table 19.** Forests by tree species

| Tree species | Volume | | Current volume increment | |
|---|---|---|---|---|
| | $m^3$ | % | $m^3$ | % |
| Turkey oak | 5,176,000 | 9.8 | 224,000 | 16.4 |
| Sessile oak | 4,277,000 | 8.1 | 158,000 | 11.6 |
| Other oaks | 129,000 | 0.2 | 4,000 | 0.3 |
| Beech | 15,963,000 | 30.2 | 436,000 | 32.0 |
| Other broadleaves | 3,706,000 | 7.0 | 151,000 | 11.1 |
| Undetermined broadleaves | 5,983,000 | 11.3 | --- | --- |
| Fir | 1,577,000 | 3.0 | 80,000 | 5.9 |
| Spruce | 1,402,000 | 2.7 | 44,000 | 3.2 |
| Pines | 2,019,000 | 3.8 | 61,000 | 4.5 |
| Other conifers | 224,000 | 0.4 | 7,000 | 0.5 |
| Conifers *d*<7 *cm* | 321,000 | 0.6 | --- | --- |
| Broadleaves *d*<7 *cm* | 12,118,000 | 22.9 | --- | --- |
| Undetermined species | --- | --- | 199,000 | 14.5 |
| **TOTAL** | **52,895,000** | **100.0** | **1,364,000** | **100.0** |

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# APPENDICES

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# APPENDIX 2 - The growing stock of the Republic of Serbia

**Table 1.** Land use

| Land use | Area | |
|---|---|---|
| | *ha* | % |
| Forests | 2,252,400.0 | 29.1 |
| Other wooded land | 382,400.0 | 4.9 |
| Barren land | 92,000.0 | 1.2 |
| Agricultural land | 3,594,800.0 | 46.4 |
| Meadows and pastures | 1,029,600.0 | 13.3 |
| Built-up area | 312,000.0 | 4.0 |
| Inland water | 85,200.0 | 1.1 |
| **TOTAL** | **7,748,400.0** | **100.0** |

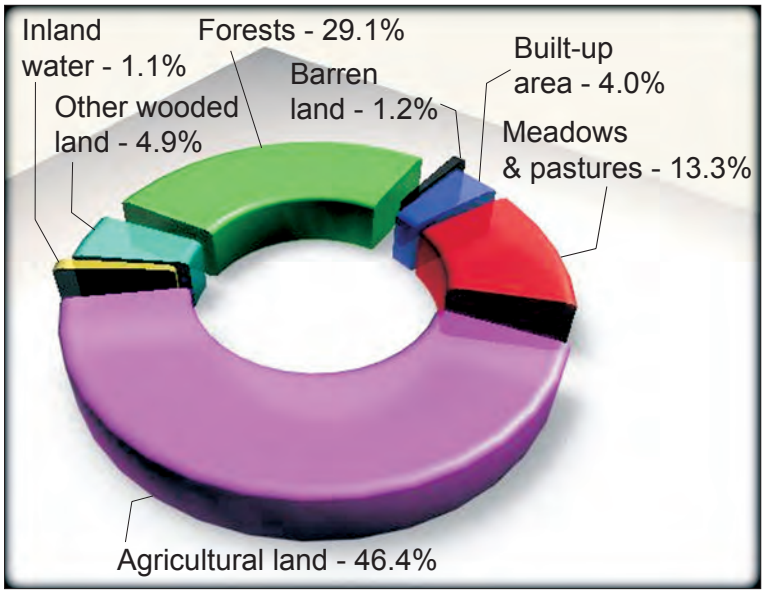



**Diagram 1.** Area structure by land use

**Table 2.** Forest ownership

| Ownership | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| State | 1,194,000.0 | 53.0 | 1,044,832,365 | 49.4 | 875 | 221,417,935.9 | 61.1 | 185.4 | 5,395,093.0 | 59.4 | 4.5 | 2.4 |
| Private | 1,058,400.0 | 47.0 | 1,069,803,488 | 50.6 | 1,011 | 141,069,481.7 | 38.9 | 133.3 | 3,684,680.0 | 40.6 | 3.5 | 2.6 |
| **TOTAL** | **2,252,400.0** | **100.0** | **2,114,635,853** | **100.0** | **939** | **362,487,417.6** | **100.0** | **160.9** | **9,079,773.0** | **100.0** | **4.0** | **2.5** |

**Table 2.1.** State forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 442,400.0 | 37.1 | 254,859,003 | 24.4 | 576 | 117,875,059.2 | 53.3 | 266.4 | 2,481,287.4 | 46.0 | 5.6 | 2.1 |
| Natural coppice stands | 616,000.0 | 51.5 | 674,417,439 | 64.5 | 1,095 | 84,001,965.5 | 37.9 | 136.4 | 1,918,476.0 | 35.6 | 3.1 | 2.3 |
| Artificially established stands | 135,600.0 | 11.4 | 115,555,923 | 11.1 | 852 | 19,540,911.2 | 8.8 | 144.1 | 995,329.6 | 18.4 | 7.3 | 5.1 |
| **TOTAL** | **1,194,000.0** | **100.0** | **1,044,832,365** | **100.0** | **875** | **221,417,935.9** | **100.0** | **185.4** | **5,395,093.0** | **100.0** | **4.5** | **2.4** |

**Table 2.2.** State forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well- preserved stands | 802,800.0 | 67.3 | 945,246,862 | 90.5 | 1,177 | 145,512,031.4 | 65.7 | 181.3 | 4,047,774.0 | 75.0 | 5.0 | 2.8 |
| Insufficiently stocked stands | 357,600.0 | 29.9 | 97,085,102 | 9.3 | 271 | 72,450,935.6 | 32.7 | 202.6 | 1,285,259.0 | 23.8 | 3.6 | 1.8 |
| Devastated stands | 33,600.0 | 2.8 | 2,500,401 | 0.2 | 74 | 3,454,968.8 | 1.6 | 102.8 | 62,060.3 | 1.2 | 1.8 | 1.8 |
| **TOTAL** | **1,194,000.0** | **100.0** | **1,044,832,365** | **100.0** | **875** | **221,417,935.9** | **100.0** | **185.4** | **5,395,093.0** | **100.0** | **4.5** | **2.4** |

**Table 2.3.** State forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 718,000.0 | 60.2 | 553,102,097 | 52.9 | 770 | 141,873,458.3 | 64.1 | 197.6 | 3,080,150.0 | 57.1 | 4.3 | 2.2 |
| Mixed broadleaf stands | 274,800.0 | 23.0 | 312,748,747 | 29.9 | 1,138 | 39,088,303.8 | 17.7 | 142.2 | 881,924.5 | 16.3 | 3.2 | 2.3 |
| Mixed broadleaf and coniferous stands | 43,200.0 | 3.6 | 42,862,553 | 4.1 | 992 | 10,044,557.7 | 4.5 | 232.5 | 262,731.8 | 4.9 | 6.1 | 2.6 |
| Mixed stands of conifers | 11,200.0 | 0.9 | 8,994,645 | 0.9 | 803 | 3,539,188.3 | 1.6 | 316.0 | 104,162.3 | 1.9 | 9.3 | 2.9 |
| Pure coniferous stands | 146,800.0 | 12.3 | 127,124,323 | 12.2 | 866 | 26,872,427.8 | 12.1 | 183.1 | 1,066,125.0 | 19.8 | 7.3 | 4.0 |
| **TOTAL** | **1,194,000,0** | **100.0** | **1,044,832,365** | **100.0** | **875** | **221,417,935.9** | **100.0** | **185.4** | **5,395,093.0** | **100.0** | **4.5** | **2.4** |

**Table 2.4.** State forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 281,524,631 | 26.9 | 105,642,460.5 | 47.7 | 1,961,039.0 | 36.3 | 1.9 |
| Hornbeam | 132,549,875 | 12.7 | 7,967,706.1 | 3.6 | 172,486.7 | 3.2 | 2.2 |
| Turkey oak | 79,603,936 | 7.6 | 17,406,509.1 | 7.9 | 362,400.8 | 6.7 | 2.1 |
| Sessile oak | 59,927,402 | 5.7 | 12,058,105.0 | 5.4 | 295,349.2 | 5.5 | 2.4 |
| Flowering ash | 56,834,932 | 5.4 | 1,970,857.0 | 0.9 | 56,885.8 | 1.1 | 2.9 |
| Oriental hornbeam | 51,348,588 | 4.9 | 989,768.0 | 0.4 | 31,169.9 | 0.6 | 3.1 |
| Black locust | 50,520,182 | 4.8 | 2,842,603.7 | 1.3 | 129,179.3 | 2.4 | 4.5 |
| Hungarian oak | 39,088,555 | 3.7 | 5,481,701.5 | 2.5 | 132,835.4 | 2.5 | 2.4 |
| Other broadleaves | 21,064,980 | 2.0 | 1,429,429.4 | 0.6 | 41,134.4 | 0.8 | 2.9 |
| Field maple | 20,139,877 | 1.9 | 1,399,011.7 | 0.6 | 30,940.0 | 0.6 | 2.2 |
| Hop hornbeam | 14,980,710 | 1.4 | 917,907.6 | 0.4 | 20,025.0 | 0.4 | 2.2 |
| Large-leaved lime | 8,209,787 | 0.8 | 2,311,086.5 | 1.0 | 42,828.7 | 0.8 | 1.9 |
| Aspen | 8,208,872 | 0.8 | 1,142,294.2 | 0.5 | 29,546.0 | 0.5 | 2.6 |
| Maple | 7,536,589 | 0.7 | 1,192,066.5 | 0.5 | 31,122.9 | 0.6 | 2.6 |
| Birch | 7,464,817 | 0.7 | 554,371.5 | 0.3 | 19,994.7 | 0.4 | 3.6 |
| Narrow-leaved ash | 6,232,660 | 0.6 | 3,005,599.7 | 1.4 | 78,970.2 | 1.5 | 2.6 |
| Pubescent oak | 6,053,489 | 0.6 | 652,861.7 | 0.3 | 18,100.8 | 0.3 | 2.8 |
| EU poplar | 5,993,395 | 0.6 | 5,731,458.7 | 2.6 | 326,377.2 | 6.0 | 5.7 |
| White ash | 5,466,442 | 0.5 | 144,868.8 | 0.1 | 4,115.2 | 0.1 | 2.8 |
| Willow | 4,667,568 | 0.4 | 1,054,596.4 | 0.5 | 26,782.8 | 0.5 | 2.5 |
| Common oak | 4,663,554 | 0.4 | 6,600,040.8 | 3.0 | 105,913.8 | 2.0 | 1.6 |
| Silver lime | 4,289,670 | 0.4 | 1,489,882.2 | 0.7 | 26,309.0 | 0.5 | 1.8 |
| Field maple | 3,847,184 | 0.4 | 261,416.9 | 0.1 | 9,041.3 | 0.2 | 3.5 |
| Cherry | 3,814,478 | 0.4 | 530,376.4 | 0.2 | 11,945.4 | 0.2 | 2.3 |
| White ash | 3,319,555 | 0.3 | 465,380.3 | 0.2 | 11,826.5 | 0.2 | 2.5 |
| Small-leaved lime | 2,951,072 | 0.3 | 739,214.4 | 0.3 | 14,855.3 | 0.3 | 2.0 |

**Table 2.4.** State forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Wild service tree | 1,919,762 | 0.2 | 105,051.9 | 0.0 | 2,368.9 | 0.0 | 2.3 |
| Alder | 1,873,427 | 0.2 | 281,788.2 | 0.1 | 8,813.0 | 0.2 | 3.1 |
| White poplar | 1,624,158 | 0.2 | 288,823.2 | 0.1 | 13,744.9 | 0.3 | 4.8 |
| Turkish hazel | 1,546,614 | 0.1 | 147,740.2 | 0.1 | 4,766.5 | 0.1 | 3.2 |
| Black poplar | 1,223,725 | 0.1 | 614,762.5 | 0.3 | 31,658.3 | 0.6 | 5.1 |
| Norway maple | 1,107,535 | 0.1 | 269,375.3 | 0.1 | 6,683.4 | 0.1 | 2.5 |
| Common walnut | 1,093,958 | 0.1 | 65,035.0 | 0.0 | 2,889.1 | 0.1 | 4.4 |
| Ash-leaved maple | 936,106 | 0.1 | 82,582.6 | 0.0 | 2,269.2 | 0.0 | 2.7 |
| European hackberry | 786,579 | 0.1 | 49,799.9 | 0.0 | 1,316.5 | 0.0 | 2.6 |
| Wych elm | 687,549 | 0.1 | 166,090.7 | 0.1 | 3,583.0 | 0.1 | 2.2 |
| Balkan maple | 636,620 | 0.1 | 88,535.0 | 0.0 | 2,800.4 | 0.1 | 3.2 |
| Black walnut | 336,701 | 0.0 | 154,849.6 | 0.1 | 4,169.5 | 0.1 | 2.7 |
| European white elm | 38,197 | 0.0 | 6,008.4 | 0.0 | 154.1 | 0.0 | 2.6 |
| **Total broadleaves** | **904,113,732** | **86.5** | **186,302,017.2** | **84.1** | **4,076,392.0** | **75.6** | **2.2** |
| Austrian pine | 55,957,294 | 5.4 | 8,521,770.3 | 3.8 | 468,683.4 | 8.7 | 5.5 |
| Spruce | 47,103,983 | 4.5 | 15,065,103.1 | 6.8 | 490,175.8 | 9.1 | 3.3 |
| Scots pine | 21,311,879 | 2.0 | 3,173,247.0 | 1.4 | 145,611.6 | 2.7 | 4.6 |
| Fir | 12,037,683 | 1.2 | 7,465,120.9 | 3.4 | 177,884.0 | 3.3 | 2.4 |
| Weymouth pine | 1,785,365 | 0.2 | 303,845.4 | 0.1 | 15,925.8 | 0.3 | 5.2 |
| Douglas-fir | 1,526,473 | 0.1 | 479,072.2 | 0.2 | 15,253.2 | 0.3 | 3.2 |
| Larch | 995,956 | 0.1 | 107,759.8 | 0.0 | 5,167.4 | 0.1 | 4.8 |
| **Total conifers** | **140,718,633** | **13.5** | **35,115,918.7** | **15.9** | **1,318,701.1** | **24.4** | **3.8** |
| **TOTAL** | **1,044,832,365** | **100.0** | **221,417,935.9** | **100.0** | **5,395,093.1** | **100.0** | **2.4** |

**Table 2.5.** State forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| 1 | Forests of beech | 444,800.0 | 37.3 | 308,063,363 | 29.5 | 693 | 109,900,924.1 | 49.7 | 247.1 | 2,049,600.0 | 38.0 | 4.6 | 1.9 |
| 2 | Forests of Turkey oak | 116,000.0 | 9.7 | 119,827,303 | 11.5 | 1,033 | 17,764,345.4 | 8.1 | 153.1 | 396,743.9 | 7.3 | 3.4 | 2.2 |
| 3 | Forests of sessile oak | 89,600.0 | 7.5 | 78,699,658 | 7.5 | 878 | 12,156,204.9 | 5.5 | 135.7 | 294,339.2 | 5.5 | 3.3 | 2.4 |
| 4 | Forests of pines | 88,800.0 | 7.4 | 86,516,113 | 8.3 | 974 | 11,501,681.4 | 5.2 | 129.5 | 608,049.4 | 11.3 | 6.8 | 5.3 |
| 5 | Forests of spruce | 68,800.0 | 5.8 | 54,268,513 | 5.2 | 789 | 15,122,648.3 | 6.8 | 219.8 | 489,979.7 | 9.1 | 7.1 | 3.2 |
| 6 | Forests of birch, aspen and black locust | 59,200.0 | 5.0 | 59,533,274 | 5.7 | 1,006 | 3,758,654.7 | 1.7 | 63.5 | 172,221.1 | 3.2 | 2.9 | 4.6 |
| 7 | Forests of hornbeam | 58,800.0 | 4.9 | 92,238,248 | 8.8 | 1,569 | 6,821,852.5 | 3.1 | 116.0 | 148,652.1 | 2.8 | 2.5 | 2.2 |
| 8 | Forests of oriental hornbeam, hop hornbeam and flowering ash | 54,000.0 | 4.5 | 79,377,930 | 7.6 | 1,470 | 2,844,687.0 | 1.3 | 52.7 | 77,103.4 | 1.4 | 1.4 | 2.7 |
| 9 | Forests of Hungarian oak | 42,400.0 | 3.6 | 47,557,258 | 4.6 | 1,122 | 5,796,742.7 | 2.6 | 136.7 | 142,681.5 | 2.6 | 3.4 | 2.5 |
| 10 | Forests of poplars | 40,000.0 | 3.4 | 13,476,350 | 1.3 | 337 | 6,672,787.0 | 3.0 | 166.8 | 362,982.2 | 6.7 | 9.1 | 5.4 |
| 11 | Forests of other broadleaves | 23,600.0 | 2.0 | 28,678,427 | 2.7 | 1,215 | 1,386,154.4 | 0.6 | 58.7 | 45,774.6 | 0.8 | 1.9 | 3.3 |
| 12 | Forests of fir | 22,400.0 | 1.9 | 15,665,043 | 1.5 | 699 | 8,819,227.2 | 4.0 | 393.7 | 199,860.2 | 3.7 | 8.9 | 2.3 |
| 13 | Forests of common oak | 20,800.0 | 1.7 | 8,026,099 | 0.8 | 386 | 7,091,693.7 | 3.2 | 340.9 | 116,409.8 | 2.2 | 5.6 | 1.6 |
| 14 | Forests of lime | 17,600.0 | 1.5 | 12,595,351 | 1.2 | 716 | 4,355,405.3 | 2.0 | 247.5 | 78,046.0 | 1.4 | 4.4 | 1.8 |
| 15 | Forests of willows | 13,200.0 | 1.1 | 5,723,923 | 0.5 | 434 | 1,226,742.2 | 0.6 | 92.9 | 31,709.9 | 0.6 | 2.4 | 2.6 |
| 16 | Forests of narrow-leaved ash | 10,000.0 | 0.8 | 8,327,351 | 0.8 | 833 | 2,937,823.5 | 1.3 | 293.8 | 78,799.1 | 1.5 | 7.9 | 2.7 |
| 17 | Forests of pubescent oak | 8,000.0 | 0.7 | 9,871,143 | 0.9 | 1,234 | 763,575.4 | 0.3 | 95.4 | 22,764.2 | 0.4 | 2.8 | 3.0 |
| 18 | Forests of ash and maple | 8,000.0 | 0.7 | 8,976,164 | 0.9 | 1,122 | 1,214,021.6 | 0.5 | 151.8 | 31,190.3 | 0.6 | 3.9 | 2.6 |
| 19 | Forests of other conifers | 4,800.0 | 0.4 | 5,240,088 | 0.5 | 1,092 | 995,912.9 | 0.4 | 207.5 | 39,176.1 | 0.7 | 8.2 | 3.9 |
| 20 | Forests of alders | 3,200.0 | 0.3 | 2,170,764 | 0.2 | 678 | 286,851.9 | 0.1 | 89.6 | 9,011.6 | 0.2 | 2.8 | 3.1 |
| **TOTAL** | | **1,194,000.0** | **100.0** | **1,044,832,365** | **100.0** | **875** | **221,417,935.9** | **100.0** | **185.4** | **5,395,093.0** | **100.0** | **4.5** | **2.4** |

**Table 2.6.** State forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 105,642,460 | 2,404,448 | 30,593,782 | 37,472,867 | 26,105,978 | 6,252,224 | 2,813,161 |
| Turkey oak | 17,406,509 | 1,168,769 | 10,558,437 | 4,331,814 | 1,212,437 | 91,697 | 43,355 |
| Sessile oak | 12,058,104 | 556,880 | 5,386,713 | 4,044,577 | 1,690,138 | 261,836 | 117,960 |
| Hornbeam | 7,967,706 | 1,764,689 | 4,223,870 | 1,213,124 | 647,062 | 92,696 | 26,265 |
| Common oak | 6,600,039 | 16,580 | 885,315 | 3,674,284 | 1,614,300 | 277,267 | 132,293 |
| EU poplar | 5,731,458 | 11,601 | 869,558 | 2,857,691 | 1,588,474 | 404,134 | |
| Hungarian oak | 5,481,701 | 572,565 | 3,942,435 | 777,722 | 188,979 | | |
| Narrow-leaved ash | 3,005,599 | 93,657 | 1,453,665 | 1,161,631 | 265,364 | 31,282 | |
| Black locust | 2,842,604 | 574,742 | 1,998,739 | 269,123 | | | |
| Large-leaved lime | 2,311,086 | 92,465 | 770,042 | 949,592 | 428,781 | 24,596 | 45,610 |
| Flowering ash | 1,970,857 | 803,068 | 1,050,010 | 91,686 | 26,093 | | |
| Silver lime | 1,489,883 | 43,955 | 357,448 | 795,667 | 292,813 | | |
| Other broadleaves | 1,429,430 | 271,634 | 819,394 | 273,285 | 40,967 | 24,150 | |
| Field maple | 1,399,012 | 247,928 | 905,891 | 198,904 | 46,289 | | |
| Maple | 1,192,066 | 111,097 | 538,325 | 376,721 | 118,111 | | 47,812 |
| Aspen | 1,142,294 | 58,300 | 673,094 | 370,385 | 40,515 | | |
| Willow | 1,054,596 | 29,218 | 599,749 | 338,122 | 79,382 | 8,125 | |
| Oriental hornbeam | 989,768 | 643,493 | 320,917 | 14,618 | 10,740 | | |
| Hop hornbeam | 917,908 | 183,559 | 657,081 | 77,268 | | | |
| Small-leaved lime | 739,214 | 39,852 | 212,038 | 355,730 | 131,594 | | |
| Pubescent oak | 652,862 | 73,324 | 307,623 | 192,908 | 29,468 | | 49,539 |
| Black poplar | 614,763 | 6,989 | 74,577 | 302,323 | 205,781 | 25,093 | |
| Birch | 554,377 | 93,229 | 324,814 | 121,087 | 15,247 | | |
| Cherry | 530,377 | 39,202 | 288,262 | 137,682 | 65,231 | | |
| White ash | 465,380 | 37,787 | 191,067 | 147,711 | 88,815 | | |
| White poplar | 288,824 | 16,651 | 122,036 | 62,046 | 88,091 | | |
| Alder | 281,788 | 12,042 | 186,288 | 71,392 | 12,066 | | |
| Norway maple | 269,375 | 10,483 | 138,053 | 97,861 | 22,978 | | |
| Field maple | 261,416 | 68,104 | 127,346 | 65,966 | | | |
| Wych elm | 166,090 | 5,305 | 85,304 | 75,481 | | | |
| Black walnut | 154,850 | | 86,635 | 68,215 | | | |
| Turkish hazel | 147,740 | 25,705 | 74,759 | 39,792 | 7,484 | | |
| White ash | 144,869 | 86,382 | 47,850 | 10,637 | | | |
| Wild service tree | 105,052 | 25,139 | 54,347 | 25,566 | | | |
| Balkan maple | 88,535 | 12,577 | 52,708 | 13,036 | 10,214 | | |
| Ash-leaved maple | 82,582 | 31,364 | 51,218 | | | | |
| Common walnut | 65,035 | 27,162 | 24,841 | 13,032 | | | |
| Europ. hackberry | 49,800 | 12,407 | 18,598 | 18,795 | | | |
| Europ. white elm | 6,008 | | 6,008 | | | | |
| **Total broadleaves** | **186,302,017** | **10,272,352** | **69,078,837** | **61,108,341** | **35,073,392** | **7,493,100** | **3,275,995** |
| Spruce | 15,065,103 | 1,467,677 | 5,361,117 | 5,779,660 | 2,286,220 | 105,769 | 64,660 |
| Austrian pine | 8,521,770 | 681,183 | 5,149,685 | 2,426,713 | 264,189 | | |
| Fir | 7,465,120 | 96,744 | 2,484,540 | 3,258,273 | 1,581,014 | 44,549 | |
| Scots pine | 3,173,247 | 219,846 | 2,110,415 | 813,687 | 29,299 | | |
| Douglas-fir | 479,073 | 13,085 | 335,936 | 130,052 | | | |
| Weymouth pine | 303,846 | 13,864 | 215,994 | 73,988 | | | |
| Larch | 107,760 | 24,616 | 74,511 | 8,633 | | | |
| **Total conifers** | **35,115,919** | **2,517,015** | **15,732,198** | **12,491,006** | **4,160,722** | **150,318** | **64,660** |
| **TOTAL** | **175,965,880** | **9,313,688** | **64,976,582** | **59,742,254** | **32,869,098** | **6,323,360** | **2,740,899** |

**Table 2.7.** Private forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 178,800.0 | 16.9 | 115,566,877 | 10.8 | 646 | 39,636,203.6 | 28.1 | 221.7 | 906,672.2 | 24.6 | 5.1 | 2.3 |
| Natural coppice stands | 840,400.0 | 79.4 | 913,188,352 | 85.4 | 1,087 | 97,186,948.6 | 68.9 | 115.6 | 2,539,717.0 | 68.9 | 3.0 | 2.6 |
| Artificially established stands | 39,200.0 | 3.7 | 41,048,260 | 3.8 | 1,047 | 4,246,329.4 | 3.0 | 108.3 | 238,291.1 | 6.5 | 6.1 | 5.6 |
| **TOTAL** | **1,058,400.0** | **100.0** | **1,069,803,488** | **100.0** | **1,011** | **141,069,481.7** | **100.0** | **133.3** | **3,684,680.0** | **100.0** | **3.5** | **2.6** |

**Table 2.8.** Private forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 786,400.0 | 74.3 | 996,981,905 | 93.2 | 1,268 | 107,136,950.0 | 75.9 | 136.2 | 3,073,561.0 | 83.5 | 3.9 | 2.9 |
| Insufficiently stocked stands | 250,400.0 | 23.7 | 71,244,020 | 6.7 | 285 | 32,993,258.9 | 23.4 | 131.8 | 594,654.3 | 16.1 | 2.4 | 1.8 |
| Devastated stands | 21,600.0 | 2.0 | 1,577,563 | 0.1 | 73 | 939,272.8 | 0.7 | 43.5 | 16,464.6 | 0.4 | 0.8 | 1.8 |
| **TOTAL** | **1,058,400.0** | **100.0** | **1,069,803,488** | **100.0** | **1,011** | **141,069,481.7** | **100.0** | **133.3** | **3,684,680.0** | **100.0** | **3.5** | **2.6** |

**Table 2.9.** Private forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 610,000.0 | 57.6 | 580,489,915 | 54.3 | 952 | 85,200,890.0 | 60.4 | 139.7 | 2,077,575.0 | 56.4 | 3.4 | 2.4 |
| Mixed broadleaf stands | 386,000.0 | 36.5 | 431,994,294 | 40.4 | 1,119 | 45,438,937.2 | 32.2 | 117.7 | 1,164,152.0 | 31.6 | 3.0 | 2.6 |
| Mixed broadleaf and coniferous stands | 10,800.0 | 1.0 | 9,799,485 | 0.9 | 907 | 1,648,515.7 | 1.2 | 152.6 | 47,116.6 | 1.3 | 4.4 | 2.9 |
| Mixed stands of conifers | 2,800.0 | 0.3 | 3,508,230 | 0.3 | 1,253 | 488,377.5 | 0.3 | 174.4 | 23,577.2 | 0.6 | 8.4 | 4.8 |
| Pure coniferous stands | 48,800.0 | 4.6 | 44,011,564 | 4.1 | 902 | 8,292,761.3 | 5.9 | 169.9 | 372,258.8 | 10.1 | 7.6 | 4.5 |
| **TOTAL** | **1,058,400.0** | **100.0** | **1,069,803,488** | **100.0** | **1,011** | **141,069,481.7** | **100.0** | **133.3** | **3,684,680.0** | **100.0** | **3.5** | **2.6** |

**Table 2.10.** Private forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 155,057,324 | 14.5 | 41,208,368.0 | 29.2 | 820,774,0 | 22.3 | 2.0 |
| Turkey oak | 154,484,684 | 14.4 | 29,573,937.0 | 21.0 | 672,475,0 | 18.3 | 2.3 |
| Hungarian oak | 114,127,248 | 10.7 | 15,504,763.0 | 11.0 | 385,932,0 | 10.5 | 2.5 |
| Sessile oak | 70,067,345 | 6.5 | 9,484,785.0 | 6.7 | 258,386,0 | 7.0 | 2.7 |
| Black locust | 168,325,267 | 15.7 | 8,401,340.0 | 6.0 | 387,678,0 | 10.5 | 4.6 |
| Hornbeam | 121,572,423 | 11.4 | 7,189,534.0 | 5.1 | 162,085,0 | 4.4 | 2.3 |
| Narrow-leaved ash | 9,184,196 | 0.9 | 2,786,711.0 | 2.0 | 74,549,0 | 2.0 | 2.7 |
| Common oak | 6,332,909 | 0.6 | 2,642,332.0 | 1.9 | 51,972,0 | 1.4 | 2.0 |
| Field maple | 27,475,307 | 2.6 | 1,782,292.0 | 1.3 | 42,212,0 | 1.1 | 2.4 |
| Flowering ash | 46,951,723 | 4.4 | 1,534,901.0 | 1.1 | 45,272,0 | 1.2 | 2.9 |
| Other broadleaves | 24,511,168 | 2.3 | 1,512,570.0 | 1.1 | 49,055,0 | 1.3 | 3.2 |
| Large-leaved lime | 8,553,554 | 0.8 | 1,224,775.0 | 0.9 | 27,822,0 | 0.8 | 2.3 |
| Aspen | 14,312,338 | 1.3 | 1,216,010.0 | 0.9 | 63,100,0 | 1.7 | 5.2 |
| Willow | 1,995,032 | 0.2 | 857,490.0 | 0.6 | 16,036,0 | 0.4 | 1.9 |
| Field maple | 14,817,964 | 1.4 | 836,526.0 | 0.6 | 34,059,0 | 0.9 | 4.1 |
| Cherry | 8,845,848 | 0.8 | 761,892.0 | 0.5 | 20,441,0 | 0.6 | 2.7 |
| Oriental hornbeam | 37,095,685 | 3.5 | 727,761.0 | 0.5 | 23,903,0 | 0.6 | 3.3 |
| Hop hornbeam | 6,970,930 | 0.7 | 562,787.0 | 0.4 | 13,941,0 | 0.4 | 2.5 |
| Alder | 3,206,360 | 0.3 | 481,890.0 | 0.3 | 13,907,0 | 0.4 | 2.9 |
| EU poplar | 496,563 | 0.0 | 406,404.0 | 0.3 | 11,895,0 | 0.3 | 2.9 |
| Black poplar | 233,828 | 0.0 | 402,601.0 | 0.3 | 10,578,0 | 0.3 | 2.6 |
| Birch | 4,177,683 | 0.4 | 320,402.0 | 0.2 | 13,216,0 | 0.4 | 4.1 |
| White poplar | 363,811 | 0.0 | 318,327.0 | 0.2 | 10,971,0 | 0.3 | 3.4 |
| Pubescent oak | 6,075,228 | 0.6 | 303,305.0 | 0.2 | 10,464,0 | 0.3 | 3.4 |
| White ash | 2,662,986 | 0.2 | 301,892.0 | 0.2 | 9,575,0 | 0.3 | 3.2 |
| Silver lime | 1,668,551 | 0.2 | 289,213.0 | 0.2 | 5,853,0 | 0.2 | 2.0 |

**Table 2.10.** Private forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Common walnut | 1,452,750 | 0.1 | 249,405.0 | 0.2 | 7,143,0 | 0.2 | 2.9 |
| Maple | 3,326,285 | 0.3 | 241,289.0 | 0.2 | 7,614,0 | 0.2 | 3.2 |
| Small-leaved lime | 4,574,462 | 0.4 | 205,659.0 | 0.1 | 5,300,0 | 0.1 | 2.6 |
| Norway maple | 586,315 | 0.1 | 148,585.0 | 0.1 | 3,226,0 | 0.1 | 2.2 |
| Turkish hazel | 976,567 | 0.1 | 59,650.0 | 0.0 | 1,755,0 | 0.0 | 2.9 |
| Europ. white elm | 745,061 | 0.1 | 26,288.0 | 0.0 | 1,394,0 | 0.0 | 5.3 |
| Wych elm | 211,069 | 0.0 | 20,989.0 | 0.0 | 590,0 | 0.0 | 2.8 |
| White ash | 1,015,762 | 0.1 | 12,707.0 | 0.0 | 338,0 | 0.0 | 2.7 |
| Ash-leaved maple | 154,203 | 0.0 | 9,693.0 | 0.0 | 424,0 | 0.0 | 4.4 |
| Balkan maple | 179,908 | 0.0 | 6,783.0 | 0.0 | 378,0 | 0.0 | 5.6 |
| Europ. hackberry | 154,203 | 0.0 | 5,788.0 | 0.0 | 377,0 | 0.0 | 6.5 |
| Wild service tree | 63,662 | 0.0 | 5,213.0 | 0.0 | 111,0 | 0.0 | 2.1 |
| Mountain ash | 5,659 | 0.0 | 3,377.0 | 0.0 | 36,0 | 0.0 | 1.1 |
| **Total broadleaves** | **1,023,011,861** | **95.6** | **131,628,234.0** | **93.3** | **3,264,837,0** | **88.6** | **2.5** |
| Austrian pine | 29,006,711 | 2.7 | 4,137,257.0 | 2.9 | 246,174,0 | 6.7 | 6.0 |
| Scots pine | 4,865,845 | 0.5 | 602,183.0 | 0.4 | 31,259,0 | 0.8 | 5.2 |
| Spruce | 10,428,114 | 1.0 | 3,745,444.0 | 2.7 | 115,070,0 | 3.1 | 3.1 |
| Fir | 1,759,533 | 0.2 | 839,803.0 | 0.6 | 21,967,0 | 0.6 | 2.6 |
| Weymouth pine | 294,618 | 0.0 | 51,571.0 | 0.0 | 2,782,0 | 0.1 | 5.4 |
| Douglas-fir | 114,592 | 0.0 | 32,079.0 | 0.0 | 888,0 | 0.0 | 2.8 |
| Other conifers | 309,482 | 0.0 | 30,516.0 | 0.0 | 1,620,0 | 0.0 | 5.3 |
| Yew | 12,732 | 0.0 | 2,395.0 | 0.0 | 83,0 | 0.0 | 3.5 |
| **Total conifers** | **46,791,627** | **4.4** | **9,441,248.0** | **6.7** | **419,843,0** | **11.4** | **4.4** |
| **TOTAL** | **1,069,803,488** | **100.0** | **141,069,482.0** | **100.0** | **3,684,680,0** | **100.0** | **2.6** |

**Table 2.11.** Private forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| 1 | Forests of Turkey oak | 229,200.0 | 21.6 | 223,118,258 | 20.9 | 973 | 31,800,580.6 | 22.6 | 138.7 | 764,903.4 | 20.7 | 3.3 | 2.4 |
| 2 | Forests of beech | 215,600.0 | 20.4 | 172,730,323 | 16.1 | 801 | 43,935,746.0 | 31.1 | 203.8 | 879,238.4 | 23.9 | 4.1 | 2.0 |
| 3 | Forests of birch, aspen and black locust | 164,000.0 | 15.5 | 185,081,696 | 17.3 | 1,129 | 9,643,473.4 | 6.8 | 58.8 | 444,966.2 | 12.1 | 2.7 | 4.6 |
| 4 | Forests of Hungarian oak | 117,200.0 | 11.1 | 130,565,067 | 12.2 | 1,114 | 15,289,912.0 | 10.8 | 130.5 | 390,378.4 | 10.5 | 3.3 | 2.6 |
| 5 | Forests of sessile oak | 83,600.0 | 7.9 | 84,695,996 | 7.9 | 1,013 | 9,439,851.0 | 6.7 | 112.9 | 247,483.3 | 6.7 | 3.0 | 2.6 |
| 6 | Forests of hornbeam | 60,000.0 | 5.7 | 83,210,994 | 7.8 | 1,387 | 6,444,724.4 | 4.6 | 107.4 | 149,095.7 | 4.0 | 2.5 | 2.3 |
| 7 | Forests of pines | 37,200.0 | 3.5 | 36,155,956 | 3.4 | 972 | 4,949,120.3 | 3.5 | 133.0 | 279,591.2 | 7.6 | 7.5 | 5.6 |
| 8 | Forests of oriental hornbeam, hop hornbeam and flowering ash | 33,200.0 | 3.1 | 50,583,513 | 4.7 | 1,524 | 1,950,245.8 | 1.4 | 58.7 | 56,025.1 | 1.5 | 1.7 | 2.9 |
| 9 | Forests of other broadleaves | 30,000.0 | 2.8 | 28,576,503 | 2.7 | 953 | 1,897,399.1 | 1.3 | 63.2 | 56,278.5 | 1.5 | 1.9 | 3.0 |
| 10 | Forests of spruce | 17,600.0 | 1.7 | 12,266,688 | 1.1 | 697 | 3,803,387.8 | 2.7 | 216.1 | 117,082.2 | 3.2 | 6.7 | 3.1 |
| 11 | Forests of narrow-leaved ash | 15,200.0 | 1.4 | 15,200,339 | 1.4 | 1,000 | 3,040,991.2 | 2.2 | 200.1 | 83,718.5 | 2.3 | 5.5 | 2.8 |
| 12 | Forests of lime | 12,800.0 | 1.2 | 17,960,650 | 1.7 | 1,403 | 1,778,158.9 | 1.3 | 138.9 | 42,651.8 | 1.2 | 3.3 | 2.4 |
| 13 | Forests of common oak | 11,600.0 | 1.1 | 8,333,842 | 0.8 | 718 | 3,027,070.4 | 2.1 | 261.0 | 61,444.6 | 1.7 | 5.3 | 2.0 |
| 14 | Forests of willows | 9,200.0 | 0.9 | 3,991,062 | 0.4 | 434 | 948,049.8 | 0.7 | 103.0 | 20,659.0 | 0.6 | 2.2 | 2.2 |
| 15 | Forests of poplars | 8,000.0 | 0.8 | 3,172,315 | 0.3 | 397 | 1,143,689.1 | 0.8 | 143.0 | 35,286.7 | 1.0 | 4.4 | 3.1 |
| 16 | Forests of ash and maple | 4,800.0 | 0.5 | 5,760,427 | 0.5 | 1,200 | 369,254.2 | 0.3 | 76.9 | 11,921.1 | 0.3 | 2.5 | 3.2 |
| 17 | Forests of alders | 3,200.0 | 0.3 | 2,657,682 | 0.2 | 831 | 386,137.4 | 0.3 | 120.7 | 10,474.4 | 0.3 | 3.3 | 2.7 |
| 18 | Forests of fir | 3,200.0 | 0.3 | 2,324,370 | 0.2 | 726 | 1,019,635.4 | 0.7 | 318.6 | 25,655.3 | 0.7 | 8.0 | 2.5 |
| 19 | Forests of pubescent oak | 2,400.0 | 0.2 | 2,683,273 | 0.3 | 1,118 | 143,636.8 | 0.1 | 59.8 | 4,767.3 | 0.1 | 2.0 | 3.3 |
| 20 | Forests of other conifers | 400.0 | 0.0 | 734,537 | 0.1 | 1,836 | 58,418.0 | 0.0 | 146.0 | 3,058.6 | 0.1 | 7.6 | 5.2 |
| **TOTAL** | | **1,058,400.0** | **100.0** | **1,069,803,488** | **100.0** | **1,011** | **141,069,481.7** | **100.0** | **133.3** | **3,684,680.0** | **100.0** | **3.5** | **2.6** |

**Table 2.12.** Private forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 41.208.368 | 1.519.493 | 15.030.334 | 14.032.363 | 6.688.184 | 2.494.602 | 1.443.392 |
| Turkey oak | 29.573.937 | 2.745.448 | 18.488.872 | 7.001.657 | 1.134.139 | 106.684 | 97.137 |
| Hungarian oak | 15.504.762 | 2.067.042 | 10.532.123 | 2.581.219 | 272.523 | 51.855 | |
| Sessile oak | 9.484.785 | 732.063 | 5.407.013 | 2.386.962 | 791.151 | 96.676 | 70.920 |
| Black locust | 8.401.339 | 2.295.109 | 5.100.092 | 904.970 | 101.168 | | |
| Hornbeam | 7.189.533 | 1.599.857 | 4.408.043 | 910.115 | 183.538 | 54.174 | 33.806 |
| Narrow-leaved ash | 2.786.712 | 169.143 | 1.169.555 | 914.400 | 463.787 | 69.827 | |
| Common oak | 2.642.332 | 160.329 | 414.674 | 957.986 | 1.070.032 | 39.311 | |
| Field maple | 1.782.292 | 417.876 | 1.095.676 | 246.187 | 22.553 | | |
| Flowering ash | 1.534.901 | 703.035 | 757.424 | 74.442 | | | |
| Other broadleaves | 1.512.572 | 344.653 | 923.923 | 194.199 | 49.797 | | |
| Large-leaved lime | 1.224.775 | 120.388 | 616.173 | 379.465 | 108.749 | | |
| Aspen | 1.216.010 | 169.300 | 845.296 | 190.990 | 10.424 | | |
| Willow | 857.489 | 11.714 | 226.957 | 257.512 | 212.079 | 95.933 | 53.294 |
| Field maple | 836.526 | 326.657 | 383.965 | 109.330 | 16.574 | | |
| Cherry | 761.892 | 112.131 | 419.391 | 218.662 | 11.708 | | |
| Oriental hornbeam | 727.761 | 554.227 | 164.588 | | 8.946 | | |
| Hop hornbeam | 562.786 | 92.508 | 429.552 | 22.617 | 18.109 | | |
| Alder | 481.890 | 38.270 | 226.598 | 173.602 | 43.420 | | |
| EU poplar | 406.404 | 10.469 | 18.647 | 69.723 | 248.939 | 58.626 | |
| Black poplar | 402.601 | | 20.900 | 82.304 | 214.216 | 23.454 | 61.727 |
| Birch | 320.402 | 36.867 | 243.660 | 39.875 | | | |
| White poplar | 318.327 | | 63.499 | 114.231 | 140.597 | | |
| Pubescent oak | 303.305 | 83.765 | 200.978 | 18.562 | | | |
| White ash | 301.893 | 38.692 | 168.655 | 57.910 | 36.636 | | |
| Silver lime | 289.213 | 21.008 | 105.270 | 162.935 | | | |
| Common walnut | 249.405 | 18.561 | 133.363 | 65.449 | 32.032 | | |
| Maple | 241.289 | 55.216 | 90.782 | 75.672 | 19.619 | | |
| Small-leaved lime | 205.659 | 91.970 | 74.070 | 39.619 | | | |
| Norway maple | 148.584 | 2.334 | 70.937 | 36.651 | 38.662 | | |
| Turkish hazel | 59.650 | 13.892 | 31.274 | 14.484 | | | |
| Europ. white elm | 26.289 | 18.822 | 7.467 | | | | |
| Wych elm | 20.989 | 2.405 | 10.814 | 7.770 | | | |
| White ash | 12.708 | 11.516 | 1.192 | | | | |
| Ash-leaved maple | 9.694 | 8.050 | 1.644 | | | | |
| Balkan maple | 6.783 | 4.881 | 1.902 | | | | |
| Europ. hackberry | 5.787 | 5.036 | 751 | | | | |
| Wild service tree | 5.213 | | 5.213 | | | | |
| Mountain ash | 3.377 | | | 3.377 | | | |
| **Total broadleaves** | **131.628.234** | **14.602.727** | **67.891.267** | **32.345.240** | **11.937.582** | **3.091.142** | **1.760.276** |
| Austrian pine | 4.137.259 | 310.959 | 2.737.715 | 974.070 | 84.846 | 29.669 | |
| Spruce | 3.745.444 | 226.967 | 1.307.924 | 1.478.323 | 599.942 | 78.007 | 54.281 |
| Fir | 839.803 | 37.631 | 351.480 | 252.339 | 198.353 | | |
| Scots pine | 602.182 | 59.865 | 433.666 | 108.651 | | | |
| Weymouth pine | 51.571 | | 51.571 | | | | |
| Douglas-fir | 32.079 | | 32.079 | | | | |
| Other conifers | 30.515 | 2.829 | 27.686 | | | | |
| Yew | 2.395 | | 2.395 | | | | |
| **Total conifers** | **9.441.248** | **638.251** | **4.944.516** | **2.813.383** | **883.141** | **107.676** | **54.281** |
| **TOTAL** | **141.069.482** | **15.240.978** | **72.835.783** | **35.158.623** | **12.820.723** | **3.198.818** | **1.814.557** |

**Table 3.** Forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 621,200.0 | 27.5 | 370,425,880 | 17.5 | 596 | 157,511,262.8 | 43.5 | 253.6 | 3,387,959.0 | 37.3 | 5.5 | 2.2 |
| Natural coppice stands | 1,456,400.0 | 64.7 | 1,587,605,791 | 75.1 | 1,090 | 181,188,914.1 | 50.0 | 124.4 | 4,458,193.0 | 49.1 | 3.1 | 2.5 |
| Artificially established stands | 174,800.0 | 7.8 | 156,604,182 | 7.4 | 896 | 23,787,240.6 | 6.5 | 136.1 | 1,233,621.0 | 13.6 | 7.1 | 5.2 |
| **TOTAL** | **2,252,400.0** | **100.0** | **2,114,635,853** | **100.0** | **939** | **362,487,417.6** | **100.0** | **160.9** | **9,079,773.0** | **100.0** | **4.0** | **2.5** |

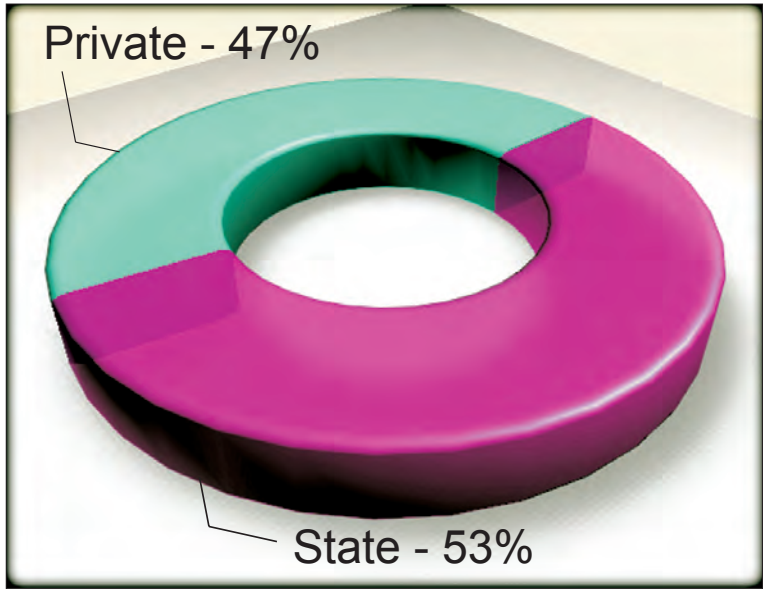



**Diagram 2.** Forests by ownership (area)

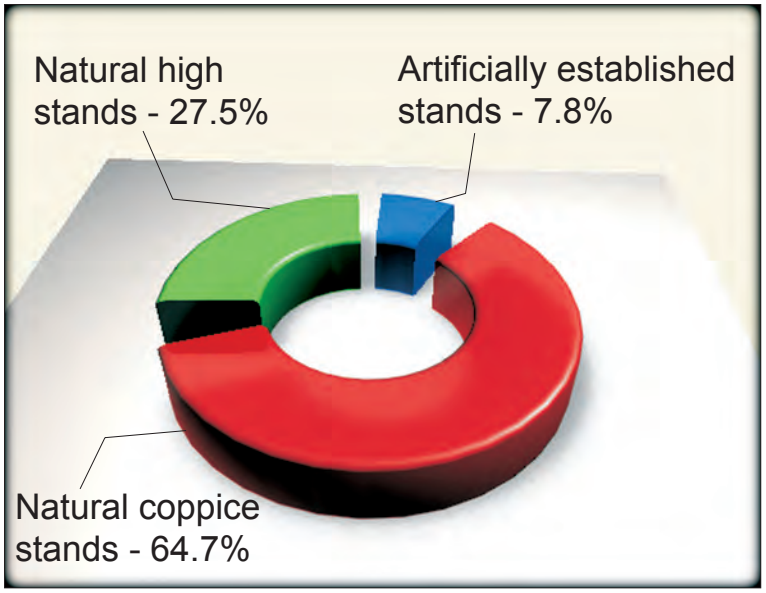



**Diagram 3.** Forests by origin (area)

**Table 3.1.** Natural high forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 337,200.0 | 54.3 | 299,839,099 | 80.9 | 889 | 85,326,618.9 | 54.2 | 253.0 | 2,168,689.0 | 64.0 | 6.4 | 2.5 |
| Insufficiently stocked stands | 267,600.0 | 43.1 | 69,368,475 | 18.8 | 259 | 69,690,967.1 | 44.2 | 260.4 | 1,185,466.0 | 35.0 | 4.4 | 1.7 |
| Devastated stands | 16,400.0 | 2.6 | 1,218,306 | 0.3 | 74 | 2,493,676.9 | 1.6 | 152.1 | 33,803.7 | 1.0 | 2.1 | 1.4 |
| **TOTAL** | **621,200.0** | **100.0** | **370,425,880** | **100.0** | **596** | **157,511,262.8** | **100.0** | **253.6** | **3,387,958.7** | **100.0** | **5.5** | **2.2** |

**Table 3.2.** Natural high forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 400,400.0 | 64.5 | 215,336,951 | 58.1 | 538 | 104,150,083.0 | 66.1 | 260.1 | 1,985,313.0 | 58.6 | 5.0 | 1.9 |
| Pure coniferous stands | 91,200.0 | 14.7 | 62,090,619 | 16.8 | 681 | 21,821,312.0 | 13.8 | 239.3 | 714,303.0 | 21.0 | 7.8 | 3.3 |
| Mixed broadleaf stands | 91,600.0 | 14.7 | 67,074,035 | 18.1 | 732 | 19,843,006.0 | 12.6 | 216.6 | 411,811.0 | 12.2 | 4.5 | 2.1 |
| Mixed broadleaf and coniferous stands | 28,800.0 | 4.6 | 18,699,667 | 5.0 | 649 | 8,606,150.0 | 5.5 | 298.8 | 189,884.0 | 5.6 | 6.6 | 2.2 |
| Mixed stands of conifers | 9,200.0 | 1.5 | 7,224,608 | 2.0 | 785 | 3,090,712.0 | 2.0 | 335.9 | 86,647.0 | 2.6 | 9.4 | 2.8 |
| **TOTAL** | **621,200.0** | **100.0** | **370,425,880** | **100.0** | **596** | **157,511,263.0** | **100.0** | **253.6** | **3,387,958.0** | **100.0** | **5.5** | **2.2** |

**Table 3.3.** Natural high forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 168,246,729 | 45.4 | 89,973,815.0 | 57.1 | 1,678,926.0 | 49.6 | 1.9 |
| Common oak | 8,640,539 | 2.3 | 8,680,603.0 | 5.5 | 142,459.0 | 4.2 | 1.6 |
| Sessile oak | 18,019,347 | 4.9 | 7,495,249.0 | 4.8 | 164,145.0 | 4.8 | 2.2 |
| Turkey oak | 13,000,694 | 3.5 | 6,117,145.0 | 3.9 | 113,016.0 | 3.3 | 1.8 |
| Narrow-leaved ash | 6,595,873 | 1.8 | 3,545,306.0 | 2.3 | 87,491.0 | 2.6 | 2.5 |
| Hungarian oak | 9,465,146 | 2.6 | 3,124,572.0 | 2.0 | 63,407.0 | 1.9 | 2.0 |
| Hornbeam | 27,266,360 | 7.4 | 2,712,944.0 | 1.7 | 53,293.0 | 1.6 | 2.0 |
| Aspen | 8,811,784 | 2.4 | 1,040,561.0 | 0.7 | 34,815.0 | 1.0 | 3.3 |
| Maple | 2,260,576 | 0.6 | 678,745.0 | 0.4 | 14,358.0 | 0.4 | 2.1 |
| Field maple | 4,557,764 | 1.2 | 656,223.0 | 0.4 | 13,044.0 | 0.4 | 2.0 |
| Large-leaved lime | 1,447,925 | 0.4 | 589,934.0 | 0.4 | 10,871.0 | 0.3 | 1.8 |
| Birch | 5,899,940 | 1.6 | 559,546.0 | 0.4 | 20,711.0 | 0.6 | 3.7 |
| Black locust | 4,545,638 | 1.2 | 470,894.0 | 0.3 | 16,251.0 | 0.5 | 3.5 |
| Other broadleaves | 3,369,066 | 0.8 | 363,169.0 | 0.2 | 9,761.0 | 0.3 | 2.7 |
| White ash | 1,730,638 | 0.5 | 324,364.0 | 0.2 | 8,075.0 | 0.2 | 2.5 |
| Cherry | 1,255,354 | 0.3 | 294,082.0 | 0.2 | 6,027.0 | 0.2 | 2.0 |
| Silver lime | 772,432 | 0.2 | 280,983.0 | 0.2 | 5,372.0 | 0.2 | 1.9 |
| Smooth-leaved elm | 1,830,226 | 0.5 | 228,313.0 | 0.1 | 7,110.0 | 0.2 | 3.1 |
| Flowering ash | 3,376,805 | 0.9 | 216,225.0 | 0.1 | 4,920.0 | 0.1 | 2.3 |
| Norway maple | 570,315 | 0.2 | 176,804.0 | 0.1 | 3,967.0 | 0.1 | 2.2 |
| Wych elm | 587,105 | 0.2 | 145,718.0 | 0.1 | 3,123.0 | 0.1 | 2.1 |
| White poplar | 256,063 | 0.1 | 135,273.0 | 0.1 | 2,165.0 | 0.1 | 1.6 |
| Small-leaved lime | 600,585 | 0.2 | 134,097.0 | 0.1 | 3,047.0 | 0.1 | 2.3 |
| Hop hornbeam | 947,488 | 0.3 | 118,549.0 | 0.1 | 2,201.0 | 0.1 | 1.9 |
| Wild service tree | 660,670 | 0.2 | 73,766.0 | 0.0 | 1,448.0 | 0.0 | 2.0 |
| Balkan maple | 374,898 | 0.1 | 68,843.0 | 0.0 | 2,124.0 | 0.1 | 3.1 |

**Table 3.3.** Natural high forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Pubescent oak | 183,912 | 0.0 | 20,775.0 | 0.0 | 607.0 | 0.0 | 2.9 |
| Oriental hornbeam | 847,469 | 0.2 | 20,389.0 | 0.0 | 563.0 | 0.0 | 2.8 |
| Alder | 96,041 | 0.0 | 19,556.0 | 0.0 | 277.0 | 0.0 | 1.4 |
| Black poplar | 11,318 | 0.0 | 15,532.0 | 0.0 | 715.0 | 0.0 | 4.6 |
| Willow | 11,318 | 0.0 | 12,027.0 | 0.0 | 54.0 | 0.0 | 0.4 |
| Turkish hazel | 69,334 | 0.0 | 7,580.0 | 0.0 | 223.0 | 0.0 | 2.9 |
| Common walnut | 12,732 | 0.0 | 2,758.0 | 0.0 | 19.0 | 0.0 | 0.7 |
| **Total broadleaves** | **296,322,082** | **80.0** | **128,304,344.0** | **81.4** | **2,474,585.0** | **73.0** | **1.9** |
| Spruce | 30,430,218 | 8.2 | 15,315,321.0 | 9.7 | 433,498.0 | 12.8 | 2.8 |
| Fir | 13,274,141 | 3.6 | 8,116,444.0 | 5.2 | 195,581.0 | 5.8 | 2.4 |
| Austrian pine | 24,094,768 | 6.5 | 4,566,716.0 | 2.9 | 237,275.0 | 7.0 | 5.2 |
| Scots pine | 6,279,206 | 1.7 | 1,200,417.0 | 0.8 | 46,800.0 | 1.4 | 3.9 |
| Douglas-fir | 25,465 | 0.0 | 8,021.0 | 0.0 | 219.0 | 0.0 | 2.7 |
| **Total conifers** | **74,103,798** | **20.0** | **29,206,919.0** | **18.6** | **913,373.0** | **27.0** | **3.1** |
| **TOTAL** | **370,425,880** | **100.0** | **157,511,263.0** | **100.0** | **3,387,958.0** | **100.0** | **2.2** |

**Table 3.4.** Natural high forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| 1 | Beech forests | 350,800.0 | 56.5 | 185,872,066 | 50.3 | 530 | 94,298,763.0 | 59.8 | 268.8 | 1,762,121.0 | 52.2 | 5.0 | 1.9 |
| 2 | Spruce forests | 54,000.0 | 8.7 | 32,679,468 | 8.8 | 605 | 15,395,327.0 | 9.8 | 285.1 | 431,019.0 | 12.7 | 8.0 | 2.8 |
| 3 | Common oak forests | 28,800.0 | 4.6 | 13,699,956 | 3.7 | 476 | 9,695,688.0 | 6.2 | 336.7 | 163,603.0 | 4.8 | 5.7 | 1.7 |
| 4 | Fir forests | 24,400.0 | 3.9 | 16,563,384 | 4.5 | 679 | 9,511,196.0 | 6.0 | 389.8 | 216,909.0 | 6.4 | 8.9 | 2.3 |
| 5 | Sessile oak forests | 44,800.0 | 7.2 | 28,921,314 | 7.8 | 646 | 8,204,144.0 | 5.2 | 183.1 | 177,134.0 | 5.2 | 4.0 | 2.2 |
| 6 | Pine forests | 40,000.0 | 6.4 | 31,693,998 | 8.6 | 792 | 5,290,042.0 | 3.4 | 132.3 | 272,095.0 | 8.0 | 6.8 | 5.1 |
| 7 | Turkey oak forests | 19,600.0 | 3.2 | 14,984,231 | 4.0 | 765 | 5,168,994.0 | 3.3 | 263.7 | 102,420.0 | 3.0 | 5.2 | 2.0 |
| 8 | Forest of narrow-leaved ash | 12,800.0 | 2.1 | 9,051,438 | 2.4 | 707 | 3,563,722.0 | 2.3 | 278.4 | 89,390.0 | 2.6 | 7.0 | 2.5 |
| 9 | Hungarian oak forests | 18,000.0 | 2.9 | 13,838,148 | 3.7 | 769 | 3,460,239.0 | 2.2 | 192.2 | 74,812.0 | 2.2 | 4.2 | 2.2 |
| 10 | Forests of birch, aspen and black locust | 18,400.0 | 3.0 | 15,564,154 | 4.2 | 846 | 1,331,776.0 | 0.8 | 72.4 | 64,406.0 | 1.9 | 3.5 | 4.8 |
| 11 | Hornbeam forests | 5,200.0 | 0.8 | 4,234,229 | 1.1 | 814 | 914,414.0 | 0.6 | 175.8 | 18,522.0 | 0.5 | 3.6 | 2.0 |
| 12 | Forests of ash and maple | 4,400.0 | 0.7 | 3,323,495 | 0.9 | 755 | 676,958.0 | 0.4 | 153.9 | 15,528.0 | 0.5 | 3.5 | 2.3 |
| **TOTAL** | | **621,200.0** | **100.0** | **370,425,880** | **100.0** | **596** | **157,511,263.0** | **100.0** | **253.6** | **3,387,958.0** | **100.0** | **5.5** | **2.2** |

**Table 3.5.** Natural high forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 89,973,814 | 1,531,469 | 20,595,901 | 34,552,793 | 24,852,635 | 5,951,929 | 2,489,087 |
| Common oak | 8,680,602 | 118,906 | 1,092,428 | 4,466,085 | 2,589,227 | 281,663 | 132,293 |
| Sessile oak | 7,495,250 | 100,360 | 2,489,929 | 3,272,238 | 1,407,564 | 194,206 | 30,953 |
| Turkey oak | 6,117,145 | 117,412 | 2,546,082 | 2,846,439 | 607,212 | | |
| Narrow-leaved ash | 3,545,306 | 121,923 | 1,330,032 | 1,416,335 | 575,907 | 101,109 | |
| Hungarian oak | 3,124,572 | 86,771 | 1,638,936 | 1,207,813 | 168,773 | 22,279 | |
| Hornbeam | 2,712,945 | 345,930 | 1,649,607 | 539,601 | 177,807 | | |
| Aspen | 1,040,561 | 64,864 | 753,359 | 222,338 | | | |
| Maple | 678,746 | 24,687 | 222,610 | 279,896 | 103,741 | | 47,812 |
| Field maple | 656,222 | 41,776 | 452,237 | 139,716 | 22,493 | | |
| Large-leaved lime | 589,933 | 7,894 | 184,269 | 304,892 | 68,282 | 24,596 | |
| Birch | 559,546 | 57,932 | 372,875 | 128,739 | | | |
| Black locust | 470,894 | 59,799 | 308,407 | 102,688 | | | |
| Other broadleaves | 363,169 | 23,810 | 231,126 | 63,104 | 45,129 | | |
| White ash | 324,364 | 34,151 | 86,273 | 120,982 | 82,958 | | |
| Cherry | 294,082 | 6,451 | 135,852 | 103,593 | 48,186 | | |
| Silver lime | 280,984 | 7,187 | 95,391 | 110,274 | 68,132 | | |
| Smooth-leaved elm | 228,313 | 25,833 | 145,391 | 57,089 | | | |
| Flowering ash | 216,225 | 44,400 | 138,940 | 32,885 | | | |
| Norway maple | 176,804 | 5,107 | 66,170 | 66,865 | 38,662 | | |
| Wych elm | 145,718 | 5,305 | 72,450 | 67,963 | | | |
| White poplar | 135,273 | | 49,880 | 23,774 | 61,619 | | |
| Small-leaved lime | 134,098 | 8,135 | 44,411 | 60,958 | 20,594 | | |
| Hop hornbeam | 118,549 | 4,046 | 107,355 | 7,148 | | | |
| Wild service tree | 73,766 | 6,083 | 42,117 | 25,566 | | | |
| Balkan maple | 68,842 | 8,488 | 40,989 | 9,151 | 10,214 | | |
| Pubescent oak | 20,775 | | 17,134 | 3,641 | | | |
| Oriental hornbeam | 20,389 | 5,574 | 14,815 | | | | |
| Alder | 19,556 | | 19,556 | | | | |
| Black poplar | 15,532 | | | 3,398 | 12,134 | | |
| Willow | 12,027 | | | 12,027 | | | |
| Turkish hazel | 7,580 | | 7,580 | | | | |
| Common walnut | 2,758 | | 2,758 | | | | |
| **Total broadleaves** | **128,304,344** | **2,864,293** | **34,954,860** | **50,247,991** | **30,961,269** | **6,575,782** | **2,700,145** |
| Spruce | 15,315,321 | 690,850 | 4,417,178 | 7,078,985 | 2,825,591 | 183,776 | 118,941 |
| Fir | 8,116,444 | 127,514 | 2,781,152 | 3,403,112 | 1,760,117 | 44,549 | |
| Austrian pine | 4,566,716 | 395,666 | 1,774,925 | 2,091,361 | 275,095 | 29,669 | |
| Scots pine | 1,200,418 | 83,352 | 405,987 | 681,780 | 29,299 | | |
| Douglas-fir | 8,021 | | 8,021 | | | | |
| **Total conifers** | **29,206,919** | **1,297,382** | **9,387,263** | **13,255,238** | **4,890,102** | **257,994** | **118,941** |
| **TOTAL** | **157,511,263** | **4,161,675** | **44,342,123** | **63,503,229** | **35,851,371** | **6,833,776** | **2,819,086** |

**Table 3.6.** Natural coppice forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 1,111,200.0 | 76.3 | 1,493,968,050 | 94.1 | 1,344 | 147,814,603.0 | 81.6 | 133.0 | 3,882,277.0 | 87.1 | 3.5 | 2.6 |
| Insufficiently stocked stands | 310,800.0 | 21.3 | 91,059,349 | 5.7 | 293 | 31,911,760.8 | 17.6 | 102.7 | 550,268.4 | 12.3 | 1.8 | 1.7 |
| Devastated stands | 34,400.0 | 2.4 | 2,578,392 | 0.2 | 75 | 1,462,550.2 | 0.8 | 42.5 | 25,648.0 | 0.6 | 0.7 | 1.8 |
| **TOTAL** | **1,456,400.0** | **100.0** | **1,587,605,791** | **100.0** | **1,090** | **181,188,914.0** | **100.0** | **124.4** | **4,458,193.4** | **100.0** | **3.1** | **2.5** |

**Table 3.7.** Natural coppice forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 879,600.0 | 60.4 | 896,873,437 | 56.5 | 1,020 | 115,470,353.0 | 63.7 | 131.3 | 2,792,266.2 | 62.6 | 3.2 | 2.4 |
| Mixed broadleaf stands | 567,200.0 | 38.9 | 674,680,905 | 42.5 | 1,189 | 64,424,374.0 | 35.6 | 113.6 | 1,623,220.2 | 36.4 | 2.9 | 2.5 |
| Mixed broadleaf and coniferous stands | 9,600.0 | 0.7 | 16,051,449 | 1.0 | 1,672 | 1,294,187.0 | 0.7 | 134.8 | 42,707.0 | 1.0 | 4.4 | 3.3 |
| **TOTAL** | **1,456,400.0** | **100.0** | **1,587,605,791** | **100.0** | **1,090** | **181,188,914.0** | **100.0** | **124.4** | **4,458,193.4** | **100.0** | **3.1** | **2.5** |

**Table 3.8.** Natural coppice forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 266,127,497 | 16.8 | 56,647,134.0 | 31.3 | 1,097,378.0 | 24.6 | 1.9 |
| Turkey oak | 218,449,234 | 13.8 | 40,623,013.0 | 22.4 | 914,723.0 | 20.5 | 2.3 |
| Hungarian oak | 143,102,353 | 9.0 | 17,810,890.0 | 9.8 | 454,206.0 | 10.2 | 2.6 |
| Sessile oak | 109,699,130 | 6.9 | 13,858,422.0 | 7.6 | 382,563.0 | 8.6 | 2.8 |
| Hornbeam | 224,407,571 | 14.1 | 12,358,444.0 | 6.8 | 279,026.0 | 6.3 | 2.3 |
| Black locust | 201,572,189 | 12.7 | 10,115,421.0 | 5.6 | 470,469.0 | 10.6 | 4.7 |
| Flowering ash | 97,672,096 | 6.2 | 3,227,579.0 | 1.8 | 95,200.0 | 2.1 | 2.9 |
| Large-leaved lime | 14,541,568 | 0.9 | 2,863,848.0 | 1.6 | 57,772.0 | 1.3 | 2.0 |
| Field maple | 42,422,216 | 2.7 | 2,497,895.0 | 1.4 | 58,913.0 | 1.3 | 2.4 |
| Other broadleaves | 38,801,448 | 2.4 | 2,434,792.0 | 1.3 | 75,631.0 | 1.7 | 3.1 |
| Narrow-leaved ash | 8,621,540 | 0.5 | 2,227,107.0 | 1.2 | 65,464.0 | 1.5 | 2.9 |
| Oriental hornbeam | 87,159,659 | 5.5 | 1,693,302.0 | 0.9 | 54,381.0 | 1.2 | 3.2 |
| Silver lime | 5,173,056 | 0.3 | 1,497,611.0 | 0.8 | 26,772.0 | 0.6 | 1.8 |
| Willow | 4,633,195 | 0.3 | 1,400,147.0 | 0.8 | 28,389.0 | 0.6 | 2.0 |
| Hop hornbeam | 20,820,239 | 1.3 | 1,334,522.0 | 0.7 | 31,325.0 | 0.7 | 2.3 |
| Aspen | 12,973,832 | 0.8 | 1,258,721.0 | 0.7 | 54,853.0 | 1.2 | 4.4 |
| Black poplar | 1,446,235 | 0.1 | 1,001,831.0 | 0.6 | 41,521.0 | 0.9 | 4.1 |
| Cherry | 11,240,916 | 0.7 | 966,837.0 | 0.5 | 25,660.0 | 0.6 | 2.7 |
| Pubescent oak | 11,881,143 | 0.7 | 926,171.0 | 0.5 | 27,621.0 | 0.6 | 3.0 |
| Smooth-leaved elm | 16,371,156 | 1.0 | 836,407.0 | 0.5 | 34,444.0 | 0.8 | 4.1 |
| Small-leaved lime | 6,912,216 | 0.4 | 808,385.0 | 0.4 | 17,041.0 | 0.4 | 2.1 |
| Alder | 4,983,746 | 0.3 | 744,122.0 | 0.4 | 22,443.0 | 0.5 | 3.0 |
| Maple | 8,463,657 | 0.5 | 727,067.0 | 0.4 | 23,669.0 | 0.5 | 3.3 |
| Common oak | 2,350,265 | 0.1 | 533,336.0 | 0.3 | 15,171.0 | 0.3 | 2.8 |
| White poplar | 1,731,906 | 0.1 | 471,877.0 | 0.3 | 22,551.0 | 0.5 | 4.8 |
| White ash | 3,837,389 | 0.2 | 355,627.0 | 0.2 | 10,047.0 | 0.2 | 2.8 |
| Common walnut | 1,985,436 | 0.1 | 285,470.0 | 0.2 | 8,313.0 | 0.2 | 2.9 |
| Birch | 4,147,957 | 0.3 | 255,674.0 | 0.1 | 9,320.0 | 0.2 | 3.6 |
| Turkish hazel | 2,453,846 | 0.2 | 199,811.0 | 0.1 | 6,298.0 | 0.1 | 3.2 |
| Norway maple | 1,038,653 | 0.1 | 179,147.0 | 0.1 | 4,505.0 | 0.1 | 2.5 |
| Euramer. poplar | 215,036 | 0.0 | 97,204.0 | 0.1 | 5,116.0 | 0.1 | 5.3 |
| Ash-leaved maple | 1,090,309 | 0.1 | 92,276.0 | 0.1 | 2,693.0 | 0.1 | 2.9 |
| White ash | 3,716,445 | 0.2 | 66,879.0 | 0.0 | 2,268.0 | 0.1 | 3.4 |
| Europ. hackberry | 940,783 | 0.1 | 55,588.0 | 0.0 | 1,694.0 | 0.0 | 3.0 |
| Wild service tree | 1,322,754 | 0.1 | 36,498.0 | 0.0 | 1,033.0 | 0.0 | 2.8 |
| Europ. white elm | 783,258 | 0.0 | 32,297.0 | 0.0 | 1,548.0 | 0.0 | 4.8 |
| Wych elm | 260,584 | 0.0 | 31,028.0 | 0.0 | 732.0 | 0.0 | 2.4 |
| Other conifers | 309,482 | 0.0 | 30,516.0 | 0.0 | 1,620.0 | 0.0 | 5.3 |
| Balkan maple | 441,630 | 0.0 | 26,474.0 | 0.0 | 1,055.0 | 0.0 | 4.0 |
| Mountain ash | 5,659 | 0.0 | 3,377.0 | 0.0 | 36.0 | 0.0 | 1.1 |
| **Total broadleaves** | **1,584,107,287** | **99.8** | **180,612,746.0** | **99.7** | **4,433,466.0** | **99.4** | **2.5** |
| Spruce | 1,103,621 | 0.1 | 260,365.0 | 0.1 | 8,816.0 | 0.2 | 3.4 |
| Austrian pine | 1,611,096 | 0.1 | 244,877.0 | 0.1 | 12,183.0 | 0.3 | 5.0 |
| Fir | 24,050 | 0.0 | 26,482.0 | 0.0 | 464.0 | 0.0 | 1.8 |
| Scots pine | 387,668 | 0.0 | 21,946.0 | 0.0 | 1,569.0 | 0.0 | 7.1 |
| Douglas-fir | 63,662 | 0.0 | 10,415.0 | 0.0 | 312.0 | 0.0 | 3.0 |
| Weymouth pine | 295,675 | 0.0 | 9,688.0 | 0.0 | 1,300.0 | 0.0 | 13.4 |
| Yew | 12,732 | 0.0 | 2,395.0 | 0.0 | 83.0 | 0.0 | 3.5 |
| **Total conifers** | **3,498,504** | **0.2** | **576,168.0** | **0.3** | **24,727.0** | **0.6** | **4.3** |
| **TOTAL** | **1,587,605,791** | **100.0** | **181,188,914.0** | **100.0** | **4,458,193.0** | **100.0** | **2.5** |

**Table 3.9.** Natural coppice forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| 1 | Beech forests | 309,600.0 | 21.3 | 294,921,620 | 18.6 | 953 | 59,537,908.0 | 32.9 | 192.3 | 1,166,717.0 | 26.2 | 3.8 | 2.0 |
| 2 | Turkey oak forests | 325,600.0 | 22.4 | 327,961,330 | 20.7 | 1,007 | 44,395,932.0 | 24.6 | 136.4 | 1,059,227.0 | 23.8 | 3.3 | 2.4 |
| 3 | Hungarian oak forests | 141,600.0 | 9.7 | 164,284,178 | 10.3 | 1,160 | 17,626,415.0 | 9.7 | 124.5 | 458,248.0 | 10.3 | 3.2 | 2.6 |
| 4 | Sessile oak forests | 128,400.0 | 8.8 | 134,474,340 | 8.5 | 1,047 | 13,391,912.0 | 7.4 | 104.3 | 364,689.0 | 8.2 | 2.8 | 2.7 |
| 5 | Hornbeam forests | 113,600.0 | 7.8 | 171,215,013 | 10.8 | 1,507 | 12,352,163.0 | 6.8 | 108.7 | 279,226.0 | 6.3 | 2.5 | 2.3 |
| 6 | Forests of birch, aspen and black locust | 197,200.0 | 13.5 | 218,711,121 | 13.8 | 1,109 | 11,488,103.0 | 6.3 | 58.3 | 526,178.0 | 11.8 | 2.7 | 4.6 |
| 7 | Lime forests | 30,400.0 | 2.1 | 30,556,001 | 1.9 | 1,005 | 6,133,564.0 | 3.4 | 201.8 | 120,698.0 | 2.7 | 4.0 | 2.0 |
| 8 | Forest of oriental hornbeam, hop hornbeam and flowering ash | 87,200.0 | 6.0 | 129,961,443 | 8.1 | 1,490 | 4,794,933.0 | 2.6 | 55.0 | 133,127.0 | 3.0 | 1.5 | 2.8 |
| 9 | Forests of other broadleaves | 51,200.0 | 3.5 | 56,380,638 | 3.5 | 1,101 | 3,101,836.0 | 1.7 | 60.6 | 96,296.0 | 2.2 | 1.9 | 3.1 |
| 10 | Forest of narrow-leaved ash | 12,400.0 | 0.9 | 14,476,253 | 0.9 | 1,167 | 2,415,093.0 | 1.3 | 194.8 | 73,127.0 | 1.6 | 5.9 | 3.0 |
| 11 | Willow forests | 18,800.0 | 1.3 | 7,581,775 | 0.5 | 403 | 1,665,180.0 | 0.9 | 88.6 | 37,329.0 | 0.8 | 2.0 | 2.2 |
| 12 | Poplar forests | 12,400.0 | 0.9 | 6,366,031 | 0.4 | 513 | 1,576,083.0 | 0.9 | 127.1 | 60,110.0 | 1.3 | 4.8 | 3.8 |
| 13 | Pubescent oak forests | 10,400.0 | 0.7 | 12,554,416 | 0.8 | 1,207 | 907,212.0 | 0.5 | 87.2 | 27,532.0 | 0.6 | 2.6 | 3.0 |
| 14 | Forests of ash and maple | 7,600.0 | 0.5 | 10,673,201 | 0.7 | 1,404 | 706,515.0 | 0.4 | 93.0 | 21,952.0 | 0.5 | 2.9 | 3.1 |
| 15 | Alder forests | 6,400.0 | 0.4 | 4,828,446 | 0.3 | 754 | 672,989.0 | 0.4 | 105.2 | 19,486.0 | 0.4 | 3.0 | 2.9 |
| 16 | Common oak forests | 3,600.0 | 0.2 | 2,659,985 | 0.2 | 739 | 423,076.0 | 0.2 | 117.5 | 14,251.0 | 0.3 | 4.0 | 3.4 |
| **Total** | | **1,456,400.0** | **100.0** | **1,587,605,791** | **100.0** | **1,090** | **181,188,914.0** | **100.0** | **124.4** | **4,458,193.0** | **100.0** | **3.1** | **2.5** |

**Table 3.10.** Natural coppice forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 56,647,135 | 2,363,938 | 24,947,475 | 16,856,834 | 7,916,525 | 2,794,897 | 1,767,466 |
| Turkey oak | 40,623,014 | 3,734,488 | 26,357,558 | 8,452,731 | 1,739,364 | 198,381 | 140,492 |
| Hungarian oak | 17,810,890 | 2,545,550 | 12,804,587 | 2,147,230 | 283,946 | 29,577 | |
| Sessile oak | 13,858,422 | 1,138,319 | 8,201,510 | 3,132,413 | 1,063,946 | 164,307 | 157,927 |
| Hornbeam | 12,358,444 | 2,983,121 | 6,940,425 | 1,575,163 | 652,793 | 146,871 | 60,071 |
| Black locust | 10,115,420 | 2,642,479 | 6,401,296 | 970,477 | 101,168 | | |
| Flowering ash | 3,227,580 | 1,420,295 | 1,647,949 | 133,243 | 26,093 | | |
| Large-leaved lime | 2,863,848 | 186,073 | 1,158,775 | 1,004,142 | 469,248 | | 45,610 |
| Field maple | 2,497,894 | 608,141 | 1,545,823 | 297,582 | 46,348 | | |
| Other broadleaves | 2,434,792 | 528,575 | 1,440,042 | 396,393 | 45,632 | 24,150 | |
| Narrow-leaved ash | 2,227,107 | 136,944 | 1,284,136 | 652,784 | 153,243 | | |
| Oriental hornbeam | 1,693,302 | 1,188,609 | 470,389 | 14,618 | 19,686 | | |
| Silver lime | 1,497,611 | 57,777 | 366,825 | 848,328 | 224,681 | | |
| Willow | 1,400,147 | 35,396 | 405,688 | 510,249 | 291,461 | 104,059 | 53,294 |
| Hop hornbeam | 1,334,522 | 272,021 | 954,987 | 89,405 | 18,109 | | |
| Aspen | 1,258,721 | 155,068 | 737,029 | 315,686 | 50,938 | | |
| Black poplar | 1,001,832 | 6,989 | 95,478 | 381,229 | 407,862 | 48,547 | 61,727 |
| Cherry | 966,837 | 144,882 | 557,496 | 252,751 | 11,708 | | |
| Pubescent oak | 926,171 | 157,089 | 482,246 | 207,829 | 29,468 | | 49,539 |
| Smooth-leaved elm | 836,406 | 361,133 | 340,492 | 118,207 | 16,574 | | |
| Small-leaved lime | 808,384 | 123,688 | 239,305 | 334,391 | 111,000 | | |
| Alder | 744,123 | 50,313 | 393,330 | 244,994 | 55,486 | | |
| Maple | 727,067 | 141,627 | 387,984 | 163,466 | 33,990 | | |
| Common oak | 533,336 | 58,003 | 207,561 | 166,185 | 66,672 | 34,915 | |
| White poplar | 471,877 | 16,651 | 135,654 | 152,503 | 167,069 | | |
| White ash | 355,626 | 37,702 | 195,752 | 79,679 | 42,493 | | |
| Common walnut | 285,469 | 33,274 | 144,849 | 75,314 | 32,032 | | |
| Birch | 255,673 | 44,351 | 163,858 | 32,217 | 15,247 | | |
| Turkish hazel | 199,812 | 39,598 | 98,453 | 54,277 | 7,484 | | |
| Norway maple | 179,146 | 7,710 | 114,121 | 34,337 | 22,978 | | |
| Euramer. poplar | 97,203 | | 39,041 | | 13,097 | 45,065 | |
| Ash-leaved maple | 92,276 | 39,414 | 52,862 | | | | |
| White ash | 66,879 | 63,832 | 3,047 | | | | |
| Europ. hackberry | 55,587 | 17,443 | 19,349 | 18,795 | | | |
| Wild service tree | 36,498 | 19,056 | 17,442 | | | | |
| Europ. white elm | 32,297 | 18,822 | 13,475 | | | | |
| Wych elm | 31,028 | 2,405 | 13,335 | 15,288 | | | |
| Other conifers | 30,515 | 2,829 | 27,686 | | | | |
| Balkan maple | 26,474 | 8,969 | 13,621 | 3,884 | | | |
| Mountain ash | 3,377 | | | 3,377 | | | |
| **Total broadleaves** | **180,612,746** | **21,392,574** | **99,420,931** | **39,736,001** | **14,136,341** | **3,590,769** | **2,336,126** |
| Spruce | 260,366 | 38,622 | 95,076 | 82,852 | 43,816 | | |
| Austrian pine | 244,876 | 15,137 | 126,470 | 103,269 | | | |
| Fir | 26,482 | | 1,644 | 5,588 | 19,250 | | |
| Scots pine | 21,946 | 9,903 | 12,043 | | | | |
| Douglas-fir | 10,415 | | 10,415 | | | | |
| Weymouth pine | 9,688 | 9,054 | 634 | | | | |
| Yew | 2,395 | | 2,395 | | | | |
| **Total conifers** | **576,168** | **72,716** | **248,677** | **191,709** | **63,066** | | |
| **TOTAL** | **181,188,914** | **21,465,290** | **99,669,608** | **39,927,710** | **14,199,407** | **3,590,769** | **2,336,126** |

**Table 3.11.** Artificially established forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 140,800.0 | 80.6 | 148,421,618 | 94.8 | 1,054 | 19,507,759.6 | 82.1 | 138.5 | 1,070,369.0 | 86.8 | 7.6 | 5.5 |
| Insufficiently stocked stands | 29,600.0 | 16.9 | 7,901,299 | 5.0 | 267 | 3,841,466.6 | 16.1 | 129.8 | 144,178.1 | 11.7 | 4.9 | 3.8 |
| Devastated stands | 4,400.0 | 2.5 | 281,265 | 0.2 | 64 | 438.014.5 | 1.8 | 99.5 | 19,073.3 | 1.5 | 4.3 | 4.4 |
| **Total** | **174,800.0** | **100.0** | **156,604,182** | **100.0** | **896** | **23,787,240.6** | **100.0** | **136.1** | **1,233,620.4** | **100.0** | **7.1** | **5.2** |

**Table 3.12.** Artificially established forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Pure coniferous stands | 104,400.0 | 59.8 | 109,045,269 | 69.6 | 1,044 | 13,343,877.0 | 56.2 | 127.8 | 724,081.0 | 58.7 | 6.9 | 5.4 |
| Pure broadleaf stands | 48,000.0 | 27.5 | 21,381,624 | 13.7 | 445 | 7,453,912.0 | 31.3 | 155.3 | 380,146.0 | 30.8 | 7.9 | 5.1 |
| Mixed broadleaf and coniferous stands | 15,600.0 | 8.9 | 17,910,922 | 11.4 | 1,148 | 1,792,737.0 | 7.5 | 114.9 | 77,257.0 | 6.3 | 5.0 | 4.3 |
| Mixed stands of conifers | 4,800.0 | 2.7 | 5,278,267 | 3.4 | 1,100 | 936,853.0 | 3.9 | 195.2 | 41,092.0 | 3.3 | 8.6 | 4.4 |
| Mixed broadleaf stands | 2,000.0 | 1.1 | 2,988,100 | 1.9 | 1,494 | 259,861.0 | 1.1 | 129.9 | 11,045.0 | 0.9 | 5.5 | 4.3 |
| **Total** | **174,800.0** | **100.0** | **156,604,182** | **100.0** | **896** | **23,787,240.0** | **100.0** | **136.1** | **1,233,621.0** | **100.0** | **7.1** | **5.2** |

**Table 3.13.** Artificially established forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Euramerican poplar | 6,274,922 | 4.0 | 6,040,659.0 | 25.4 | 333,156.0 | 27.0 | 5.5 |
| Black locust | 12,727,622 | 8.1 | 657,628.0 | 2.8 | 30,138.0 | 2.4 | 4.6 |
| Willow | 2,018,088 | 1.3 | 499,912.0 | 2.1 | 14,377.0 | 1.2 | 2.9 |
| Turkey oak | 2,638,691 | 1.7 | 240,288.0 | 1.0 | 7,137.0 | 0.6 | 3.0 |
| Beech | 2,207,729 | 1.4 | 229,879.0 | 1.0 | 5,508.0 | 0.4 | 2.4 |
| Sessile oak | 2,276,269 | 1.5 | 189,219.0 | 0.8 | 7,027.0 | 0.6 | 3.7 |
| Black walnut | 336,701 | 0.2 | 154,850.0 | 0.7 | 4,169.0 | 0.3 | 2.7 |
| Other broadleaves | 3,405,634 | 2.2 | 144,038.0 | 0.6 | 4,796.0 | 0.4 | 3.3 |
| White ash | 2,765,759 | 1.8 | 90,698.0 | 0.4 | 2,185.0 | 0.2 | 2.4 |
| White ash | 414,510 | 0.3 | 87,284.0 | 0.4 | 3,276.0 | 0.3 | 3.8 |
| Hornbeam | 2,448,367 | 1.6 | 85,851.0 | 0.4 | 2,253.0 | 0.2 | 2.6 |
| Large-leaved lime | 773,847 | 0.5 | 82,079.0 | 0.3 | 2,008.0 | 0.2 | 2.4 |
| Norway maple | 84,883 | 0.1 | 62,010.0 | 0.3 | 1,438.0 | 0.1 | 2.3 |
| Flowering ash | 2,737,754 | 1.7 | 61,954.0 | 0.3 | 2,038.0 | 0.2 | 3.3 |
| Birch | 1,594,604 | 1.0 | 59,553.0 | 0.3 | 3,178.0 | 0.3 | 5.3 |
| Aspen | 735,594 | 0.5 | 59,022.0 | 0.2 | 2,979.0 | 0.2 | 5.0 |
| Hungarian oak | 648,304 | 0.4 | 51,004.0 | 0.2 | 1,155.0 | 0.1 | 2.3 |
| Smooth-leaved elm | 463,766 | 0.3 | 33,223.0 | 0.1 | 1,546.0 | 0.1 | 4.7 |
| Cherry | 164,056 | 0.1 | 31,349.0 | 0.1 | 699.0 | 0.1 | 2.2 |
| Common oak | 5,659 | 0.0 | 28,434.0 | 0.1 | 255.0 | 0.0 | 0.9 |
| Hop hornbeam | 183,912 | 0.1 | 27,623.0 | 0.1 | 439.0 | 0.0 | 1.6 |
| Maple | 138,642 | 0.1 | 27,543.0 | 0.1 | 711.0 | 0.1 | 2.6 |
| Field maple | 635,205 | 0.4 | 27,186.0 | 0.1 | 1,195.0 | 0.1 | 4.4 |
| Common walnut | 548,540 | 0.4 | 26,213.0 | 0.1 | 1,700.0 | 0.1 | 6.5 |
| Narrow-leaved ash | 199,443 | 0.1 | 19,897.0 | 0.1 | 564.0 | 0.0 | 2.8 |
| Wych elm | 50,930 | 0.0 | 10,334.0 | 0.0 | 318.0 | 0.0 | 3.1 |

**Table 3.13.** Artificially established forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Pubescent oak | 63,662 | 0.0 | 9,221.0 | 0.0 | 336.0 | 0.0 | 3.6 |
| Oriental hornbeam | 437,146 | 0.3 | 3,837.0 | 0.0 | 129.0 | 0.0 | 3.4 |
| Small-leaved lime | 12,732 | 0.0 | 2,391.0 | 0.0 | 67.0 | 0.0 | 2.8 |
| Silver lime | 12,732 | 0.0 | 502.0 | 0.0 | 18.0 | 0.0 | 3.6 |
| **Total broadleaves** | **47,005,705** | **30.0** | **9,043,679.0** | **38.0** | **434,797.0** | **35.2** | **4.8** |
| Austrian pine | 59,258,140 | 37.8 | 7,847,434.0 | 33.0 | 465,400.0 | 37.7 | 5.9 |
| Spruce | 25,998,259 | 16.6 | 3,234,860.0 | 13.6 | 162,932.0 | 13.2 | 5.0 |
| Scots pine | 19,510,851 | 12.5 | 2,553,067.0 | 10.7 | 128,501.0 | 10.4 | 5.0 |
| Douglas-fir | 1,551,938 | 1.0 | 492,715.0 | 2.1 | 15,610.0 | 1.3 | 3.2 |
| Weymouth pine | 1,784,308 | 1.1 | 345,728.0 | 1.5 | 17,408.0 | 1.4 | 5.0 |
| Fir | 499,025 | 0.3 | 161,997.0 | 0.7 | 3,806.0 | 0.3 | 2.3 |
| Larch | 995,956 | 0.6 | 107,760.0 | 0.5 | 5,167.0 | 0.4 | 4.8 |
| **Total conifers** | **109,598,477** | **70.0** | **14,743,561.0** | **62.0** | **798,824.0** | **64.8** | **5.4** |
| **TOTAL** | **156,604,182** | **100.0** | **23,787,240.0** | **100.0** | **1,233,621.0** | **100.0** | **5.2** |

**Table 3.14.** Artificially established forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| 1 | Pine forests | 86,000.0 | 49.1 | 90,978,070 | 58.0 | 1,058 | 11,160,758.0 | 46.9 | 129.8 | 615,546.0 | 49.8 | 7.2 | 5.5 |
| 2 | Poplar forests | 35,600.0 | 20.4 | 10,282,634 | 6.6 | 289 | 6,240,393.0 | 26.3 | 175.3 | 338,159.0 | 27.4 | 9.5 | 5.4 |
| 3 | Spruce forests | 32,400.0 | 18.5 | 33,855,733 | 21.6 | 1,045 | 3,530,710.0 | 14.9 | 109.0 | 176,043.0 | 14.3 | 5.4 | 5.0 |
| 4 | Forests of other conifers | 5,200.0 | 3.0 | 5,974,626 | 3.8 | 1,149 | 1,054,331.0 | 4.4 | 202.8 | 42,235.0 | 3.4 | 8.1 | 4.0 |
| 5 | Forests of birch, aspen and black locust | 7,600.0 | 4.3 | 10,339,695 | 6.6 | 1,360 | 582,249.0 | 2.4 | 76.6 | 26,603.0 | 2.2 | 3.5 | 4.6 |
| 6 | Willow forests | 3,600.0 | 2.1 | 2,133,211 | 1.4 | 593 | 509,612.0 | 2.1 | 141.6 | 15,040.0 | 1.2 | 4.2 | 3.0 |
| 7 | Fir forests | 1,200.0 | 0.7 | 1,426,028 | 0.9 | 1,188 | 327,667.0 | 1.4 | 273.1 | 8,606.0 | 0.7 | 7.2 | 2.6 |
| 8 | Forests of ash and maple | 800.0 | 0.5 | 739,894 | 0.5 | 925 | 199,802.0 | 0.8 | 249.8 | 5,632.0 | 0.5 | 7.0 | 2.8 |
| 9 | Forests of other broadleaves | 2,400.0 | 1.4 | 874,291 | 0.6 | 364 | 181,718.0 | 0.8 | 75.7 | 5,757.0 | 0.5 | 2.4 | 3.2 |
| **Total** | | **174,800.0** | **100.0** | **156,604,182** | **100.0** | **896** | **23,787,240.0** | **100.0** | **136.1** | **1,233,621.0** | **100.0** | **7.1** | **5.2** |

**Table 3.15.** Artificially established forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Euramerican poplar | 6,040,658 | 22,069 | 849,163 | 2,927,414 | 1,824,317 | 417,695 | |
| Black locust | 657,627 | 167,572 | 389,127 | 100,928 | | | |
| Willow | 499,911 | 5,536 | 421,018 | 73,357 | | | |
| Turkey oak | 240,288 | 62,318 | 143,669 | 34,301 | | | |
| Beech | 229,879 | 28,535 | 80,740 | 95,602 | 25,002 | | |
| Sessile oak | 189,219 | 50,265 | 102,287 | 26,888 | 9,779 | | |
| Black walnut | 154,850 | | 86,635 | 68,215 | | | |
| Other broadleaves | 144,038 | 63,902 | 72,149 | 7,987 | | | |
| White ash | 90,698 | 34,066 | 45,995 | 10,637 | | | |
| White ash | 87,283 | 4,626 | 77,698 | 4,959 | | | |
| Hornbeam | 85,851 | 35,495 | 41,881 | 8,475 | | | |
| Large-leaved lime | 82,078 | 18,886 | 43,170 | 20,022 | | | |
| Norway maple | 62,010 | | 28,699 | 33,311 | | | |
| Flowering ash | 61,954 | 41,409 | 20,545 | | | | |
| Birch | 59,553 | 27,813 | 31,740 | | | | |
| Aspen | 59,022 | 7,668 | 28,003 | 23,351 | | | |
| Hungarian oak | 51,004 | 7,286 | 31,036 | 3,898 | 8,784 | | |
| Smooth-leaved elm | 33,223 | 7,795 | 25,428 | | | | |
| Cherry | 31,349 | | 14,305 | | 17,044 | | |
| Common oak | 28,434 | | | | 28,434 | | |
| Hop hornbeam | 27,623 | | 24,292 | 3,331 | | | |
| Maple | 27,543 | | 18,513 | 9,030 | | | |
| Field maple | 27,186 | 15,887 | 3,507 | 7,792 | | | |
| Common walnut | 26,212 | 12,449 | 10,597 | 3,166 | | | |
| Narrow-leaved ash | 19,897 | 3,933 | 9,051 | 6,913 | | | |
| Wych elm | 10,334 | | 10,334 | | | | |
| Pubescent oak | 9,221 | | 9,221 | | | | |
| Oriental hornbeam | 3,837 | 3,537 | 300 | | | | |
| Small-leaved lime | 2,391 | | 2,391 | | | | |
| Silver lime | 502 | | 502 | | | | |
| **Total broadleaves** | **9,043,679** | **621,047** | **2,621,996** | **3,469,577** | **1,913,360** | **417,695** | |
| Austrian pine | 7,847,434 | 581,339 | 5,986,005 | 1,206,153 | 73,937 | | |
| Spruce | 3,234,860 | 965,172 | 2,156,787 | 96,145 | 16,756 | | |
| Scots pine | 2,553,067 | 186,457 | 2,126,052 | 240,558 | | | |
| Douglas-fir | 492,716 | 13,085 | 349,579 | 130,052 | | | |
| Weymouth pine | 345,728 | 4,810 | 266,930 | 73,988 | | | |
| Fir | 161,997 | 6,861 | 53,225 | 101,911 | | | |
| Larch | 107,760 | 24,616 | 74,511 | 8,633 | | | |
| **Total conifers** | **14,743,561** | **1,782,340** | **11,013,089** | **1,857,440** | **90,693** | | |
| **TOTAL** | **23,787,240** | **2,403,387** | **13,635,085** | **5,327,017** | **2,004,053** | **417,695** | |

**Table 4.** Forests by naturalness

| Naturalness | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Forests without anthropogenic interventions | 1,200.0 | 0.1 | 305,578 | 0.1 | 255 | 666,721.7 | 0.2 | 555.6 | 9,502.5 | 0.1 | 7.9 | 1.4 |
| Semi-natural forests | 2,076,400.0 | 92.1 | 1,957,726,093 | 92.5 | 943 | 338,033,455.3 | 93.2 | 162.8 | 7,836,649.4 | 86.3 | 3.8 | 2.3 |
| Plantations | 174,800.0 | 7.8 | 156,604,182 | 7.4 | 896 | 23,787,240.6 | 6.6 | 136.1 | 1,233,621.0 | 13.6 | 7.1 | 5.2 |
| **TOTAL** | **2,252,400.0** | **100.0** | **2,114,635,853** | **100.0** | **939** | **362,487,417.6** | **100.0** | **160.9** | **9,079,772.9** | **100.0** | **4.0** | **2.5** |

**Table 5.** Forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 1,589,200.0 | 70.6 | 1,942,228,767 | 91.8 | 1,222 | 252,648,981.5 | 69.7 | 159.0 | 7,121,335.0 | 78.4 | 4.5 | 2.8 |
| Insufficiently stocked stands | 608,000.0 | 27.0 | 168,329,122 | 8.0 | 277 | 105,444,194.6 | 29.1 | 173.4 | 1,879,913.0 | 20.7 | 3.1 | 1.8 |
| Devastated stands | 55,200.0 | 2.4 | 4,077,964 | 0.2 | 74 | 4,394,241.5 | 1.2 | 79.6 | 78,524.9 | 0.9 | 1.4 | 1.8 |
| **TOTAL** | **2,252,400.0** | **100.0** | **2,114,635,853** | **100.0** | **939** | **362,487,417.6** | **100.0** | **160.9** | **9,079,772.9** | **100.0** | **4.0** | **2.5** |

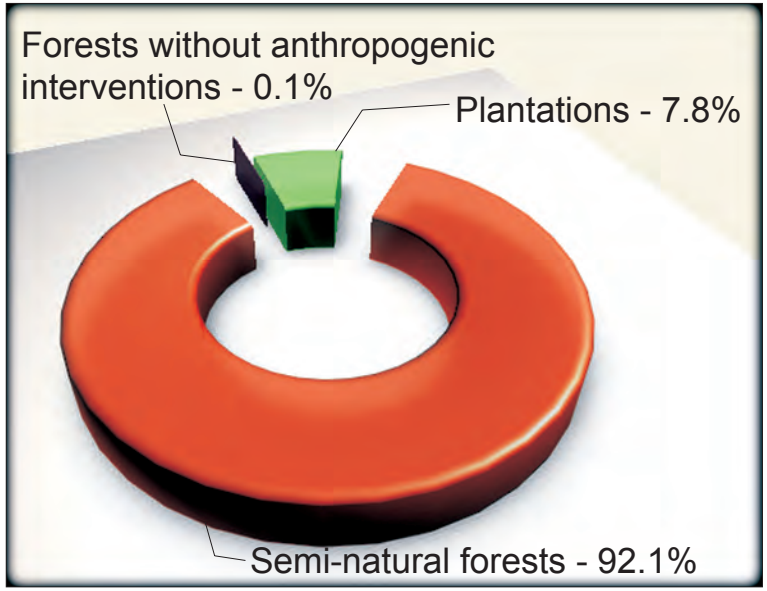



**Diagram 4.** Forests by naturalness (area)

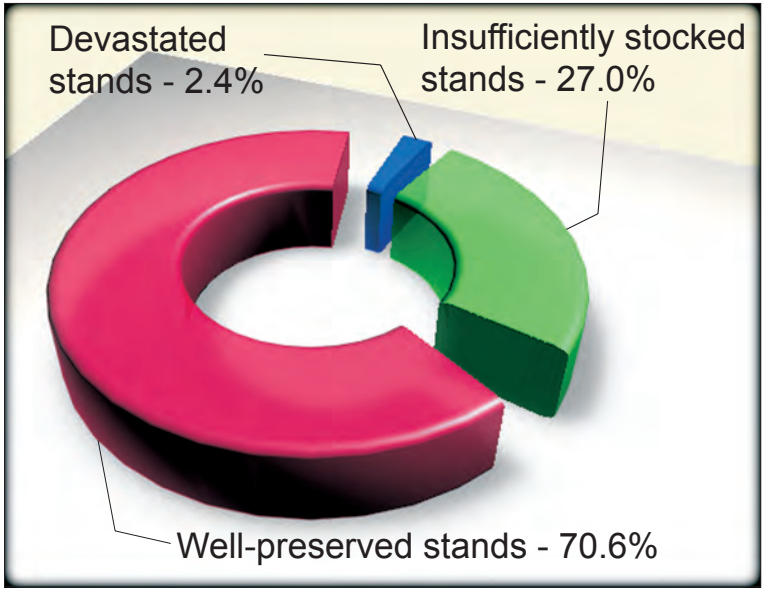



**Diagram 5.** Forests by preservation status (area)

**Table 5.1.** Well-preserved forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 1,111,200.0 | 69.9 | 1,493,968,050 | 76.9 | 1,344 | 147,814,603.0 | 58.5 | 133.0 | 3,882,276.0 | 54.5 | 3.5 | 2.6 |
| Natural high stands | 337,200.0 | 21.2 | 299,839,099 | 15.5 | 889 | 85,326,619.0 | 33.8 | 253.0 | 2,168,689.0 | 30.5 | 6.4 | 2.5 |
| Artificially established stands | 140,800.0 | 8.9 | 148,421,618 | 7.6 | 1,054 | 19,507,760.0 | 7.7 | 138.5 | 1,070,369.0 | 15.0 | 7.6 | 5.5 |
| **TOTAL** | **1,589,200.0** | **100.0** | **1,942,228,767** | **100.0** | **1,222** | **252,648,982.0** | **100.0** | **159.0** | **7,121,334.0** | **100.0** | **4.5** | **2.8** |

**Table 5.2.** Well-preserved forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 871,600.0 | 54.9 | 1,016,825,938 | 52.4 | 1,167 | 145,455,359.0 | 57.6 | 166.9 | 3,769,551.0 | 52.9 | 4.3 | 2.6 |
| Mixed broadleaf stands | 522,000.0 | 32.8 | 707,249,243 | 36.4 | 1,355 | 68,022,619.0 | 26.9 | 130.3 | 1,765,378.0 | 24.9 | 3.4 | 2.6 |
| Pure coniferous stands | 146,400.0 | 9.2 | 158,135,458 | 8.1 | 1,080 | 27,322,819.0 | 10.8 | 186.6 | 1,228,422.0 | 17.2 | 8.4 | 4.5 |
| Mixed broadleaf and coniferous stands | 38,000.0 | 2.4 | 48,262,645 | 2.5 | 1,270 | 8,301,893.0 | 3.3 | 218.5 | 242,395.0 | 3.4 | 6.4 | 2.9 |
| Mixed stands of conifers | 11,200.0 | 0.7 | 11,755,483 | 0.6 | 1,050 | 3,546,292.0 | 1.4 | 316.6 | 115,588.0 | 1.6 | 10.3 | 3.3 |
| **TOTAL** | **1,589,200.0** | **100.0** | **1,942,228,767** | **100.0** | **1,222** | **252,648,982.0** | **100.0** | **159.0** | **7,121,334.0** | **100.0** | **4.5** | **2.8** |

**Table 5.3.** Well-preserved forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 375,736,155 | 19.3 | 83,406,891.0 | 33.0 | 1,818,100.0 | 25.5 | 2.2 |
| Turkey oak | 213,992,823 | 11.0 | 40,006,628.0 | 15.8 | 915,879.0 | 12.9 | 2.3 |
| Hungarian oak | 146,011,766 | 7.5 | 18,615,578.0 | 7.4 | 477,906.0 | 6.7 | 2.6 |
| Sessile oak | 119,088,030 | 6.1 | 16,990,202.0 | 6.7 | 472,586.0 | 6.6 | 2.8 |
| Hornbeam | 243,671,428 | 12.5 | 12,727,446.0 | 5.0 | 301,226.0 | 4.2 | 2.4 |
| Black locust | 209,889,245 | 10.8 | 10,002,377.0 | 4.0 | 474,552.0 | 6.7 | 4.7 |
| Narrow-leaved ash | 13,478,653 | 0.7 | 3,958,099.0 | 1.6 | 116,299.0 | 1.6 | 2.9 |
| Common oak | 8,337,037 | 0.4 | 3,882,990.0 | 1.5 | 78,928.0 | 1.1 | 2.0 |
| Flowering ash | 99,457,309 | 5.1 | 3,250,674.0 | 1.3 | 96,585.0 | 1.4 | 3.0 |
| Euramer. poplar | 5,106,821 | 0.3 | 3,225,095.0 | 1.3 | 224,341.0 | 3.2 | 7.0 |
| Field maple | 43,670,088 | 2.2 | 2,558,161.0 | 1.0 | 62,636.0 | 0.9 | 2.4 |
| Large-leaved lime | 15,237,767 | 0.8 | 2,470,486.0 | 1.0 | 54,237.0 | 0.8 | 2.2 |
| Other broadleaves | 40,210,228 | 2.1 | 2,223,537.0 | 0.9 | 73,722.0 | 1.0 | 3.3 |
| Aspen | 21,227,685 | 1.1 | 2,077,172.0 | 0.8 | 83,575.0 | 1.2 | 4.0 |
| Oriental hornbeam | 85,990,355 | 4.4 | 1,657,977.0 | 0.7 | 53,405.0 | 0.7 | 3.2 |
| Hop hornbeam | 21,143,515 | 1.1 | 1,381,723.0 | 0.5 | 32,305.0 | 0.5 | 2.3 |
| Maple | 10,185,388 | 0.5 | 1,151,584.0 | 0.5 | 33,639.0 | 0.5 | 2.9 |
| Willow | 4,647,233 | 0.2 | 1,026,579.0 | 0.4 | 26,002.0 | 0.4 | 2.5 |
| Cherry | 11,439,564 | 0.6 | 964,133.0 | 0.4 | 25,532.0 | 0.4 | 2.6 |
| Silver lime | 5,220,896 | 0.3 | 899,346.0 | 0.4 | 19,833.0 | 0.3 | 2.2 |
| Smooth-leaved elm | 17,727,757 | 0.9 | 859,796.0 | 0.3 | 36,697.0 | 0.5 | 4.3 |
| Pubescent oak | 11,233,396 | 0.6 | 849,374.0 | 0.3 | 26,016.0 | 0.4 | 3.1 |
| Small-leaved lime | 7,213,514 | 0.4 | 720,401.0 | 0.3 | 16,545.0 | 0.2 | 2.3 |
| Birch | 10,603,553 | 0.5 | 719,082.0 | 0.3 | 26,143.0 | 0.4 | 3.6 |
| White ash | 5,521,157 | 0.3 | 579,117.0 | 0.2 | 17,485.0 | 0.2 | 3.0 |
| Alder | 4,441,019 | 0.2 | 477,456.0 | 0.2 | 14,874.0 | 0.2 | 3.1 |

**Table 5.3.** Well-preserved forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| White poplar | 1,668,085 | 0.1 | 278,492.0 | 0.1 | 14,783.0 | 0.2 | 5.3 |
| Black poplar | 957,885 | 0.0 | 244,815.0 | 0.1 | 20,000.0 | 0.3 | 8.2 |
| Norway maple | 1,417,488 | 0.1 | 234,114.0 | 0.1 | 6,603.0 | 0.1 | 2.8 |
| Turkish hazel | 2,468,007 | 0.1 | 190,070.0 | 0.1 | 6,269.0 | 0.1 | 3.3 |
| Common walnut | 1,998,880 | 0.1 | 153,060.0 | 0.1 | 6,611.0 | 0.1 | 4.3 |
| White ash | 5,846,999 | 0.3 | 137,949.0 | 0.1 | 3,939.0 | 0.1 | 2.9 |
| Wild service tree | 1,952,301 | 0.1 | 104,411.0 | 0.0 | 2,410.0 | 0.0 | 2.3 |
| Ash-leaved maple | 1,064,845 | 0.1 | 89,008.0 | 0.0 | 2,593.0 | 0.0 | 2.9 |
| Wych elm | 649,629 | 0.0 | 86,855.0 | 0.0 | 2,282.0 | 0.0 | 2.6 |
| Balkan maple | 779,746 | 0.0 | 77,307.0 | 0.0 | 2,864.0 | 0.0 | 3.7 |
| Europ. hackberry | 940,783 | 0.0 | 55,588.0 | 0.0 | 1,694.0 | 0.0 | 3.0 |
| Europ. white elm | 590,858 | 0.0 | 21,679.0 | 0.0 | 1,182.0 | 0.0 | 5.5 |
| Black walnut | 50,930 | 0.0 | 7,097.0 | 0.0 | 252.0 | 0.0 | 3.6 |
| Mountain ash | 5,659 | 0.0 | 3,377.0 | 0.0 | 36.0 | 0.0 | 1.1 |
| **Total broadleaves** | **1,770,874,474** | **91.2** | **218,365,726.0** | **86.4** | **5,650,565.0** | **79.3** | **2.6** |
| Spruce | 50,180,554 | 2.6 | 12,572,004.0 | 5.0 | 451,617.0 | 6.3 | 3.6 |
| Austrian pine | 80,508,931 | 4.1 | 11,250,481.0 | 4.5 | 662,547.0 | 9.3 | 5.9 |
| Fir | 11,221,855 | 0.6 | 6,073,934.0 | 2.4 | 152,222.0 | 2.1 | 2.5 |
| Scots pine | 24,610,283 | 1.3 | 3,527,332.0 | 1.4 | 166.,062.0 | 2.3 | 4.7 |
| Douglas-fir | 1,522,229 | 0.1 | 455,781.0 | 0.2 | 15,099.0 | 0.2 | 3.3 |
| Weymouth pine | 1,992,271 | 0.1 | 263,053.0 | 0.1 | 16,352.0 | 0.2 | 6.2 |
| Yew | 12,732 | 0.0 | 2,395.0 | 0.0 | 83.0 | 0.0 | 3.5 |
| Larch | 995,956 | 0.1 | 107,760.0 | 0.0 | 5,167.0 | 0.1 | 4.8 |
| Other conifers | 309,482 | 0.0 | 30,516.0 | 0.0 | 1,620.0 | 0.0 | 5.3 |
| **Total conifers** | **171,354,293** | **8.8** | **34,283,256.0** | **13.6** | **1,470,769.0** | **20.7** | **4.3** |
| **TOTAL** | **1,942,228,767** | **100.0** | **252,648,982.0** | **100.0** | **7,121,334.0** | **100.0** | **2.8** |

**Table 5.4.** Well-preserved forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| 1 | Beech forests | 395,200.0 | 24.9 | 414,501,501 | 21.3 | 1,049 | 88,311,688.0 | 35.0 | 223.5 | 1,929,090.0 | 27.1 | 4.9 | 2.2 |
| 2 | Turkey oak forests | 256,800.0 | 16.1 | 318,124,035 | 16.4 | 1,239 | 42,485,263.0 | 16.8 | 165.4 | 1,032,639.0 | 14.4 | 4.0 | 2.4 |
| 3 | Hungarian oak forests | 134,000.0 | 8.4 | 170,796,883 | 8.8 | 1,275 | 18,730,950.0 | 7.4 | 139.8 | 491,737.0 | 6.9 | 3.7 | 2.6 |
| 4 | Sessile oak forests | 127,600.0 | 8.0 | 151,911,129 | 7.8 | 1,191 | 16,878,212.0 | 6.7 | 132.3 | 460,288.0 | 6.5 | 3.6 | 2.7 |
| 5 | Pine forests | 101,600.0 | 6.4 | 116,364,606 | 6.0 | 1,145 | 14,851,757.0 | 5.9 | 146.2 | 827,375.0 | 11.6 | 8.1 | 5.6 |
| 6 | Spruce forests | 57,200.0 | 3.6 | 58,918,748 | 3.0 | 1,030 | 12,749,431.0 | 5.0 | 222.9 | 455,063.0 | 6.4 | 8.0 | 3.6 |
| 7 | Forests of birch, aspen and black locust | 181,200.0 | 11.4 | 233,719,397 | 12.0 | 1,290 | 11,768,793.0 | 4.7 | 64.9 | 560,545.0 | 7.9 | 3.1 | 4.8 |
| 8 | Hornbeam forests | 101,600.0 | 6.4 | 170,224,344 | 8.8 | 1,675 | 11,680,133.0 | 4.6 | 115.0 | 275,204.0 | 3.9 | 2.7 | 2.4 |
| 9 | Fir forests | 16,800.0 | 1.1 | 15,262,879 | 0.8 | 909 | 7,402,176.0 | 2.9 | 440.6 | 176,290.0 | 2.5 | 10.5 | 2.4 |
| 10 | Forests of oriental hornbeam, hop hornbeam and flowering ash | 63,600.0 | 4.0 | 123,441,391 | 6.4 | 1,941 | 4,488,316.0 | 1.8 | 70.6 | 126,016.0 | 1.8 | 2.0 | 2.8 |
| 11 | Forest of narrow-leaved ash | 18,400.0 | 1.2 | 21,377,330 | 1.1 | 1,162 | 4,396.098.0 | 1.7 | 238.9 | 130,048.0 | 1.8 | 7.1 | 3.0 |
| 12 | Common oak forests | 13,600.0 | 0.9 | 11,841,349 | 0.6 | 871 | 4,023,475.0 | 1.6 | 295.8 | 85,360.0 | 1.2 | 6.3 | 2.1 |
| 13 | Lime forests | 21,200.0 | 1.3 | 27,871,421 | 1.4 | 1,315 | 3,965,408.0 | 1.6 | 187.0 | 89,715.0 | 1.3 | 4.2 | 2.3 |
| 14 | Poplar forests | 29,200.0 | 1.8 | 12,805,152 | 0.7 | 439 | 3,859,466.0 | 1.5 | 132.2 | 252,433.0 | 3.5 | 8.6 | 6.5 |
| 15 | Forests of other broadleaves | 34,800.0 | 2.2 | 52,202,885 | 2.7 | 1,500 | 2,585,215.0 | 1.0 | 74.3 | 84,589.0 | 1.2 | 2.4 | 3.3 |
| 16 | Forests of ash and maple | 9,600.0 | 0.6 | 13,939,484 | 0.7 | 1,452 | 1,201,427.0 | 0.5 | 125.1 | 36,414.0 | 0.5 | 3.8 | 3.0 |
| 17 | Willow forests | 10,000.0 | 0.6 | 7,151,800 | 0.4 | 715 | 1,109,472.0 | 0.4 | 110.9 | 30,687.0 | 0.4 | 3.1 | 2.8 |
| 18 | Forests of other conifers | 4,400.0 | 0.3 | 5,762,419 | 0.3 | 1,310 | 889,553.0 | 0.4 | 202.2 | 38,624.0 | 0.5 | 8.8 | 4.3 |
| 19 | Pubescent oak forests | 8,000.0 | 0.5 | 11,824,542 | 0.6 | 1,478 | 818,118.0 | 0.3 | 102.3 | 25,553.0 | 0.4 | 3.2 | 3.1 |
| 20 | Alder forests | 4,400.0 | 0.3 | 4,187,473 | 0.2 | 952 | 454,031.0 | 0.2 | 103.2 | 13,664.0 | 0.2 | 3.1 | 3.0 |
| **TOTAL** | | **1,589,200.0** | **100.0** | **1,942,228,767** | **100.0** | **1,222** | **252,648,982.0** | **100.0** | **159.0** | **7,121,334.0** | **100.0** | **4.5** | **2.8** |

**Table 5.5.** Well-preserved forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 83,406,890 | 3,898,490 | 37,814,877 | 27,141,760 | 10,300,688 | 2,647,384 | 1,603,691 |
| Turkey oak | 40,006,628 | 3,732,887 | 26,139,678 | 8,392,938 | 1,502,847 | 97,786 | 140,492 |
| Hungarian oak | 18,615,577 | 2,610,591 | 13,411,936 | 2,254,114 | 287,081 | 51,855 | |
| Sessile oak | 16,990,202 | 1,263,083 | 9,575,813 | 4,333,262 | 1,476,472 | 182,446 | 159,126 |
| Hornbeam | 12,727,445 | 3,334,823 | 7,493,888 | 1,356,474 | 457,567 | 84,693 | |
| Black locust | 10,002,377 | 2,832,941 | 6,182,536 | 921,097 | 65,803 | | |
| Narrow-leaved ash | 3,958,099 | 259,942 | 2,200,350 | 1,263,071 | 203,454 | 31,282 | |
| Common oak | 3,882,991 | 176,910 | 899,329 | 1,973,782 | 714,589 | 118,381 | |
| Flowering ash | 3,250,673 | 1,472,602 | 1,606,484 | 145,494 | 26,093 | | |
| Euramer. poplar | 3,225,095 | 22,069 | 809,757 | 1,934,458 | 377,241 | 81,570 | |
| Field maple | 2,558,161 | 648,177 | 1,611,924 | 252,827 | 45,233 | | |
| Large-leaved lime | 2,470,485 | 207,902 | 1,165,982 | 819,724 | 276,877 | | |
| Other broadleaves | 2,223,536 | 586,833 | 1,298,589 | 272,134 | 41,830 | 24,150 | |
| Aspen | 2,077,173 | 216,934 | 1,380,744 | 453,583 | 25,912 | | |
| Oriental hornbeam | 1,657,978 | 1,171,067 | 452,607 | 14,618 | 19,686 | | |
| Hop hornbeam | 1,381,723 | 276,067 | 1,005,540 | 82,007 | 18,109 | | |
| Maple | 1,151,584 | 166,313 | 545,259 | 345,076 | 94,936 | | |
| Willow | 1,026,579 | 36,207 | 577,501 | 287,584 | 86,653 | 38,634 | |
| Cherry | 964,132 | 148,220 | 563,185 | 216,429 | 36,298 | | |
| Silver lime | 899,346 | 64,964 | 428,649 | 326,757 | 78,976 | | |
| Smooth-leaved elm | 859,796 | 394,761 | 352,661 | 95,800 | 16,574 | | |
| Pubescent oak | 849,373 | 147,045 | 464,940 | 158,381 | 29,468 | | 49,539 |
| Small-leaved lime | 720,401 | 131,823 | 260,118 | 281,428 | 47,032 | | |
| Birch | 719,082 | 124,396 | 469,278 | 110,161 | 15,247 | | |
| White ash | 579,117 | 76,479 | 303,468 | 141,242 | 57,928 | | |
| Alder | 477,456 | 50,313 | 319,075 | 108,068 | | | |
| White poplar | 278,492 | 16,651 | 128,373 | 90,721 | 42,747 | | |
| Black poplar | 244,815 | 6,989 | 69,813 | 41,251 | 126,762 | | |
| Norway maple | 234,115 | 12,817 | 158,672 | 55,705 | 6,921 | | |
| Turkish hazel | 190,070 | 39,598 | 103,069 | 47,403 | | | |
| Common walnut | 153,059 | 45,723 | 82,585 | 24,751 | | | |
| White ash | 137,948 | 88,306 | 43,114 | 6,528 | | | |
| Wild service tree | 104,410 | 25,139 | 57,154 | 22,117 | | | |
| Ash-leaved maple | 89,008 | 39,414 | 49,594 | | | | |
| Wych elm | 86,855 | 7,710 | 56,643 | 22,502 | | | |
| Balkan maple | 77,307 | 17,458 | 51,827 | 8,022 | | | |
| Europ. hackberry | 55,587 | 17,443 | 19,349 | 18,795 | | | |
| Europ. white elm | 21,680 | 14,875 | 6,805 | | | | |
| Black walnut | 7,097 | | 7,097 | | | | |
| Mountain ash | 3,377 | | | 3,377 | | | |
| **Total broadleaves** | **218,365,726** | **24,383,962** | **118,168,263** | **54,023,441** | **16,479,024** | **3,358,181** | **1,952,848** |
| Spruce | 12,572,004 | 1,643,007 | 5,617,860 | 4,321,138 | 989,999 | | |
| Austrian pine | 11,250,481 | 960,453 | 7,396,523 | 2,621,941 | 241,895 | 29,669 | |
| Fir | 6,073,934 | 134,375 | 2,286,892 | 2,491,009 | 1,117,109 | 44,549 | |
| Scots pine | 3,527,333 | 269,809 | 2,402,405 | 825,820 | 29,299 | | |
| Douglas-fir | 455,781 | 13,085 | 328,620 | 114,076 | | | |
| Weymouth pine | 263,053 | 13,864 | 249,189 | | | | |
| Yew | 2,395 | | 2,395 | | | | |
| Larch | 107,760 | 24,616 | 74,511 | 8,633 | | | |
| Other conifers | 30,515 | 2,829 | 27,686 | | | | |
| **Total conifers** | **34,283,256** | **3,062,038** | **18,386,081** | **10,382,617** | **2,378,302** | **74,218** | |
| **TOTAL** | **252,648,982** | **27,446,000** | **136,554,344** | **64,406,058** | **18,857,326** | **3,432,399** | **1,952,848** |

**Table 5.6.** Insufficiently stocked forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 267,600.0 | 44.0 | 69,368,475 | 41.2 | 259 | 69,690,967.0 | 66.1 | 260.4 | 1,185,466.0 | 63.0 | 4.4 | 1.7 |
| Natural coppice stands | 310,800.0 | 51.1 | 91,059,348 | 54.1 | 293 | 31,911,761.0 | 30.3 | 102.7 | 550,269.0 | 29.3 | 1.8 | 1.7 |
| Artificially established stands | 29,600.0 | 4.9 | 7,901,299 | 4.7 | 267 | 3,841,467.0 | 3.6 | 129.8 | 144,178.0 | 7.7 | 4.9 | 3.8 |
| **TOTAL** | **608,000.0** | **100.0** | **168,329,122** | **100.0** | **277** | **105,444,195.0** | **100.0** | **173.4** | **1,879,913.0** | **100.0** | **3.1** | **1.8** |

**Table 5.7.** Insufficiently stocked forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 413,200.0 | 68.0 | 113,436,365 | 67.5 | 275 | 77,618,635.0 | 73.6 | 187.8 | 1,317,910.0 | 70.1 | 3.2 | 1.7 |
| Mixed broadleaf stands | 130,800.0 | 21.4 | 37,050,994 | 22.0 | 283 | 16,283,720.0 | 15.4 | 124.5 | 277,546.0 | 14.8 | 2.1 | 1.7 |
| Pure coniferous stands | 45,600.0 | 7.5 | 12,694,978 | 7.5 | 278 | 7,669,385.0 | 7.3 | 168.2 | 204,853.0 | 10.9 | 4.5 | 2.7 |
| Mixed broadleaf and coniferous stands | 15,600.0 | 2.6 | 4,399,393 | 2.6 | 282 | 3,391,180.0 | 3.2 | 217.4 | 67,453.0 | 3.6 | 4.3 | 2.0 |
| Mixed stands of conifers | 2,800.0 | 0.5 | 747,392 | 0.4 | 267 | 481,275.0 | 0.5 | 171.9 | 12,151.0 | 0.6 | 4.3 | 2.5 |
| **TOTAL** | **608,000.0** | **100.0** | **168,329,122** | **100.0** | **277** | **105,444,195.0** | **100.0** | **173.4** | **1,879,913.0** | **100.0** | **3.1** | **1.8** |

**Table 5.8.** Insufficiently stocked forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 59,617,219 | 35.4 | 60,668,705.0 | 57.5 | 929,890.0 | 49.5 | 1.5 |
| Turkey oak | 19,593,761 | 11.6 | 6,812,773.0 | 6.5 | 116,327.0 | 6.2 | 1.7 |
| Common oak | 2,608,719 | 1.5 | 5,250,517.0 | 5.0 | 77,340.0 | 4.1 | 1.5 |
| Sessile oak | 10,589,822 | 6.3 | 4,428,890.0 | 4.2 | 78,866.0 | 4.2 | 1.8 |
| Euramerican poplar | 1,249,482 | 0.7 | 2,505,728.0 | 2.4 | 96,367.0 | 5.1 | 3.8 |
| Hornbeam | 10,334,864 | 6.1 | 2,348,740.0 | 2.2 | 32,550.0 | 1.7 | 1.4 |
| Hungarian oak | 7,021,976 | 4.2 | 2,314,307.0 | 2.2 | 39,935.0 | 2.1 | 1.7 |
| Narrow-leaved ash | 1,892,063 | 1.1 | 1,798,862.0 | 1.7 | 36,361.0 | 1.9 | 2.0 |
| Black locust | 8,780,224 | 5.2 | 1,217,896.0 | 1.2 | 41,448.0 | 2.2 | 3.4 |
| Large-leaved lime | 1,514,255 | 0.9 | 1,055,605.0 | 1.0 | 16,279.0 | 0.9 | 1.5 |
| Silver lime | 737,324 | 0.4 | 879,750.0 | 0.8 | 12,329.0 | 0.7 | 1.4 |
| Willow | 1,789,949 | 1.1 | 794,936.0 | 0.8 | 14,967.0 | 0.8 | 1.9 |
| Black poplar | 403,468 | 0.2 | 686,881.0 | 0.7 | 18,308.0 | 1.0 | 2.7 |
| Other broadleaves | 5,004,379 | 3.0 | 630,434.0 | 0.6 | 14,525.0 | 0.8 | 2.3 |
| Field maple | 3,926,706 | 2.3 | 611,228.0 | 0.6 | 10,425.0 | 0.6 | 1.7 |
| Cherry | 1,220,762 | 0.7 | 328,136.0 | 0.3 | 6,854.0 | 0.4 | 2.1 |
| Alder | 638,768 | 0.4 | 286,222.0 | 0.3 | 7,846.0 | 0.4 | 2.7 |
| Aspen | 1,287,866 | 0.8 | 276,067.0 | 0.3 | 9,000.0 | 0.5 | 3.3 |
| Flowering ash | 4,303,881 | 2.6 | 254,078.0 | 0.2 | 5,550.0 | 0.3 | 2.2 |
| White poplar | 184,072 | 0.1 | 248,443.0 | 0.2 | 6,811.0 | 0.4 | 2.7 |
| Smooth-leaved elm | 937,392 | 0.6 | 238,147.0 | 0.2 | 6,404.0 | 0.3 | 2.7 |
| Maple | 671,828 | 0.4 | 233,959.0 | 0.2 | 4,738.0 | 0.3 | 2.0 |
| Small-leaved lime | 286,555 | 0.2 | 221,284.0 | 0.2 | 3,537.0 | 0.2 | 1.6 |
| White ash | 448,648 | 0.3 | 185,017.0 | 0.2 | 3,848.0 | 0.2 | 2.1 |
| Norway maple | 270,704 | 0.2 | 167,788.0 | 0.2 | 3,130.0 | 0.2 | 1.9 |
| Common walnut | 547,828 | 0.3 | 161,380.0 | 0.2 | 3,421.0 | 0.2 | 2.1 |

**Table 5.8.** Insufficiently stocked forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Birch | 1,026,215 | 0.6 | 155,337.0 | 0.1 | 7,068.0 | 0.4 | 4.6 |
| Black walnut | 285,772 | 0.2 | 147,753.0 | 0.1 | 3,917.0 | 0.2 | 2.7 |
| Pubescent oak | 842,386 | 0.5 | 104,423.0 | 0.1 | 2,484.0 | 0.1 | 2.4 |
| Wych elm | 236,257 | 0.1 | 99,539.0 | 0.1 | 1,870.0 | 0.1 | 1.9 |
| Hop hornbeam | 808,125 | 0.5 | 98,971.0 | 0.1 | 1,661.0 | 0.1 | 1.7 |
| Oriental hornbeam | 2,453,918 | 1.5 | 59,551.0 | 0.1 | 1,668.0 | 0.1 | 2.8 |
| White ash | 635,205 | 0.4 | 19,628.0 | 0.0 | 515.0 | 0.0 | 2.6 |
| Balkan maple | 36,782 | 0.0 | 18,011.0 | 0.0 | 315.0 | 0.0 | 1.7 |
| Turkish hazel | 55,174 | 0.0 | 17,320.0 | 0.0 | 252.0 | 0.0 | 1.5 |
| European white elm | 192,401 | 0.1 | 10,618.0 | 0.0 | 366.0 | 0.0 | 3.4 |
| Wild service tree | 31,124 | 0.0 | 5,854.0 | 0.0 | 70.0 | 0.0 | 1.2 |
| Ash-leaved maple | 25,465 | 0.0 | 3,268.0 | 0.0 | 100.0 | 0.0 | 3.1 |
| **Total broadleaves** | **152,491,337** | **90.6** | **95,346,045.0** | **90.4** | **1,617,340.0** | **86.0** | **1.7** |
| Spruce | 7,191,682 | 4.3 | 6,099,180.0 | 5.8 | 149,999.0 | 8.0 | 2.5 |
| Austrian pine | 4,360,414 | 2.6 | 1,375,771.0 | 1.3 | 51,000.0 | 2.7 | 3.7 |
| Fir | 2,575,361 | 1.5 | 2,230,990.0 | 2.1 | 47,629.0 | 2.5 | 2.1 |
| Scots pine | 1,503,780 | 0.9 | 244,475.0 | 0.2 | 10,547.0 | 0.6 | 4.3 |
| Weymouth pine | 87,712 | 0.1 | 92,363.0 | 0.1 | 2,356.0 | 0.1 | 2.6 |
| Douglas-fir | 118,836 | 0.1 | 55,371.0 | 0.1 | 1,042.0 | 0.1 | 1.9 |
| **Total conifers** | **15,837,785** | **9.4** | **10.098,150.0** | **9.6** | **262,573.0** | **14.0** | **2.6** |
| **TOTAL** | **168,329,122** | **100.0** | **105,444,195.0** | **100.0** | **1,879,913.0** | **100.0** | **1.8** |

**Table 5.9.** Insufficiently stocked forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| 1 | Beech forests | 246,800.0 | 40.6 | 64,927,790 | 38.6 | 263 | 62,699,841.0 | 59.5 | 254.1 | 965,313.0 | 51.3 | 3.9 | 1.5 |
| 2 | Turkey oak forests | 82,000.0 | 13.5 | 24,226,324 | 14.4 | 295 | 6,899,372.0 | 6.4 | 84.1 | 125,847.0 | 6.7 | 1.5 | 1.8 |
| 3 | Spruce forests | 27,200.0 | 4.5 | 7,469,323 | 4.4 | 275 | 6,040.016.0 | 5.7 | 222.1 | 148,462.0 | 7.9 | 5.5 | 2.5 |
| 4 | Common oak forests | 18,000.0 | 3.0 | 4,458,528 | 2.6 | 248 | 5,972,622.0 | 5.7 | 331.8 | 90,640.0 | 4.9 | 5.0 | 1.5 |
| 5 | Sessile oak forests | 40,400.0 | 6.6 | 11,173,289 | 6.6 | 277 | 4,597,655.0 | 4.4 | 113.8 | 79,328.0 | 4.2 | 2.0 | 1.7 |
| 6 | Poplar forests | 13,600.0 | 2.2 | 3,489,162 | 2.1 | 257 | 3,399,564.0 | 3.2 | 250.0 | 121,511.0 | 6.5 | 8.9 | 3.6 |
| 7 | Fir forests | 8,800.0 | 1.4 | 2,726,534 | 1.6 | 310 | 2,436,686.0 | 2.3 | 276.9 | 49,225.0 | 2.6 | 5.6 | 2.0 |
| 8 | Hungarian oak forests | 23,600.0 | 3.9 | 7,144,169 | 4.2 | 303 | 2,307,651.0 | 2.2 | 97.8 | 40,511.0 | 2.2 | 1.7 | 1.8 |
| 9 | Lime forests | 8,800.0 | 1.4 | 2,646,383 | 1.6 | 301 | 2,163,436.0 | 2.1 | 245.8 | 30,883.0 | 1.6 | 3.5 | 1.4 |
| 10 | Forests of birch, aspen and black locust | 38,000.0 | 6.3 | 10,757,880 | 6.4 | 283 | 1,616,237.0 | 1.5 | 42.5 | 56,000.0 | 3.0 | 1.5 | 3.5 |
| 11 | Pine forests | 22,400.0 | 3.7 | 6,149,143 | 3.7 | 275 | 1,562,647.0 | 1.5 | 69.8 | 58,694.0 | 3.1 | 2.6 | 3.8 |
| 12 | Forest of narrow-leaved ash | 6,400.0 | 1.1 | 2,113,578 | 1.3 | 330 | 1,561,169.0 | 1.5 | 243.9 | 31,847.0 | 1.7 | 5.0 | 2.0 |
| 13 | Hornbeam forests | 16,400.0 | 2.7 | 5,158,407 | 3.1 | 315 | 1,520,190.0 | 1.4 | 92.7 | 21,941.0 | 1.2 | 1.3 | 1.4 |
| 14 | Willow forests | 9,600.0 | 1.6 | 2,313,717 | 1.4 | 241 | 957,184.0 | 0.9 | 99.7 | 19,475.0 | 1.0 | 2.0 | 2.0 |
| 15 | Forests of other broadleaves | 16,000.0 | 2.6 | 4,781,379 | 2.8 | 299 | 631,636.0 | 0.6 | 39.5 | 15,928.0 | 0.8 | 1.0 | 2.5 |
| 16 | Forests of oriental hornbeam, hop hornbeam and flowering ash | 22,800.0 | 3.8 | 6,520,052 | 3.9 | 286 | 306,617.0 | 0.3 | 13.4 | 7,111.0 | 0.4 | 0.3 | 2.3 |
| 17 | Forests of ash and maple | 2,400.0 | 0.4 | 743,347 | 0.4 | 310 | 301,210.0 | 0.3 | 125.5 | 5,850.0 | 0.3 | 2.4 | 1.9 |
| 18 | Alder forests | 2,000.0 | 0.3 | 640,973 | 0.4 | 320 | 218,959.0 | 0.2 | 109.5 | 5,822.0 | 0.3 | 2.9 | 2.7 |
| 19 | Forests of other conifers | 800.0 | 0.1 | 212,207 | 0.1 | 265 | 164,778.0 | 0.2 | 206.0 | 3,610.0 | 0.2 | 4.5 | 2.2 |
| 20 | Pubescent oak forests | 2,000.0 | 0.3 | 676,937 | 0.4 | 338 | 86,725.0 | 0.1 | 43.4 | 1,915.0 | 0.1 | 1.0 | 2.2 |
| **TOTAL** | | **608,000.0** | **100.0** | **168,329,122** | **100.0** | **277** | **105,444,195.0** | **100.0** | **173.4** | **1,879,913.0** | **100.0** | **3.1** | **1.8** |

**Table 5.10.** Insufficiently stocked forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 60,668,706 | 25,451 | 7,699,073 | 23,832,312 | 21,339,684 | 5,705,180 | 2,067,006 |
| Turkey oak | 6,812,772 | 181,330 | 2,832,949 | 2,889,331 | 828,686 | 80,476 | |
| Common oak | 5,250,516 | | 400,660 | 2,601,411 | 1,917,955 | 198,197 | 132,293 |
| Sessile oak | 4,428,890 | 25,861 | 1,176,218 | 2,063,667 | 957,324 | 176,066 | 29,754 |
| Euramerican poplar | 2,505,728 | | 78,448 | 913,290 | 1,231,935 | 282,055 | |
| Hornbeam | 2,348,740 | 29,723 | 1,125,681 | 748,641 | 348,712 | 62,177 | 33,806 |
| Hungarian oak | 2,314,307 | 29,016 | 1,023,647 | 1,087,223 | 174,421 | | |
| Narrow-leaved ash | 1,798,863 | 2,858 | 411,994 | 788,488 | 525,696 | 69,827 | |
| Black locust | 1,217,896 | 36,910 | 892,624 | 252,996 | 35,366 | | |
| Large-leaved lime | 1,055,604 | 4,951 | 220,232 | 499,562 | 260,653 | 24,596 | 45,610 |
| Silver lime | 879,749 | | 34,069 | 631,844 | 213,836 | | |
| Willow | 794,936 | 4,725 | 211,761 | 280,663 | 179,068 | 65,425 | 53,294 |
| Black poplar | 686,881 | | 15,339 | 311,985 | 274,376 | 23,454 | 61,727 |
| Other broadleaves | 630,434 | 29,454 | 400,380 | 161,244 | 39,356 | | |
| Field maple | 611,228 | 17,627 | 388,718 | 192,264 | 12,619 | | |
| Cherry | 328,135 | 3,112 | 144,467 | 139,915 | 40,641 | | |
| Alder | 286,221 | | 93,810 | 136,925 | 55,486 | | |
| Aspen | 276,067 | 10,667 | 137,647 | 102,727 | 25,026 | | |
| Flowering ash | 254,078 | 33,500 | 199,944 | 20,634 | | | |
| White poplar | 248,442 | | 30,902 | 59,469 | 158,071 | | |
| Smooth-leaved elm | 238,147 | | 158,650 | 79,497 | | | |
| Maple | 233,959 | | 83,848 | 107,317 | 42,794 | | |
| Small-leaved lime | 221,284 | | 22,800 | 113,922 | 84,562 | | |
| White ash | 185,017 | | 53,115 | 64,378 | 67,524 | | |
| Norway maple | 167,788 | | 50,318 | 78,808 | 38,662 | | |
| Common walnut | 161,380 | | 75,619 | 53,729 | 32,032 | | |
| Birch | 155,337 | 5,701 | 98,841 | 50,795 | | | |
| Black walnut | 147,753 | | 79,538 | 68,215 | | | |
| Pubescent oak | 104,423 | 10,044 | 41,290 | 53,089 | | | |
| Wych elm | 99,540 | | 38,791 | 60,749 | | | |
| Hop hornbeam | 98,971 | | 81,094 | 17,877 | | | |
| Oriental hornbeam | 59,551 | 26,653 | 32,898 | | | | |
| White ash | 19,628 | 9,592 | 5,927 | 4,109 | | | |
| Balkan maple | 18,011 | | 2,783 | 5,014 | 10,214 | | |
| Turkish hazel | 17,321 | | 2,963 | 6,874 | 7,484 | | |
| European white elm | 10,618 | 3,947 | 6,671 | | | | |
| Wild service tree | 5,853 | | 2,405 | 3,448 | | | |
| Ash-leaved maple | 3,268 | | 3,268 | | | | |
| **Total broadleaves** | **95,346,045** | **491,122** | **18,359,382** | **38,482,412** | **28,902,183** | **6,687,453** | **2,423,490** |
| Spruce | 6,099,180 | 51,637 | 1,041,342 | 2,829,573 | 1,873,911 | 183,776 | 118,941 |
| Austrian pine | 1,375,771 | 31,690 | 464,014 | 772,930 | 107,137 | | |
| Fir | 2,230,990 | | 549,129 | 1,019,603 | 662,258 | | |
| Scots pine | 244,475 | 9,903 | 138,054 | 96,518 | | | |
| Weymouth pine | 92,363 | | 18,375 | 73,988 | | | |
| Douglas-fir | 55,370 | | 39,395 | 15,975 | | | |
| **Total conifers** | **10,098,150** | **93,230** | **2,250,309** | **4,808,587** | **2,643,306** | **183,776** | **118,941** |
| **TOTAL** | **105,444,195** | **584,352** | **20,609,691** | **43,290,999** | **31,545,489** | **6,871,229** | **2,542,431** |

**Table 5.11.** Devastated forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 16,400.0 | 29.7 | 1,218,306 | 29.9 | 74 | 2,493,677.0 | 56.7 | 152.1 | 33,804.0 | 43.0 | 2.1 | 1.4 |
| Natural coppice stands | 34,400.0 | 62.3 | 2,578,392 | 63.2 | 75 | 1,462,550.0 | 33.3 | 42.5 | 25,648.0 | 32.7 | 0.7 | 1.8 |
| Artificially established stands | 4,400.0 | 8.0 | 281,266 | 6.9 | 64 | 438,015.0 | 10.0 | 99.5 | 19,073.0 | 24.3 | 4.3 | 4.4 |
| **Total** | **55,200.0** | **100.0** | **4,077,964** | **100.0** | **74** | **4,394,242.0** | **100.0** | **79.6** | **78,525.0** | **100.0** | **1.4** | **1.8** |

**Table 5.12.** Devastated forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 43,200.0 | 78.3 | 3,329,709 | 81.6 | 77 | 4,000,354.0 | 91.0 | 92.6 | 70,263.0 | 89.5 | 1.6 | 1.8 |
| Mixed broadleaf stands | 8,400.0 | 15.2 | 442,804 | 10.9 | 53 | 220,902.0 | 5.0 | 26.3 | 3,153.0 | 4.0 | 0.4 | 1.4 |
| Pure coniferous stands | 3,600.0 | 6.5 | 305,451 | 7.5 | 85 | 172,986.0 | 3.9 | 48.1 | 5,109.0 | 6.5 | 1.4 | 3.0 |
| **Total** | **55,200.0** | **100.0** | **4,077,964** | **100.0** | **74** | **4,394,242.0** | **100.0** | **79.6** | **78,525.0** | **100.0** | **1.4** | **1.8** |

**Table 5.13.** Devastated forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 1,228,581 | 30.1 | 2,775,232.0 | 63.2 | 33,823.0 | 43.1 | 1.2 |
| Euramerican poplar | 133,656 | 3.3 | 407,040.0 | 9.3 | 17,564.0 | 22.4 | 4.3 |
| Turkey oak | 502,035 | 12.3 | 161,045.0 | 3.7 | 2,670.0 | 3.4 | 1.7 |
| Sessile oak | 316,895 | 7.8 | 123,798.0 | 2.8 | 2,283.0 | 2.9 | 1.8 |
| Common oak | 50,707 | 1.2 | 108,866.0 | 2.5 | 1,618.0 | 2.1 | 1.5 |
| Willow | 225,419 | 5.5 | 90,571.0 | 2.1 | 1,850.0 | 2.4 | 2.0 |
| Other broadleaves | 361,541 | 8.9 | 88,029.0 | 2.0 | 1,942.0 | 2.5 | 2.2 |
| Black poplar | 96,200 | 2.4 | 85,668.0 | 1.9 | 3,928.0 | 5.0 | 4.6 |
| Hornbeam | 116,006 | 2.8 | 81,054.0 | 1.8 | 796.0 | 1.0 | 1.0 |
| White poplar | 135,812 | 3.3 | 80,216.0 | 1.8 | 3,122.0 | 4.0 | 3.9 |
| Hungarian oak | 182,061 | 4.5 | 56,580.0 | 1.3 | 927.0 | 1.2 | 1.6 |
| Maple | 5,659 | 0.1 | 47,812.0 | 1.1 | 360.0 | 0.5 | 0.8 |
| Narrow-leaved ash | 46,140 | 1.1 | 35,350.0 | 0.8 | 860.0 | 1.1 | 2.4 |
| Black locust | 175,980 | 4.3 | 23,670.0 | 0.5 | 857.0 | 1.1 | 3.6 |
| Norway maple | 5,659 | 0.1 | 16,058.0 | 0.4 | 177.0 | 0.2 | 1.1 |
| Field maple | 18,391 | 0.5 | 11,914.0 | 0.3 | 91.0 | 0.1 | 0.8 |
| Large-leaved lime | 11,318 | 0.3 | 9,771.0 | 0.2 | 136.0 | 0.2 | 1.4 |
| Aspen | 5,659 | 0.1 | 5,065.0 | 0.1 | 71.0 | 0.1 | 1.4 |
| Small-leaved lime | 25,465 | 0.6 | 3,189.0 | 0.1 | 74.0 | 0.1 | 2.3 |
| White ash | 12,732 | 0.3 | 3,140.0 | 0.1 | 65.0 | 0.1 | 2.1 |
| Pubescent oak | 52,935 | 1.3 | 2,370.0 | 0.1 | 65.0 | 0.1 | 2.7 |
| Flowering ash | 25,465 | 0.6 | 1,006.0 | 0.0 | 22.0 | 0.0 | 2.2 |
| Wych elm | 12,732 | 0.3 | 685.0 | 0.0 | 22.0 | 0.0 | 3.2 |
| Birch | 12,732 | 0.3 | 354.0 | 0.0 | 3.0 | 0.0 | 0.8 |
| **Total broadleaves** | **3,759,781** | **92.2** | **4,218,482.0** | **96.0** | **73,323.0** | **93.4** | **1.7** |
| Spruce | 159,862 | 3.9 | 139,363.0 | 3.2 | 3,630.0 | 4.6 | 2.6 |

**Table 5.13.** Devastated forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Austrian pine | 94,659 | 2.3 | 32,775.0 | 0.7 | 1,311.0 | 1.7 | 4.0 |
| Scots pine | 63,662 | 1.6 | 3,622.0 | 0.1 | 261.0 | 0.3 | 7.2 |
| **Total conifers** | **318,183** | **7.8** | **175,760.0** | **4.0** | **5,202.0** | **6.6** | **3.0** |
| **TOTAL** | **4,077,964** | **100.0** | **4,394,242.0** | **100.0** | **78,525.0** | **100.0** | **1.8** |

**Table 5.14.** Devastated forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| 1 | Beech forests | 18,400.0 | 33.3 | 1,364,395 | 33.6 | 74 | 2,825,142.0 | 64.3 | 153.5 | 34,435.0 | 43.8 | 1.9 | 1.2 |
| 2 | Poplar forests | 5,200.0 | 9.4 | 354,350 | 8.7 | 68 | 557,447.0 | 12.7 | 107.2 | 24,325.0 | 31.0 | 4.7 | 4.4 |
| 3 | Turkey oak forests | 6,400.0 | 11.6 | 595,202 | 14.6 | 93 | 180,291.0 | 4.1 | 28.2 | 3,161.0 | 4.0 | 0.5 | 1.8 |
| 4 | Spruce forests | 2,000.0 | 3.6 | 147,130 | 3.6 | 74 | 136,589.0 | 3.1 | 68.3 | 3,536.0 | 4.5 | 1.8 | 2.6 |
| 5 | Common oak forests | 800.0 | 1.5 | 60,064 | 1.5 | 75 | 122,667.0 | 2.8 | 153.3 | 1,855.0 | 2.4 | 2.3 | 1.5 |
| 6 | Sessile oak forests | 5,200.0 | 9.4 | 311,236 | 7.6 | 60 | 120,189.0 | 2.7 | 23.1 | 2,206.0 | 2.8 | 0.4 | 1.8 |
| 7 | Willow forests | 2,800.0 | 5.1 | 249,469 | 6.1 | 89 | 108,136.0 | 2.5 | 38.6 | 2,207.0 | 2.8 | 0.8 | 2.0 |
| 8 | Forests of ash and maple | 800.0 | 1.5 | 53,759 | 1.3 | 67 | 80,639.0 | 1.8 | 100.8 | 847.0 | 1.1 | 1.1 | 1.1 |
| 9 | Forests of other broadleaves | 2,800.0 | 5.1 | 270,666 | 6.6 | 97 | 66,702.0 | 1.5 | 23.8 | 1,536.0 | 2.0 | 0.5 | 2.3 |
| 10 | Hornbeam forests | 800.0 | 1.5 | 66,491 | 1.6 | 83 | 66,254.0 | 1.5 | 82.8 | 603.0 | 0.8 | 0.8 | 0.9 |
| 11 | Hungarian oak forests | 2,000.0 | 3.6 | 181,274 | 4.4 | 91 | 48,054.0 | 1.1 | 24.0 | 812.0 | 1.0 | 0.4 | 1.7 |
| 12 | Pine forests | 2,000.0 | 3.6 | 158,321 | 3.9 | 79 | 36,397.0 | 0.8 | 18.2 | 1,572.0 | 2.0 | 0.8 | 4.3 |
| 13 | Forest of narrow-leaved ash | 400.0 | 0.7 | 36,782 | 0.9 | 92 | 21,548.0 | 0.5 | 53.9 | 623.0 | 0.8 | 1.6 | 2.9 |
| 14 | Forests of birch, aspen and black locust | 4,000.0 | 7.2 | 137,693 | 3.4 | 34 | 17,097.0 | 0.4 | 4.3 | 642.0 | 0.8 | 0.2 | 3.8 |
| 15 | Lime forests | 400.0 | 0.7 | 38,197 | 0.9 | 95 | 4,720.0 | 0.1 | 11.8 | 100.0 | 0.1 | 0.3 | 2.1 |
| 16 | Pubescent oak forests | 400.0 | 0.7 | 52,935 | 1.3 | 132 | 2,370.0 | 0.1 | 5.9 | 65.0 | 0.1 | 0.2 | 2.7 |
| 17 | Forests of oriental hornbeam, hop hornbeam and flowering ash | 800.0 | 1.5 | 0 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total** | | **55,200.0** | **100.0** | **4,077,964** | **100.0** | **74** | **4,394,242.0** | **100.0** | **79.6** | **78,525.0** | **100.0** | **1.4** | **1.8** |

**Table 5.15.** Devastated forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 2,775,232 | | 110,166 | 531,158 | 1,153,790 | 394,261 | 585,857 |
| Euramerican poplar | 407,040 | | | 79,666 | 228,238 | 99,136 | |
| Turkey oak | 161,046 | | 74,681 | 51,202 | 15,044 | 20,119 | |
| Sessile oak | 123,798 | | 41,695 | 34,610 | 47,493 | | |
| Common oak | 108,866 | | | 57,078 | 51,788 | | |
| Willow | 90,571 | | 37,444 | 27,387 | 25,740 | | |
| Other broadleaves | 88,029 | | 44,348 | 34,106 | 9,575 | | |
| Black poplar | 85,668 | | 10,326 | 31,390 | 18,859 | 25,093 | |
| Hornbeam | 81,055 | | 12,344 | 18,124 | 24,322 | | 26,265 |
| White poplar | 80,215 | | 26,259 | 26,086 | 27,870 | | |
| Hungarian oak | 56,580 | | 38,976 | 17,604 | | | |
| Maple | 47,812 | | | | | | 47,812 |
| Narrow-leaved ash | 35,350 | | 10,876 | 24,474 | | | |
| Black locust | 23,670 | | 23,670 | | | | |
| Norway maple | 16,058 | | | | 16,058 | | |
| Field maple | 11,914 | | 924 | | 10,990 | | |
| Large-leaved lime | 9,771 | | | 9,771 | | | |
| Aspen | 5,065 | | | 5,065 | | | |
| Small-leaved lime | 3,189 | | 3,189 | | | | |
| White ash | 3,140 | | 3,140 | | | | |
| Pubescent oak | 2,370 | | 2,370 | | | | |
| Flowering ash | 1,006 | | 1,006 | | | | |
| Wych elm | 685 | | 685 | | | | |
| Birch | 354 | | 354 | | | | |
| **Total broadleaves** | **4,218,482** | | **442,453** | **947,721** | **1,629,767** | **538,609** | **659,934** |
| Spruce | 139,363 | | 9,838 | 107,272 | 22,253 | | |
| Austrian pine | 32,774 | | 26,862 | 5,912 | | | |
| Scots pine | 3,622 | | 3,622 | | | | |
| **Total conifers** | **175,760** | | **40,322** | **113,184** | **22,253** | | |
| **TOTAL** | **4,394,242** | | **482,775** | **1,060,905** | **1,652,020** | **538,609** | **659,934** |

**Table 6.** Forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 1,328,000.0 | 59.0 | 1,133,592,012 | 53.6 | 854 | 227,074,348.3 | 62.7 | 171.0 | 5,157,725.0 | 56.9 | 3.9 | 2.3 |
| Mixed broadleaf stands | 660,800.0 | 29.3 | 744,743,041 | 35.2 | 1,127 | 84,527,241.0 | 23.3 | 127.9 | 2,046,077.0 | 22.5 | 3.1 | 2.4 |
| Mixed broadleaf and coniferous stands | 54,000.0 | 2.4 | 52,662,038 | 2.5 | 975 | 11,693,073.3 | 3.2 | 216.5 | 309,847.4 | 3.4 | 5.7 | 2.6 |
| Mixed stands of conifers | 14,000.0 | 0.6 | 12,502,875 | 0.6 | 893 | 4,027,565.9 | 1.1 | 287.7 | 127,739.4 | 1.4 | 9.1 | 3.2 |
| Pure coniferous stands | 195,600.0 | 8.7 | 171,135,887 | 8.1 | 875 | 35,165,189.1 | 9.7 | 179.8 | 1,438,384.0 | 15.8 | 7.4 | 4.1 |
| **TOTAL** | **2,252,400.0** | **100.0** | **2,114,635,853** | **100.0** | **939** | **362,487,417.6** | **100.0** | **160.9** | **9,079,772.8** | **100.0** | **4.0** | **2.5** |

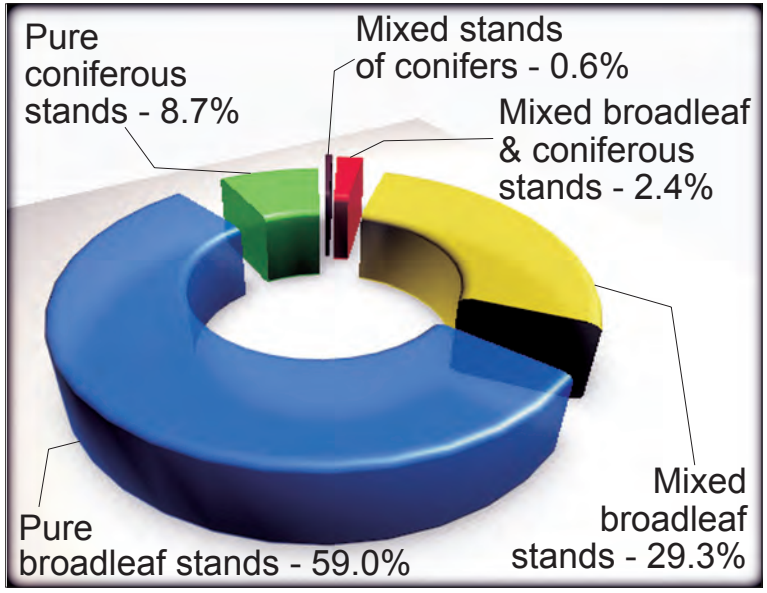



**Diagram 6.** Forests by mixture (area)

**Table 6.1.** Pure broadleaf forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 879,600.0 | 66.2 | 896,873,437 | 79.1 | 1,020 | 115,470,353.0 | 50.8 | 131.3 | 2,792,266.0 | 54.1 | 3.2 | 2.4 |
| Natural high stands | 400,400.0 | 30.2 | 215,336,951 | 19.0 | 538 | 104,150,083.0 | 45.9 | 260.1 | 1,985,313.0 | 38.5 | 5.0 | 1.9 |
| Artificially established stands | 48,000.0 | 3.6 | 21,381,624 | 1.9 | 445 | 7,453,912.0 | 3.3 | 155.3 | 380,146.0 | 7.4 | 7.9 | 5.1 |
| **TOTAL** | **1,328,000.0** | **100.0** | **1,133,592,012** | **100.0** | **854** | **227,074,348.0** | **100.0** | **171.0** | **5,157,725.0** | **100.0** | **3.9** | **2.3** |

**Table 6.2.** Pure broadleaf forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 871,600.0 | 65.6 | 1,016,825,938 | 89.7 | 1,167 | 145,455,358.8 | 64.1 | 166.9 | 3,769,551.0 | 73.0 | 4.3 | 2.6 |
| Insufficiently stocked stands | 413,200.0 | 31.1 | 113,436,365 | 10.0 | 275 | 77,618,635.3 | 34.2 | 187.8 | 1,317,910.0 | 25.6 | 3.2 | 1.7 |
| Devastated stands | 43,200.0 | 3.3 | 3,329,709 | 0.3 | 77 | 4,000,354.2 | 1.8 | 92.6 | 70,264.0 | 1.4 | 1.6 | 1.8 |
| **TOTAL** | **1,328,000.0** | **100.0** | **1,133,592,012** | **100.0** | **854** | **227,074,348.3** | **100.0** | **171.0** | **5,157,725.0** | **100.0** | **3.9** | **2.3** |

**Table 6.3.** Pure broadleaf forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 373,044,108 | 32.9 | 131,197,744.0 | 57.8 | 2,456,151.0 | 47.6 | 1.9 |
| Turkey oak | 138,626,782 | 12.2 | 27,881,313.0 | 12.3 | 622,205.0 | 12.1 | 2.2 |
| Sessile oak | 73,305,280 | 6.5 | 11,941,425.0 | 5.3 | 313,122.0 | 6.1 | 2.6 |
| Hungarian oak | 74,615,103 | 6.6 | 10,226,597.0 | 4.5 | 255,375.0 | 5.0 | 2.5 |
| Black locust | 162,614,932 | 14.3 | 8,034,914.0 | 3.5 | 380,833.0 | 7.4 | 4.7 |
| Common oak | 8,264,394 | 0.7 | 6,801,869.0 | 3.0 | 117,972.0 | 2.3 | 1.7 |
| Euramer. poplar | 6,206,485 | 0.5 | 6,008,560.0 | 2.6 | 329,454.0 | 6.4 | 5.5 |
| Hornbeam | 94,993,691 | 8.4 | 5,935,320.0 | 2.6 | 127,769.0 | 2.5 | 2.2 |
| Narrow-leaved ash | 10,287,126 | 0.9 | 3,570,701.0 | 1.6 | 100,146.0 | 1.9 | 2.8 |
| Large-leaved lime | 7,749,912 | 0.7 | 1,596,282.0 | 0.7 | 32,570.0 | 0.6 | 2.0 |
| Willow | 4,939,850 | 0.4 | 1,404,805.0 | 0.6 | 31,965.0 | 0.6 | 2.3 |
| Flowering ash | 32,163,719 | 2.8 | 1,141,935.0 | 0.5 | 31,836.0 | 0.6 | 2.8 |
| Aspen | 13,795,113 | 1.2 | 1,107,928.0 | 0.5 | 59,338.0 | 1.2 | 5.4 |
| Field maple | 12,941,440 | 1.1 | 1,059,021.0 | 0.5 | 23,605.0 | 0.5 | 2.2 |
| Other broadleaves | 17,703,704 | 1.6 | 1,035,225.0 | 0.5 | 31,580.0 | 0.6 | 3.1 |
| Silver lime | 3,515,556 | 0.3 | 801,080.0 | 0.4 | 14,235.0 | 0.3 | 1.8 |
| Black poplar | 1,242,518 | 0.1 | 747,571.0 | 0.3 | 27,580.0 | 0.5 | 3.7 |
| Hop hornbeam | 9,716,613 | 0.9 | 678,984.0 | 0.3 | 15,907.0 | 0.3 | 2.3 |
| Oriental hornbeam | 34,878,381 | 3.1 | 662,382.0 | 0.3 | 20,503.0 | 0.4 | 3.1 |
| Maple | 6,104,632 | 0.5 | 562,224.0 | 0.2 | 17,531.0 | 0.3 | 3.1 |
| Cherry | 6,158,374 | 0.5 | 519,827.0 | 0.2 | 13,934.0 | 0.3 | 2.7 |
| Birch | 5,492,615 | 0.5 | 479,904.0 | 0.2 | 19,605.0 | 0.4 | 4.1 |
| Smooth-leaved elm | 7,005,691 | 0.6 | 477,735.0 | 0.2 | 17,031.0 | 0.3 | 3.6 |
| Pubescent oak | 4,507,001 | 0.4 | 468,388.0 | 0.2 | 13,529.0 | 0.3 | 2.9 |
| Alder | 3,791,614 | 0.3 | 454,260.0 | 0.2 | 15,276.0 | 0.3 | 3.4 |
| Small-leaved lime | 5,325,560 | 0.5 | 366,651.0 | 0.2 | 9,225.0 | 0.2 | 2.5 |

**Table 6.3.** Pure broadleaf forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| White poplar | 1,305,937 | 0.1 | 276,907.0 | 0.1 | 13,906.0 | 0.3 | 5.0 |
| White ash | 2,844,240 | 0.3 | 234,225.0 | 0.1 | 7,993.0 | 0.2 | 3.4 |
| Norway maple | 629,782 | 0.1 | 189,862.0 | 0.1 | 4,251.0 | 0.1 | 2.2 |
| Black walnut | 336,701 | 0.0 | 154,850.0 | 0.1 | 4,169.0 | 0.1 | 2.7 |
| Wych elm | 421,584 | 0.0 | 105,002.0 | 0.0 | 2,088.0 | 0.0 | 2.0 |
| White ash | 3,640,050 | 0.3 | 101,733.0 | 0.0 | 2,441.0 | 0.0 | 2.4 |
| Ash-leaved maple | 936,106 | 0.1 | 82,583.0 | 0.0 | 2,269.0 | 0.0 | 2.7 |
| Common walnut | 1,012,102 | 0.1 | 72,811.0 | 0.0 | 3,345.0 | 0.1 | 4.6 |
| Balkan maple | 427,483 | 0.0 | 45,690.0 | 0.0 | 1,634.0 | 0.0 | 3.6 |
| Wild service tree | 318,310 | 0.0 | 34,846.0 | 0.0 | 621.0 | 0.0 | 1.8 |
| Turkish hazel | 602,377 | 0.1 | 23,218.0 | 0.0 | 725.0 | 0.0 | 3.1 |
| Europ. hackberry | 198,059 | 0.0 | 12,303.0 | 0.0 | 362.0 | 0.0 | 2.9 |
| Europ. white elm | 308,407 | 0.0 | 11,815.0 | 0.0 | 637.0 | 0.0 | 5.4 |
| Mountain ash | 5,659 | 0.0 | 3,377.0 | 0.0 | 36.0 | 0.0 | 1.1 |
| **Total broadleaves** | **1,131,976,991** | **99.9** | **226,511,867.0** | **99.8** | **5,142,755.0** | **99.7** | **2.3** |
| Spruce | 656,892 | 0.1 | 285,468.0 | 0.1 | 6,627.0 | 0.1 | 2.3 |
| Fir | 345,189 | 0.0 | 177,523.0 | 0.1 | 4,322.0 | 0.1 | 2.4 |
| Austrian pine | 328,546 | 0.0 | 75,571.0 | 0.0 | 2,887.0 | 0.1 | 3.8 |
| Scots pine | 79,261 | 0.0 | 10,675.0 | 0.0 | 480.0 | 0.0 | 4.5 |
| Douglas-fir | 63,662 | 0.0 | 10,415.0 | 0.0 | 312.0 | 0.0 | 3.0 |
| Other conifers | 141,471 | 0.0 | 2,829.0 | 0.0 | 342.0 | 0.0 | 12.1 |
| **Total conifers** | **1,615,021** | **0.1** | **562,481.0** | **0.2** | **14,970.0** | **0.3** | **2.7** |
| **TOTAL** | **1,133,592,012** | **100.0** | **227,074,348.0** | **100.0** | **5,157,725.0** | **100.0** | **2.3** |

**Table 6.4.** Pure broadleaf forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| 1 | Beech forests | 569,600.0 | 42.9 | 400,648,560 | 35.3 | 703 | 135,915,847.0 | 59.9 | 238.6 | 2,552,603.0 | 49.5 | 4.5 | 1.9 |
| 2 | Turkey oak forests | 185,200.0 | 13.8 | 177,558,933 | 15.7 | 959 | 29,116,193.0 | 12.9 | 157.2 | 673,344.0 | 13.0 | 3.6 | 2.3 |
| 3 | Sessile oak forests | 99,600.0 | 7.5 | 81,551,503 | 7.2 | 819 | 11,846,633.0 | 5.2 | 118.9 | 309,662.0 | 6.0 | 3.1 | 2.6 |
| 4 | Hungarian oak forests | 74,000.0 | 5.6 | 78,176,483 | 6.9 | 1,056 | 10,052,960.0 | 4.4 | 135.9 | 250,717.0 | 4.9 | 3.4 | 2.5 |
| 5 | Forests of birch, aspen and black locust | 165,600.0 | 12.5 | 180,668,207 | 15.9 | 1,091 | 9,542,719.0 | 4.2 | 57.6 | 456,471.0 | 8.9 | 2.8 | 4.8 |
| 6 | Poplar forests | 43,200.0 | 3.3 | 12,243,616 | 1.1 | 283 | 7,235,412.0 | 3.2 | 167.5 | 376.002.0 | 7.3 | 8.7 | 5.2 |
| 7 | Common oak forests | 22,400.0 | 1.7 | 11,094,048 | 1.0 | 495 | 7,117,493.0 | 3.1 | 317.7 | 126,675.0 | 2.5 | 5.7 | 1.8 |
| 8 | Hornbeam forests | 42,800.0 | 3.2 | 62,652,170 | 5.5 | 1,464 | 4,218,318.0 | 1.9 | 98.6 | 89,884.0 | 1.7 | 2.1 | 2.1 |
| 9 | Forest of narrow-leaved ash | 15,200.0 | 1.1 | 13,569,862 | 1.2 | 893 | 3,672,654.0 | 1.6 | 241.6 | 105,594.0 | 2.0 | 6.9 | 2.9 |
| 10 | Lime forests | 13,200.0 | 1.0 | 17,178,204 | 1.5 | 1,301 | 2,601,668.0 | 1.1 | 197.1 | 53,592.0 | 1.0 | 4.1 | 2.1 |
| 11 | Forests of oriental hornbeam, hop hornbeam and flowering ash | 41,200.0 | 3.1 | 53,419,974 | 4.7 | 1,297 | 1,691,402.0 | 0.7 | 41.1 | 47,299.0 | 0.9 | 1.1 | 2.8 |
| 12 | Willow forests | 15,600.0 | 1.2 | 6,846,006 | 0.6 | 439 | 1,525,477.0 | 0.7 | 97.8 | 35,144.0 | 0.7 | 2.3 | 2.3 |
| 13 | Forests of other broadleaves | 26,400.0 | 2.0 | 21,181,882 | 1.9 | 802 | 1,220,726.0 | 0.5 | 46.2 | 37,050.0 | 0.7 | 1.4 | 3.0 |
| 14 | Pubescent oak forests | 5,200.0 | 0.4 | 5,395,980 | 0.5 | 1,038 | 483,474.0 | 0.2 | 93.0 | 13,806.0 | 0.3 | 2.7 | 2.9 |
| 15 | Forests of ash and maple | 4,800.0 | 0.4 | 7,661,798 | 0.7 | 1,596 | 419,350.0 | 0.2 | 87.4 | 16,239.0 | 0.3 | 3.4 | 3.9 |
| 16 | Alder forests | 4,000.0 | 0.3 | 3,744,786 | 0.3 | 936 | 414.022.0 | 0.2 | 103.5 | 13,643.0 | 0.3 | 3.4 | 3.3 |
| **Total** | | **1,328,000.0** | **100.0** | **1,133,592,012** | **100.0** | **854** | **227,074,348.0** | **100.0** | **171.0** | **5,157,725.0** | **100.0** | **3.9** | **2.3** |

**Table 6.5.** Pure broadleaf forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 131,197,744 | 3,237,782 | 40,137,151 | 45,583,198 | 30,176,446 | 8,269,499 | 3,793,668 |
| Turkey oak | 27,881,312 | 2,446,569 | 17,678,581 | 6,300,789 | 1,188,079 | 126,802 | 140,492 |
| Sessile oak | 11,941,426 | 740,360 | 6,059,432 | 3,529,450 | 1,287,554 | 135,750 | 188,880 |
| Hungarian oak | 10,226,596 | 1,308,055 | 7,093,636 | 1,659,577 | 113,473 | 51,855 | |
| Black locust | 8,034,914 | 2,144,031 | 5,066,862 | 742,486 | 81,535 | | |
| Common oak | 6,801,870 | 129,290 | 1,064,843 | 3,551,288 | 1,847,941 | 140,978 | 67,530 |
| Euramer. poplar | 6,008,560 | 22,069 | 832,534 | 2,911,945 | 1,824,317 | 417,695 | |
| Hornbeam | 5,935,319 | 1,253,435 | 3,298,892 | 891,581 | 411,046 | 46,559 | 33,806 |
| Narrow-leaved ash | 3,570,702 | 189,193 | 1,755,148 | 1,177,936 | 380,228 | 68,197 | |
| Large-leaved lime | 1,596,282 | 100,066 | 603,791 | 585,225 | 282,604 | 24,596 | |
| Willow | 1,404,806 | 26,531 | 661,317 | 445,054 | 153,185 | 65,425 | 53,294 |
| Flowering ash | 1,141,935 | 419,925 | 666,715 | 55,295 | | | |
| Aspen | 1,107,928 | 157,544 | 809,431 | 140,953 | | | |
| Field maple | 1,059,022 | 153,524 | 744,638 | 137,251 | 23,609 | | |
| Other broadleaves | 1,035,224 | 209,483 | 640,887 | 156,675 | 28,179 | | |
| Silver lime | 801,080 | 43,799 | 211,651 | 437,402 | 108,228 | | |
| Black poplar | 747,571 | 6,989 | 70,858 | 316,435 | 266,469 | 25,093 | 61,727 |
| Hop hornbeam | 678,984 | 120,562 | 496,606 | 43,707 | 18,109 | | |
| Oriental hornbeam | 662,383 | 437,808 | 204,767 | 10,862 | 8,946 | | |
| Maple | 562,224 | 123,207 | 230,620 | 142,709 | 17,876 | | 47,812 |
| Cherry | 519,826 | 77,625 | 282,565 | 135,046 | 24,590 | | |
| Birch | 479,903 | 58,003 | 314,174 | 92,479 | 15,247 | | |
| Smooth-leaved elm | 477,735 | 139,759 | 219,892 | 118,084 | | | |
| Pubescent oak | 468,388 | 60,309 | 171,963 | 173,624 | 12,953 | | 49,539 |
| Alder | 454,259 | 43,861 | 249,669 | 136,072 | 24,657 | | |
| Small-leaved lime | 366,652 | 107,603 | 133,546 | 99,064 | 26,439 | | |
| White poplar | 276,908 | 11,459 | 120,083 | 76,422 | 68,944 | | |
| White ash | 234,225 | 35,141 | 164,873 | 34,211 | | | |
| Norway maple | 189,862 | | 92,325 | 58,875 | 38,662 | | |
| Black walnut | 154,850 | | 86,635 | 68,215 | | | |
| Wych elm | 105,002 | 5,305 | 32,918 | 66,779 | | | |
| White ash | 101,734 | 42,654 | 48,443 | 10,637 | | | |
| Ash-leaved maple | 82,582 | 31,364 | 51,218 | | | | |
| Common walnut | 72,811 | 19,947 | 42,250 | 10,614 | | | |
| Balkan maple | 45,689 | 13,369 | 13,208 | 8,898 | 10,214 | | |
| Wild service tree | 34,846 | 1,429 | 26,103 | 7,314 | | | |
| Turkish hazel | 23,219 | 5,362 | 17,857 | | | | |
| Europ. hackberry | 12,304 | 3,721 | 3,186 | 5,397 | | | |
| Europ. white elm | 11,814 | 9,436 | 2,378 | | | | |
| Mountain ash | 3,377 | | | 3,377 | | | |
| **Total broadleaves** | **226,511,868** | **13,936,569** | **90,401,646** | **69,924,926** | **38,439,530** | **9,372,449** | **4,436,748** |
| Spruce | 285,467 | 8,205 | 94,152 | 128,219 | 54,891 | | |
| Fir | 177,523 | | 79,938 | 37,548 | 60,037 | | |
| Austrian pine | 75,571 | | 29,656 | 45,915 | | | |
| Scots pine | 10,675 | | 10,675 | | | | |
| Douglas-fir | 10,415 | | 10,415 | | | | |
| Other conifers | 2,829 | 2,829 | | | | | |
| **Total conifers** | **562,480** | **11,034** | **224,836** | **211,682** | **114,928** | | |
| **TOTAL** | **227,074,348** | **13,947,603** | **90,626,482** | **70,136,608** | **38,554,458** | **9,372,449** | **4,436,748** |

**Table 6.6.** Mixed forests of broadleaves by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 567,200.0 | 85.8 | 674,680,905 | 90.6 | 1,189 | 64,424,374.0 | 76.2 | 113.6 | 1,623,220.0 | 79.4 | 2.9 | 2.5 |
| Natural high stands | 91,600.0 | 13.9 | 67,074,035 | 9.0 | 732 | 19,843,006.0 | 23.5 | 216.6 | 411,811.0 | 20.1 | 4.5 | 2.1 |
| Artificially established stands | 2,000.0 | 0.3 | 2,988,101 | 0.4 | 1,494 | 259,861.0 | 0.3 | 129.9 | 11,046.0 | 0.5 | 5.5 | 4.3 |
| **TOTAL** | **660,800.0** | **100.0** | **744,743,041** | **100.0** | **1,127** | **84,527,241.0** | **100.0** | **127.9** | **2,046.077.0** | **100.0** | **3.1** | **2.4** |

**Table 6.7.** Mixed forests of broadleaves by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 522,000.0 | 79.0 | 707,249,243 | 94.9 | 1,355 | 68,022,619.4 | 80.4 | 130.3 | 1,765,378.0 | 86.2 | 3.4 | 2.6 |
| Insufficiently stocked stands | 130,800.0 | 19.8 | 37,050,994 | 5.0 | 283 | 16,283,719.8 | 19.3 | 124.5 | 277,545.9 | 13.6 | 2.1 | 1.7 |
| Devastated stand | 8,000.0 | 1.2 | 442,804 | 0.1 | 55 | 220,901.7 | 0.3 | 27.6 | 3,153.0 | 0.2 | 0.4 | 1.4 |
| **TOTAL** | **660,800.0** | **100.0** | **744,743,041** | **100.0** | **1,127** | **84,527,241.0** | **100.0** | **127.9** | **2,046,076.9** | **100.0** | **3.1** | **2.4** |

**Table 6.8.** Mixed forests of broadleaves by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Turkey oak | 89,045,126 | 12.0 | 18,596,598.0 | 22.0 | 398,425.0 | 19.5 | 2.1 |
| Beech | 50,400,298 | 6.8 | 11,424,371.0 | 13.5 | 242,050.0 | 11.8 | 2.1 |
| Hungarian oak | 77,211,094 | 10.4 | 10,600,549.0 | 12.5 | 260,692.0 | 12.7 | 2.5 |
| Sessile oak | 51,889,979 | 7.0 | 9,067,297.0 | 10.7 | 224,122.0 | 11.0 | 2.5 |
| Hornbeam | 154,341,137 | 20.7 | 9,058,598.0 | 10.7 | 202,355.0 | 9.9 | 2.2 |
| Black locust | 53,148,594 | 7.1 | 3,102,833.0 | 3.7 | 131,225.0 | 6.4 | 4.2 |
| Common oak | 2,732,069 | 0.4 | 2,440,503.0 | 2.9 | 39,914.0 | 2.0 | 1.6 |
| Flowering ash | 67,968,888 | 9.1 | 2,281,251.0 | 2.7 | 67,759.0 | 3.3 | 3.0 |
| Narrow-leaved ash | 5,129,730 | 0.7 | 2,221,610.0 | 2.6 | 53,373.0 | 2.6 | 2.4 |
| Field maple | 34,006,001 | 4.6 | 2,101,002.0 | 2.5 | 48,373.0 | 2.4 | 2.3 |
| Large-leaved lime | 7,537,692 | 1.0 | 1,770,739.0 | 2.1 | 34,066.0 | 1.7 | 1.9 |
| Other broadleaves | 24,944,331 | 3.3 | 1,768.012.0 | 2.1 | 54,172.0 | 2.6 | 3.1 |
| Oriental hornbeam | 53,128,746 | 7.1 | 1,051,309.0 | 1.2 | 34,441.0 | 1.7 | 3.3 |
| Silver lime | 2,305,438 | 0.3 | 931,369.0 | 1.1 | 16,948.0 | 0.8 | 1.8 |
| Aspen | 7,264,106 | 1.0 | 925,365.0 | 1.1 | 30,076.0 | 1.5 | 3.3 |
| Hop hornbeam | 10,830,219 | 1.5 | 753,856.0 | 0.9 | 17,058.0 | 0.8 | 2.3 |
| Maple | 4,405,400 | 0.6 | 739,946.0 | 0.9 | 18,789.0 | 0.9 | 2.5 |
| Cherry | 6,067,128 | 0.8 | 705,629.0 | 0.8 | 16,943.0 | 0.8 | 2.4 |
| Smooth-leaved elm | 11,659,458 | 1.6 | 620,208.0 | 0.7 | 26,070.0 | 1.3 | 4.2 |
| Small-leaved lime | 2,187,242 | 0.3 | 575,832.0 | 0.7 | 10,864.0 | 0.5 | 1.9 |
| White ash | 3,107,174 | 0.4 | 510,911.0 | 0.6 | 12,824.0 | 0.6 | 2.5 |
| Willow | 1,722,750 | 0.2 | 507,281.0 | 0.6 | 10,854.0 | 0.5 | 2.1 |
| Pubescent oak | 7,123,737 | 1.0 | 447,294.0 | 0.5 | 13,958.0 | 0.7 | 3.1 |
| White poplar | 682,031 | 0.1 | 330,243.0 | 0.4 | 10,810.0 | 0.5 | 3.3 |
| Alder | 1,288,173 | 0.2 | 309,418.0 | 0.4 | 7,445.0 | 0.4 | 2.4 |
| Black poplar | 215,035 | 0.0 | 269,793.0 | 0.3 | 14,656.0 | 0.7 | 5.4 |

**Table 6.8.** Mixed forests of broadleaves by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Birch | 2,496,878 | 0.3 | 250,483.0 | 0.3 | 8,243.0 | 0.4 | 3.3 |
| Common walnut | 1,534,607 | 0.2 | 241,629.0 | 0.3 | 6,687.0 | 0.3 | 2.8 |
| Norway maple | 1,064,069 | 0.1 | 228.098.0 | 0.3 | 5,659.0 | 0.3 | 2.5 |
| Turkish hazel | 1,920,804 | 0.3 | 184,172.0 | 0.2 | 5,796.0 | 0.3 | 3.1 |
| Euramerican poplar | 283,474 | 0.0 | 129,302.0 | 0.2 | 8,818.0 | 0.4 | 6.8 |
| Wild service tree | 1,665,114 | 0.2 | 75,419.0 | 0.1 | 1,859.0 | 0.1 | 2.5 |
| Wych elm | 394,981 | 0.1 | 59,852.0 | 0.1 | 1,552.0 | 0.1 | 2.6 |
| White ash | 2,842,154 | 0.4 | 55,843.0 | 0.1 | 2,012.0 | 0.1 | 3.6 |
| Balkan maple | 389,045 | 0.1 | 49,628.0 | 0.1 | 1,545.0 | 0.1 | 3.1 |
| European hackberry | 742,723 | 0.1 | 43,284.0 | 0.1 | 1,332.0 | 0.1 | 3.1 |
| European white elm | 474,851 | 0.1 | 20,482.0 | 0.0 | 911.0 | 0.0 | 4.4 |
| Ash-leaved maple | 154,203 | 0.0 | 9,693.0 | 0.0 | 424.0 | 0.0 | 4.4 |
| **Total broadleaves** | **744,304,481** | **99.9** | **84,459,703.0** | **99.9** | **2,043.098.0** | **99.9** | **2.4** |
| Austrian pine | 164,106 | 0.0 | 36,501.0 | 0.1 | 1,483.0 | 0.1 | 4.1 |
| Scots pine | 210,792 | 0.1 | 19,332.0 | 0.0 | 1,077.0 | 0.0 | 5.6 |
| Spruce | 50,930 | 0.0 | 9,310.0 | 0.0 | 336.0 | 0.0 | 3.6 |
| Yew | 12,732 | 0.0 | 2,395.0 | 0.0 | 83.0 | 0.0 | 3.5 |
| **Total conifers** | **438,560** | **0.1** | **67,538.0** | **0.1** | **2,979.0** | **0.1** | **4.4** |
| **TOTAL** | **744,743,041** | **100.0** | **84,527,241.0** | **100.0** | **2,046,077.0** | **100.0** | **2.4** |

**Table 6.9.** Mixed forests of broadleaves by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| 1 | Turkey oak forests | 156,400.0 | 23.7 | 158,264,200 | 21.3 | 1,012 | 20,111,505.0 | 23.8 | 128.6 | 474,633.0 | 23.3 | 3.0 | 2.4 |
| 2 | Beech forests | 81,200.0 | 12.3 | 71,966,041 | 9.7 | 886 | 14,600,255.0 | 17.2 | 179.8 | 304,889.0 | 14.9 | 3.8 | 2.1 |
| 3 | Hungarian oak forests | 84,800.0 | 12.8 | 99,521,429 | 13.4 | 1,174 | 10,872,028.0 | 12.9 | 128.2 | 278,909.0 | 13.6 | 3.3 | 2.6 |
| 4 | Sessile oak forests | 70,800.0 | 10.7 | 79,792,820 | 10.7 | 1,127 | 9,434,827.0 | 11.2 | 133.3 | 223,129.0 | 10.9 | 3.2 | 2.4 |
| 5 | Hornbeam forests | 75,200.0 | 11.4 | 110,500,997 | 14.8 | 1,469 | 8,956,140.0 | 10.6 | 119.1 | 204,232.0 | 10.0 | 2.7 | 2.3 |
| 6 | Forests of birch, aspen and black locust | 56,800.0 | 8.6 | 63,902,907 | 8.6 | 1,125 | 3,853,275.0 | 4.6 | 67.8 | 160,411.0 | 7.8 | 2.8 | 4.2 |
| 7 | Lime forests | 16,000.0 | 2.4 | 11,556,679 | 1.6 | 722 | 3,208,711.0 | 3.7 | 200.5 | 57,949.0 | 2.8 | 3.6 | 1.8 |
| 8 | Forests of oriental hornbeam, hop hornbeam and flowering ash | 46,000.0 | 7.0 | 76,541,470 | 10.3 | 1,664 | 3,103,531.0 | 3.7 | 67.5 | 85,828.0 | 4.2 | 1.9 | 2.8 |
| 9 | Common oak forests | 10,000.0 | 1.5 | 5,265,892 | 0.7 | 527 | 3,001,272.0 | 3.6 | 300.1 | 51,179.0 | 2.5 | 5.1 | 1.7 |
| 10 | Forest of narrow-leaved ash | 10,000.0 | 1.5 | 9,957,828 | 1.3 | 996 | 2,306,161.0 | 2.7 | 230.6 | 56,924.0 | 2.8 | 5.7 | 2.5 |
| 11 | Forests of other broadleaves | 27,200.0 | 4.1 | 36,073,048 | 4.8 | 1,326 | 2,062,828.0 | 2.4 | 75.8 | 65,004.0 | 3.2 | 2.4 | 3.2 |
| 12 | Forests of ash and maple | 8,000.0 | 1.2 | 7,074,792 | 0.9 | 884 | 1,163,925.0 | 1.4 | 145.5 | 26,872.0 | 1.3 | 3.4 | 2.3 |
| 13 | Willow forests | 6,800.0 | 1.0 | 2,868,980 | 0.4 | 422 | 649,314.0 | 0.8 | 95.5 | 17,225.0 | 0.8 | 2.5 | 2.7 |
| 14 | Poplar forests | 4,800.0 | 0.7 | 4,405,049 | 0.6 | 918 | 581,064.0 | 0.7 | 121.1 | 22,267.0 | 1.1 | 4.6 | 3.8 |
| 15 | Pubescent oak forests | 4,400.0 | 0.7 | 5,967,249 | 0.8 | 1,356 | 363,438.0 | 0.4 | 82.6 | 10,782.0 | 0.5 | 2.5 | 3.0 |
| 16 | Alder forests | 2,400.0 | 0.4 | 1,083,660 | 0.1 | 452 | 258,967.0 | 0.3 | 107.9 | 5,844.0 | 0.3 | 2.4 | 2.3 |
| **TOTAL** | | **660,800.0** | **100.0** | **744,743,041** | **100.0** | **1,127** | **84,527,241.0** | **100.0** | **127.9** | **2.046,077.0** | **100.0** | **3.1** | **2.4** |

**Table 6.10.** Mixed forests of broadleaves by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Turkey oak | 18,596,598 | 1,338,315 | 11,068,869 | 4,972,381 | 1,145,454 | 71,579 | |
| Beech | 11,424,371 | 523,001 | 4,322,580 | 4,280,127 | 1,509,161 | 326,616 | 462,886 |
| Hungarian oak | 10,600,549 | 1,315,141 | 7,337,705 | 1,653,790 | 293,913 | | |
| Sessile oak | 9,067,298 | 470,959 | 4,462,912 | 2,792,972 | 1,117,692 | 222,763 | |
| Hornbeam | 9,058,599 | 2,035,614 | 5,287,919 | 1,216,075 | 392,414 | 100,312 | 26,265 |
| Black locust | 3,102,832 | 682,119 | 1,980,553 | 420,527 | 19,633 | | |
| Common oak | 2,440,504 | 47,619 | 235,147 | 1,080,983 | 836,392 | 175,600 | 64,763 |
| Flowering ash | 2,281,251 | 1,034,810 | 1,109,515 | 110,833 | 26,093 | | |
| Narrow-leaved ash | 2,221,610 | 73,607 | 868,072 | 898,096 | 348,923 | 32,912 | |
| Field maple | 2,101,003 | 496,393 | 1,251,537 | 307,840 | 45,233 | | |
| Large-leaved lime | 1,770,738 | 82,746 | 695,350 | 692,106 | 254,926 | | 45,610 |
| Other broadleaves | 1,768,012 | 360,415 | 1,021,293 | 299,571 | 62,583 | 24,150 | |
| Oriental hornbeam | 1,051,309 | 756,375 | 280,438 | 3,756 | 10,740 | | |
| Silver lime | 931,370 | 21,164 | 224,795 | 500,826 | 184,585 | | |
| Aspen | 925,365 | 62,389 | 514,563 | 297,475 | 50,938 | | |
| Hop hornbeam | 753,856 | 144,527 | 556,482 | 52,847 | | | |
| Maple | 739,946 | 43,106 | 352,306 | 283,011 | 61,523 | | |
| Cherry | 705,628 | 71,953 | 386,439 | 211,932 | 35,304 | | |
| Smooth-leaved elm | 620,208 | 255,002 | 291,419 | 57,213 | 16,574 | | |
| Small-leaved lime | 575,832 | 24,220 | 150,171 | 296,286 | 105,155 | | |
| White ash | 510,912 | 41,338 | 189,102 | 171,410 | 109,062 | | |
| Willow | 507,281 | 14,402 | 165,389 | 150,580 | 138,276 | 38,634 | |
| Pubescent oak | 447,294 | 94,008 | 298,925 | 37,846 | 16,515 | | |
| White poplar | 330,243 | 5,192 | 65,452 | 99,855 | 159,744 | | |
| Alder | 309,418 | 6,451 | 163,216 | 108,922 | 30,829 | | |
| Black poplar | 269,792 | | 24,619 | 68,192 | 153,527 | 23,454 | |
| Birch | 250,483 | 18,066 | 176,826 | 55,591 | | | |
| Common walnut | 241,628 | 25,776 | 115,954 | 67,866 | 32,032 | | |
| Norway maple | 228,098 | 12,817 | 116,665 | 75,638 | 22,978 | | |
| Turkish hazel | 184,173 | 34,236 | 88,176 | 54,277 | 7,484 | | |
| Euramerican poplar | 129,302 | | 55,671 | 15,469 | 13,097 | 45,065 | |
| Wild service tree | 75,419 | 23,711 | 33,457 | 18,251 | | | |
| Wych elm | 59,851 | 2,405 | 47,189 | 10,257 | | | |
| White ash | 55,842 | 55,244 | 598 | | | | |
| Balkan maple | 49,629 | 4,089 | 41,402 | 4,138 | | | |
| European hackberry | 43,285 | 13,723 | 16,164 | 13,398 | | | |
| European white elm | 20,482 | 9,385 | 11,097 | | | | |
| Ash-leaved maple | 9,694 | 8,050 | 1,644 | | | | |
| **Total broadleaves** | **84,459,705** | **10,208,368** | **44,009,611** | **21,380,337** | **7,200,780** | **1,061,085** | **599,524** |
| Austrian pine | 36,502 | | 22,943 | 13,559 | | | |
| Scots pine | 19,331 | 4,951 | 10,108 | 4,272 | | | |
| Spruce | 9,310 | | 9,310 | | | | |
| Yew | 2,395 | | 2,395 | | | | |
| **Total conifers** | **67,538** | **4,951** | **44,756** | **17,831** | | | |
| **TOTAL** | **84,527,243** | **10,213,319** | **44,054,367** | **21,398,168** | **7,200,780** | **1,061,085** | **599,524** |

**Table 6.11.** Mixed forests of broadleaves and conifers by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 28,800.0 | 53.3 | 18,699,667 | 35.5 | 649 | 8,606,150.0 | 73.6 | 298.8 | 189,884.0 | 61.3 | 6.6 | 2.2 |
| Artificially established stands | 15,600.0 | 28.9 | 17,910,922 | 34.0 | 1,148 | 1,792,737.0 | 15.3 | 114.9 | 77,257.0 | 24.9 | 5.0 | 4.3 |
| Natural coppice stands | 9,600.0 | 17.8 | 16,051,449 | 30.5 | 1,672 | 1,294,187.0 | 11.1 | 134.8 | 42,707.0 | 13.8 | 4.4 | 3.3 |
| **TOTAL** | **54,000.0** | **100.0** | **52,662,038** | **100.0** | **975** | **11,693,074.0** | **100.0** | **216.5** | **309,848.0** | **100.0** | **5.7** | **2.6** |

**Table 6.12.** Mixed forests of broadleaves and conifers by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 38,000.0 | 70.4 | 48,262,645 | 91.6 | 1,270 | 8,301,893.1 | 71.0 | 218.5 | 242,395.0 | 78.2 | 6.4 | 2.9 |
| Insufficiently stocked stands | 16,000.0 | 29.6 | 4,399,393 | 8.4 | 275 | 3,391,180.9 | 29.0 | 211.9 | 67,453.0 | 21.8 | 4.2 | 2.0 |
| **TOTAL** | **54,000.0** | **100.0** | **52,662,038** | **100.0** | **975** | **11,693,074.0** | **100.0** | **216.5** | **309,848.0** | **100.0** | **5.7** | **2.6** |

**Table 6.13.** Mixed forests of broadleaves and conifers by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 10.442.854 | 19.8 | 3,663,285.0 | 31.3 | 71,640.0 | 23.1 | 2.0 |
| Sessile oak | 3,193,792 | 6.1 | 432,764.0 | 3.7 | 12,815.0 | 4.1 | 3.0 |
| Turkey oak | 4,876,562 | 9.3 | 351,992.0 | 3.0 | 9,776.0 | 3.2 | 2.8 |
| Aspen | 1,048,952 | 2.0 | 237,141.0 | 2.0 | 2,485.0 | 0.8 | 1.0 |
| Large-leaved lime | 1,475,736 | 2.8 | 168,841.0 | 1.4 | 4,016.0 | 1.3 | 2.4 |
| Hungarian oak | 950,093 | 1.8 | 140,514.0 | 1.2 | 2,143.0 | 0.7 | 1.5 |
| Hornbeam | 2,893,509 | 5.5 | 112,837.0 | 1.0 | 2,933.0 | 0.9 | 2.6 |
| Maple | 201,469 | 0.4 | 80,626.0 | 0.7 | 1,602.0 | 0.5 | 2.0 |
| Black locust | 1,765,559 | 3.4 | 63,667.0 | 0.5 | 2,879.0 | 0.9 | 4.5 |
| Birch | 1,413,224 | 2.7 | 59,734.0 | 0.5 | 1,679.0 | 0.5 | 2.8 |
| Flowering ash | 2,060,401 | 3.9 | 48,531.0 | 0.4 | 1,420.0 | 0.5 | 2.9 |
| Silver lime | 124,495 | 0.2 | 46,144.0 | 0.4 | 961.0 | 0.3 | 2.1 |
| Pubescent oak | 485,246 | 0.9 | 39,948.0 | 0.3 | 1,058.0 | 0.3 | 2.6 |
| Other broadleaves | 1,340,599 | 2.5 | 37,075.0 | 0.3 | 1,588.0 | 0.5 | 4.3 |
| Hop hornbeam | 1,110,548 | 2.1 | 36,003.0 | 0.3 | 722.0 | 0.2 | 2.0 |
| Cherry | 154,359 | 0.3 | 29,014.0 | 0.2 | 749.0 | 0.2 | 2.6 |
| Field maple | 488,075 | 0.9 | 18,630.0 | 0.2 | 1,100.0 | 0.4 | 5.9 |
| White ash | 18,391 | 0.0 | 17,796.0 | 0.2 | 478.0 | 0.2 | 2.7 |
| Wych elm | 31,124 | 0.1 | 9,274.0 | 0.1 | 173.0 | 0.1 | 1.9 |
| Small-leaved lime | 12,732 | 0.0 | 2,391.0 | 0.0 | 67.0 | 0.0 | 2.8 |
| **Total broadleaves** | **34,087,718** | **64.7** | **5,596,208.0** | **47.9** | **120,282.0** | **38.8** | **2.1** |
| Fir | 4,373,134 | 8.3 | 2,812,699.0 | 24.1 | 64,832.0 | 20.9 | 2.3 |
| Spruce | 5,779,468 | 11.0 | 1,883,279.0 | 16.1 | 57,140.0 | 18.4 | 3.0 |
| Austrian pine | 6,202,377 | 11.8 | 1,105,602.0 | 9.5 | 54,001.0 | 17.4 | 4.9 |
| Scots pine | 1,458,567 | 2.8 | 190,908.0 | 1.6 | 8,653.0 | 2.8 | 4.5 |
| Douglas-fir | 66,491 | 0.1 | 47,417.0 | 0.4 | 719.0 | 0.2 | 1.5 |

**Table 6.13.** Mixed forests of broadleaves and conifers by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Weymouth pine | 526,272 | 1.0 | 29,275.0 | 0.3 | 2,943.0 | 0.9 | 10.1 |
| Other conifers | 168,011 | 0.3 | 27,686.0 | 0.2 | 1,278.0 | 0.4 | 4.6 |
| **Total conifers** | **18,574,320** | **35.3** | **6,096,866.0** | **52.1** | **189,566.0** | **61.2** | **3.1** |
| TOTAL | **52,662,038** | **100.0** | **11,693,074.0** | **100.0** | **309,848.0** | **100.0** | **2.6** |

**Table 6.14.** Mixed forests of broadleaves and conifers by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| 1 | Fir forests | 10,800.0 | 20.0 | 8,193,213 | 15.6 | 759 | 4.050,521.0 | 34.6 | 375.0 | 85,705.0 | 27.7 | 7.9 | 2.1 |
| 2 | Beech forests | 9,600.0 | 17.8 | 8,179,085 | 15.5 | 852 | 3,320,569.0 | 28.4 | 345.9 | 71,346.0 | 23.0 | 7.4 | 2.1 |
| 3 | Spruce forests | 8,800.0 | 16.3 | 8,395,260 | 15.9 | 954 | 1,541,179.0 | 13.2 | 175.1 | 46,976.0 | 15.2 | 5.3 | 3.0 |
| 4 | Pine forests | 13,200.0 | 24.4 | 11,858,990 | 22.5 | 898 | 1,363,097.0 | 11.7 | 103.3 | 58,868.0 | 19.0 | 4.5 | 4.3 |
| 5 | Turkey oak forests | 3,600.0 | 6.6 | 7,122,428 | 13.4 | 1,978 | 337,227.0 | 2.8 | 93.7 | 13,670.0 | 4.3 | 3.8 | 4.1 |
| 6 | Lime forests | 1,200.0 | 2.2 | 1,821,118 | 3.5 | 1,518 | 323,186.0 | 2.8 | 269.3 | 9,156.0 | 3.0 | 7.6 | 2.8 |
| 7 | Sessile oak forests | 2,800.0 | 5.2 | 2,051,330 | 3.9 | 733 | 314,597.0 | 2.7 | 112.4 | 9,031.0 | 2.9 | 3.2 | 2.9 |
| 8 | Hungarian oak forests | 800.0 | 1.5 | 424,413 | 0.8 | 531 | 161,667.0 | 1.4 | 202.1 | 3,434.0 | 1.1 | 4.3 | 2.1 |
| 9 | Forests of other conifers | 800.0 | 1.5 | 1,085,083 | 2.1 | 1,356 | 122,479.0 | 1.0 | 153.1 | 4,781.0 | 1.5 | 6.0 | 3.9 |
| 10 | Hornbeam forests | 800.0 | 1.5 | 2,296,075 | 4.4 | 2,870 | 92,119.0 | 0.8 | 115.1 | 3,631.0 | 1.2 | 4.5 | 3.9 |
| 11 | Pubescent oak forests | 800.0 | 1.5 | 1,191,186 | 2.3 | 1,489 | 60,298.0 | 0.5 | 75.4 | 2,944.0 | 1.0 | 3.7 | 4.9 |
| 12 | Forests of birch, aspen and black locust | 800.0 | 1.5 | 43,817 | 0.1 | 55 | 6,135.0 | 0.1 | 7.7 | 306.0 | 0.1 | 0.4 | 5.0 |
| **TOTAL** | | **54,000.0** | **100.0** | **52,662,038** | **100.0** | **975** | **11,693,074.0** | **100.0** | **216.5** | **309,848.0** | **100.0** | **5.7** | **2.6** |

**Table 6.15.** Mixed forests of broadleaves and conifers by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 3,663,285 | 136,081 | 959,633 | 1,392,645 | 1,024,216 | 150,710 | |
| Sessile oak | 432,765 | 55,839 | 196,804 | 104,078 | 76,044 | | |
| Turkey oak | 351,993 | 91,546 | 187,103 | 60,300 | 13,044 | | |
| Aspen | 237,141 | 4,640 | 150,696 | 81,805 | | | |
| Large-leaved lime | 168,841 | 30,041 | 87,074 | 51,726 | | | |
| Hungarian oak | 140,514 | 12,945 | 27,879 | 45,574 | 54,116 | | |
| Hornbeam | 112,838 | 47,995 | 22,119 | 15,583 | 27,141 | | |
| Maple | 80,626 | | 32,847 | 21,242 | 26,537 | | |
| Black locust | 63,666 | 25,295 | 30,141 | 8,230 | | | |
| Birch | 59,734 | 14,685 | 39,467 | 5,582 | | | |
| Flowering ash | 48,531 | 28,068 | 20,463 | | | | |
| Silver lime | 46,144 | | 25,770 | 20,374 | | | |
| Pubescent oak | 39,948 | 2,773 | 37,175 | | | | |
| Other broadleaves | 37,075 | 21,051 | 16,024 | | | | |
| Hop hornbeam | 36,003 | 8,856 | 23,816 | 3,331 | | | |
| Cherry | 29,014 | | 23,327 | 5,687 | | | |
| Field maple | 18,629 | 14,854 | 3,775 | | | | |
| White ash | 17,796 | | 1,407 | | 16,389 | | |
| Wych elm | 9,275 | | 3,060 | 6,215 | | | |
| Small-leaved lime | 2,391 | | 2,391 | | | | |
| **Total broadleaves** | **5,596,208** | **494,669** | **1,890,971** | **1,822,372** | **1,237,487** | **150,710** | |
| Fir | 2,812,699 | 44,824 | 827,927 | 1,109,158 | 830,790 | | |
| Spruce | 1,883,279 | 194,523 | 541,763 | 691,216 | 455,777 | | |
| Austrian pine | 1,105,603 | 68,444 | 651,068 | 338,330 | 47,761 | | |
| Scots pine | 190,908 | 21,362 | 120,501 | 49,045 | | | |
| Douglas-fir | 47,417 | | 19,589 | 27,828 | | | |
| Weymouth pine | 29,275 | 13,864 | 15,411 | | | | |
| Other conifers | 27,686 | | 27,686 | | | | |
| **Total conifers** | **6,096,866** | **343,017** | **2,203,945** | **2,215,577** | **1,334,328** | | |
| TOTAL | **11,693,074** | **837,686** | **4,094,916** | **4,037,949** | **2,571,815** | **150,710** | |

**Table 6.16.** Mixed forests of conifers by origin

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 9,200.0 | 65.7 | 7,224,608 | 57.8 | 785 | 3,090,713.0 | 76.7 | 335.9 | 86,647.0 | 67.8 | 9.4 | 2.8 |
| Artificially established stands | 4,800.0 | 34.3 | 5,278,267 | 42.2 | 1,100 | 936,853.0 | 23.3 | 195.2 | 41,092.0 | 32.2 | 8.6 | 4.4 |
| **TOTAL** | **14,000.0** | **100.0** | **12,502,875** | **100.0** | **893** | **4,027,566.0** | **100.0** | **287.7** | **127,739.0** | **100.0** | **9.1** | **3.2** |

**Table 6.17.** Mixed forests of conifers by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 11,200.0 | 80.0 | 11,755,483 | 94.0 | 1,050 | 3,546,291.6 | 88.1 | 316.6 | 115,588.4 | 90.5 | 10.3 | 3.3 |
| Insufficiently stocked stands | 2,800.0 | 20.0 | 747,392 | 6.0 | 267 | 481,274.3 | 11.9 | 171.9 | 12,151.0 | 9.5 | 4.3 | 2.5 |
| **TOTAL** | **14,000.0** | **100.0** | **12,502,875** | **100.0** | **893** | **4,027,565.9** | **100.0** | **287.7** | **127,739.4** | **100.0** | **9.1** | **3.2** |

**Table 6.18.** Mixed forests of conifers by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Spruce | 4,411,548 | 35.3 | 1,683,605.0 | 41.8 | 50,659.0 | 39.7 | 3.0 |
| Fir | 1,385,172 | 11.1 | 811,065.0 | 20.1 | 19,449.0 | 15.2 | 2.4 |
| Scots pine | 3,363,105 | 26.9 | 725,543.0 | 18.0 | 28,169.0 | 22.1 | 3.9 |
| Austrian pine | 2,835,582 | 22.7 | 655,243.0 | 16.3 | 26,640.0 | 20.9 | 4.1 |
| Douglas-fir | 50,930 | 0.4 | 21,664.0 | 0.5 | 576.0 | 0.5 | 2.7 |
| **Total conifers** | **12,046,336** | **96.3** | **3,897,120.0** | **96.8** | **125,492.0** | **98.2** | **3.2** |
| Beech | 326,798 | 2.6 | 120,296.0 | 3.0 | 1,979.0 | 1.5 | 1.6 |
| Birch | 25,465 | 0.2 | 3,667.0 | 0.1 | 62.0 | 0.0 | 1.7 |
| Sessile oak | 38,197 | 0.3 | 2,678.0 | 0.1 | 89.0 | 0.1 | 3.3 |
| Maple | 50,930 | 0.4 | 2,496.0 | 0.1 | 85.0 | 0.1 | 3.4 |
| Cherry | 15,149 | 0.1 | 1,309.0 | 0.0 | 32.0 | 0.0 | 2.4 |
| **Total broadleaves** | **456,539** | **3.7** | **130,446.0** | **3.2** | **2,247.0** | **1.8** | **1.7** |
| **TOTAL** | **12,502,875** | **100.0** | **4,027,566.0** | **100.0** | **127,739.0** | **100.0** | **3.2** |

**Table 6.19.** Mixed forests of conifers by stand categories

| Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Spruce forests | 5,600.0 | 40.0 | 4,678,128 | 37.4 | 835 | 2,092,800.0 | 52.0 | 373.7 | 58,033.0 | 45.4 | 10.4 | 2.8 |
| Pine forests | 6,000.0 | 42.9 | 6,155,388 | 49.2 | 1,026 | 1,103,095.0 | 27.4 | 183.8 | 48,506.0 | 38.0 | 8.1 | 4.4 |
| Fir forests | 2,400.0 | 17.1 | 1,669,359 | 13.4 | 696 | 831,671.0 | 20.6 | 346.5 | 21,200.0 | 16.6 | 8.8 | 2.5 |
| **TOTAL** | **14,000.0** | **100.0** | **12,502,875** | **100.0** | **893** | **4,027,566.0** | **100.0** | **287.7** | **127,739.0** | **100.0** | **9.1** | **3.2** |

**Table 6.20.** Mixed forests of conifers by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Spruce | 1,683,605 | 125,968 | 669,323 | 731,226 | 157,088 | | |
| Fir | 811,065 | 13,723 | 258,971 | 496,496 | 41,875 | | |
| Scots pine | 725,543 | 29,025 | 399,235 | 283,000 | 14,283 | | |
| Austrian pine | 655,243 | 23,449 | 310,391 | 254,116 | 67,287 | | |
| Douglas-fir | 21,664 | | 21,664 | | | | |
| **Total conifers** | **3,897,120** | **192,165** | **1,659,584** | **1,764,838** | **280,533** | | |
| Beech | 120,295 | 4,470 | 18,058 | 36,123 | 61,644 | | |
| Birch | 3,667 | | 3,667 | | | | |
| Sessile oak | 2,678 | | 2,678 | | | | |
| Maple | 2,496 | | 2,496 | | | | |
| Cherry | 1,309 | | 1,309 | | | | |
| **Total broadleaves** | **130,446** | **4,470** | **28,208** | **36,123** | **61,644** | | |
| **TOTAL** | **4,027,566** | **196,635** | **1,687,792** | **1,800,961** | **342,177** | | |

**Table 6.21.** Pure forests of conifers by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 91,200.0 | 46.6 | 62,090,619 | 36.3 | 681 | 21,821,312.0 | 62.1 | 239.3 | 714,302.0 | 49.7 | 7.8 | 3.3 |
| Artificially established stands | 104,400.0 | 53.4 | 109,045,268 | 63.7 | 1,044 | 13,343,877.0 | 37.9 | 127.8 | 724,081.0 | 50.3 | 6.9 | 5.4 |
| **TOTAL** | **195,600.0** | **100.0** | **171,135,887** | **100.0** | **875** | **35,165,189.0** | **100.0** | **179.8** | **1,438,383.0** | **100.0** | **7.4** | **4.1** |

**Table 6.22.** Pure forests of conifers by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 146,400.0 | 74.9 | 158,135,458 | 92.4 | 1,080 | 27,322,818.6 | 77.7 | 186.6 | 1,228,422.0 | 85.4 | 8.4 | 4.5 |
| Insufficiently stocked stands | 45,600.0 | 23.3 | 12,694,978 | 7.4 | 278 | 7,669,384.9 | 21.8 | 168.2 | 204,852.7 | 14.2 | 4.5 | 2.7 |
| Devastated stands | 3,600.0 | 1.8 | 305,451 | 0.2 | 85 | 172,985.6 | 0.5 | 48.1 | 5,108.6 | 0.4 | 1.4 | 3.0 |
| **TOTAL** | **195,600.0** | **100.0** | **171,135,887** | **100.0** | **875** | **35,165,189.1** | **100.0** | **179.8** | **1,438,383.3** | **100.0** | **7.4** | **4.1** |

**Table 6.23.** Pure forests of conifers by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Spruce | 46,633,260 | 27.2 | 14.948.885.0 | 42.5 | 490,484.0 | 34.1 | 3.3 |
| Austrian pine | 75,433,392 | 44.1 | 10.786.109.0 | 30.7 | 629,846.0 | 43.8 | 5.8 |
| Fir | 7,693,721 | 4.5 | 4.503.636.0 | 12.8 | 111,249.0 | 7.7 | 2.5 |
| Scots pine | 21,065,999 | 12.3 | 2.828.971.0 | 8.0 | 138,491.0 | 9.6 | 4.9 |
| Douglas-fir | 1,459,981 | 0.9 | 431.655.0 | 1.2 | 14,535.0 | 1.0 | 3.4 |
| Weymouth pine | 1,553,710 | 0.9 | 326.141.0 | 0.9 | 15,765.0 | 1.1 | 4.8 |
| Larch | 995,956 | 0.6 | 107.760.0 | 0.3 | 5,167.0 | 0.4 | 4.8 |
| **Total conifers** | **154,836,019** | **90.5** | **33.933.157.0** | **96.5** | **1,405,537.0** | **97.7** | **4.1** |
| Beech | 2,367,897 | 1.4 | 445.132.0 | 1.3 | 9,991.0 | 0.7 | 2.2 |
| Turkey oak | 1,540,150 | 0.9 | 150.543.0 | 0.4 | 4,469.0 | 0.3 | 3.0 |
| Other broadleaves | 1,587,514 | 0.9 | 101.688.0 | 0.3 | 2,848.0 | 0.2 | 2.8 |
| Sessile oak | 1,567,499 | 0.9 | 98.726.0 | 0.3 | 3,587.0 | 0.2 | 3.6 |
| Aspen | 413,040 | 0.2 | 87.870.0 | 0.2 | 748.0 | 0.1 | 0.9 |
| Birch | 2,214,319 | 1.3 | 80.987.0 | 0.2 | 3,621.0 | 0.3 | 4.5 |
| Hornbeam | 1,893,962 | 1.1 | 50.485.0 | 0.1 | 1,515.0 | 0.1 | 3.0 |
| Maple | 100,444 | 0.1 | 48.063.0 | 0.1 | 730.0 | 0.1 | 1.5 |

**Table 6.23.** Pure forests of conifers by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Black locust | 1,316,364 | 0.8 | 42,530.0 | 0.1 | 1,921.0 | 0.1 | 4.5 |
| Cherry | 265,317 | 0.2 | 36,491.0 | 0.1 | 729.0 | 0.1 | 2.0 |
| Flowering ash | 1,593,647 | 0.9 | 34,041.0 | 0.1 | 1,144.0 | 0.1 | 3.4 |
| Hungarian oak | 439,513 | 0.3 | 18,805.0 | 0.1 | 557.0 | 0.0 | 3.0 |
| Wych elm | 50,930 | 0.0 | 12,951.0 | 0.0 | 360.0 | 0.0 | 2.8 |
| Hop hornbeam | 294,260 | 0.2 | 11,851.0 | 0.0 | 279.0 | 0.0 | 2.4 |
| White ash | 12,732 | 0.0 | 4,342.0 | 0.0 | 104.0 | 0.0 | 2.4 |
| Oriental hornbeam | 437,146 | 0.3 | 3,837.0 | 0.0 | 129.0 | 0.0 | 3.4 |
| Field maple | 179,668 | 0.1 | 2,650.0 | 0.0 | 74.0 | 0.0 | 2.8 |
| Pubescent oak | 12,732 | 0.0 | 537.0 | 0.0 | 20.0 | 0.0 | 3.7 |
| Silver lime | 12,732 | 0.0 | 502.0 | 0.0 | 18.0 | 0.0 | 3.6 |
| **Total broadleaves** | **16,299,868** | **9.5** | **1,232,032.0** | **3.5** | **32,846.0** | **2.3** | **2.7** |
| **TOTAL** | **171,135,887** | **100.0** | **35,165,189.0** | **100.0** | **1,438,383.0** | **100.0** | **4.1** |

**Table 6.24.** Pure forests of conifers by stand categories

| Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees*·$ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Spruce forests | 72,000.0 | 36.9 | 53,461,812 | 31.2 | 743 | 15,292,057.0 | 43.5 | 212.4 | 502,052.0 | 34.9 | 7.0 | 3.3 |
| Pine forests | 106,800.0 | 54.6 | 104,657,692 | 61.2 | 980 | 13,984,610.0 | 39.8 | 130.9 | 780,267.0 | 54.2 | 7.3 | 5.6 |
| Fir forests | 12,400.0 | 6.3 | 8,126,841 | 4.7 | 655 | 4,956,670.0 | 14.1 | 399.7 | 118,610.0 | 8.3 | 9.6 | 2.4 |
| Forests of other conifers | 4,400.0 | 2.2 | 4,889,542 | 2.9 | 1,111 | 931,852.0 | 2.6 | 211.8 | 37,454.0 | 2.6 | 8.5 | 4.0 |
| **TOTAL** | **195,600.0** | **100.0** | **171,135,887** | **100.0** | **875** | **35,165,189.0** | **100.0** | **179.8** | **1,438,383.0** | **100.0** | **7.4** | **4.1** |

**Table 6.25.** Pure forests of conifers by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Spruce | 14,948,886 | 1,365,948 | 5,354,492 | 5,707,322 | 2,218,407 | 183,776 | 118,941 |
| Austrian pine | 10,786,110 | 900,250 | 6,873,342 | 2,748,864 | 233,985 | 29,669 | |
| Fir | 4,503,636 | 75,828 | 1,669,185 | 1,867,410 | 846,664 | 44,549 | |
| Scots pine | 2,828,972 | 224,373 | 2,003,562 | 586,021 | 15,016 | | |
| Douglas-fir | 431,656 | 13,085 | 316,347 | 102,224 | | | |
| Weymouth pine | 326,141 | | 252,153 | 73,988 | | | |
| Larch | 107,760 | 24,616 | 74,511 | 8,633 | | | |
| **Total conifers** | **33,933,157** | **2,604,100** | **16,543,592** | **11,094,462** | **3,314,072** | **257,994** | **118,941** |
| Beech | 445,131 | 22,607 | 186,693 | 213,136 | 22,695 | | |
| Turkey oak | 150,543 | 37,787 | 112,756 | | | | |
| Other broadleaves | 101,687 | 25,337 | 65,113 | 11,237 | | | |
| Sessile oak | 98,727 | 21,787 | 71,901 | 5,039 | | | |
| Aspen | 87,869 | 3,027 | 43,701 | 41,141 | | | |
| Birch | 80,986 | 39,343 | 34,339 | 7,304 | | | |
| Hornbeam | 50,485 | 27,502 | 22,983 | | | | |
| Maple | 48,063 | | 10,838 | 5,431 | 31,794 | | |
| Black locust | 42,529 | 18,405 | 21,274 | 2,850 | | | |
| Cherry | 36,490 | 1,754 | 14,012 | 3,680 | 17,044 | | |
| Flowering ash | 34,041 | 23,300 | 10,741 | | | | |
| Hungarian oak | 18,805 | 3,466 | 15,339 | | | | |
| Wych elm | 12,951 | | 12,951 | | | | |
| Hop hornbeam | 11,851 | 2,122 | 9,729 | | | | |
| White ash | 4,342 | | 4,342 | | | | |
| Oriental hornbeam | 3,837 | 3,537 | 300 | | | | |
| Field maple | 2,650 | 1,033 | 1,617 | | | | |
| Pubescent oak | 537 | | 537 | | | | |
| Silver lime | 502 | | 502 | | | | |
| **Total broadleaves** | **1,232,032** | **231,007** | **639,668** | **289,818** | **71,533** | | |
| **TOTAL** | **35,165,189** | **2,835,107** | **17,183,260** | **11,384,280** | **3,385,605** | **257,994** | **118,941** |

**Table 7.** Forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 436,581,955 | 20.6 | 146,850,828.0 | 40.5 | 2,781,812.0 | 30.6 | 1.9 |
| Turkey oak | 234,088,620 | 11.1 | 46,980,446.0 | 13.0 | 1,034,876.0 | 11.4 | 2.2 |
| Sessile oak | 129,994,747 | 6.1 | 21,542,890.0 | 5.9 | 553,735.0 | 6.1 | 2.6 |
| Hungarian oak | 153,215,803 | 7.2 | 20,986,465.0 | 5.8 | 518,767.0 | 5.7 | 2.5 |
| Hornbeam | 254,122,298 | 12.0 | 15,157,240.0 | 4.2 | 334,572.0 | 3.7 | 2.2 |
| Black locust | 218,845,449 | 10.3 | 11,243,944.0 | 3.1 | 516,857.0 | 5.7 | 4.6 |
| Common oak | 10,996,463 | 0.5 | 9,242,373.0 | 2.5 | 157,886.0 | 1.7 | 1.7 |
| Euramer. poplar | 6,489,959 | 0.3 | 6,137,862.0 | 1.7 | 338,272.0 | 3.7 | 5.5 |
| Narrow-leaved ash | 15,416,856 | 0.7 | 5,792,311.0 | 1.6 | 153,519.0 | 1.7 | 2.7 |
| Large-leaved lime | 16,763,340 | 0.8 | 3,535,861.0 | 1.0 | 70,651.0 | 0.8 | 2.0 |
| Flowering ash | 103,786,655 | 4.9 | 3,505,758.0 | 1.0 | 102,158.0 | 1.1 | 2.9 |
| Field maple | 47,615,184 | 2.3 | 3,181,303.0 | 0.9 | 73,152.0 | 0.8 | 2.3 |
| Other broadleaves | 45,576,148 | 2.2 | 2,942,000.0 | 0.8 | 90,189.0 | 1.0 | 3.1 |
| Aspen | 22,521,210 | 1.1 | 2,358,305.0 | 0.7 | 92,646.0 | 1.0 | 3.9 |
| Willow | 6,662,601 | 0.3 | 1,912,086.0 | 0.5 | 42,819.0 | 0.5 | 2.2 |
| Silver lime | 5,958,221 | 0.3 | 1,779,096.0 | 0.5 | 32,162.0 | 0.4 | 1.8 |
| Oriental hornbeam | 88,444,273 | 4.2 | 1,717,529.0 | 0.5 | 55,073.0 | 0.6 | 3.2 |
| Hop hornbeam | 21,951,640 | 1.0 | 1,480,694.0 | 0.4 | 33,966.0 | 0.4 | 2.3 |
| Maple | 10,862,874 | 0.5 | 1,433,355.0 | 0.4 | 38,737.0 | 0.4 | 2.7 |
| Cherry | 12,660,326 | 0.6 | 1,292,269.0 | 0.4 | 32,386.0 | 0.4 | 2.5 |
| Smooth-leaved elm | 18,665,149 | 0.9 | 1,097,943.0 | 0.3 | 43,101.0 | 0.5 | 3.9 |
| Black poplar | 1,457,553 | 0.1 | 1,017,364.0 | 0.3 | 42,236.0 | 0.5 | 4.2 |
| Pubescent oak | 12,128,717 | 0.6 | 956,167.0 | 0.3 | 28,564.0 | 0.3 | 3.0 |
| Small-leaved lime | 7,525,534 | 0.4 | 944,874.0 | 0.3 | 20,156.0 | 0.2 | 2.1 |
| Birch | 11,642,500 | 0.6 | 874,774.0 | 0.2 | 33,210.0 | 0.4 | 3.8 |
| White ash | 5,982,538 | 0.3 | 767,274.0 | 0.2 | 21,399.0 | 0.2 | 2.8 |

**Table 7.** Forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Alder | 5,079,787 | 0.2 | 763,678.0 | 0.2 | 22,720.0 | 0.3 | 3.0 |
| White poplar | 1,987,969 | 0.1 | 607,150.0 | 0.2 | 24,716.0 | 0.3 | 4.1 |
| Norway maple | 1,693,850 | 0.1 | 417,960.0 | 0.1 | 9,910.0 | 0.1 | 2.4 |
| Common walnut | 2,546,708 | 0.1 | 314,440.0 | 0.1 | 10,032.0 | 0.1 | 3.2 |
| Turkish hazel | 2,523,181 | 0.1 | 207,391.0 | 0.1 | 6,521.0 | 0.1 | 3.1 |
| Wych elm | 898,618 | 0.0 | 187,079.0 | 0.1 | 4,173.0 | 0.0 | 2.2 |
| White ash | 6,482,204 | 0.3 | 157,576.0 | 0.0 | 4,453.0 | 0.0 | 2.8 |
| Black walnut | 336,701 | 0.0 | 154,850.0 | 0.0 | 4,169.0 | 0.0 | 2.7 |
| Wild service tree | 1,983,424 | 0.1 | 110,265.0 | 0.0 | 2,480.0 | 0.0 | 2.2 |
| Balkan maple | 816,528 | 0.0 | 95,318.0 | 0.0 | 3,179.0 | 0.0 | 3.3 |
| Ash-leaved maple | 1,090,309 | 0.1 | 92,276.0 | 0.0 | 2,693.0 | 0.0 | 2.9 |
| Europ. hackberry | 940,783 | 0.0 | 55,588.0 | 0.0 | 1,694.0 | 0.0 | 3.0 |
| Europ. white elm | 783,258 | 0.0 | 32,297.0 | 0.0 | 1,548.0 | 0.0 | 4.8 |
| Mountain ash | 5,659 | 0.0 | 3,377.0 | 0.0 | 36.0 | 0.0 | 1.1 |
| **Total broadleaves** | **1,927,125,592** | **91.1** | **317,930,256.0** | **87.7** | **7,341,225.0** | **80.9** | **2.3** |
| Spruce | 57,532,098 | 2.7 | 18,810,547.0 | 5.2 | 605,246.0 | 6.7 | 3.2 |
| Fir | 13,797,216 | 0.7 | 8,304,924.0 | 2.3 | 199,851.0 | 2.2 | 2.4 |
| Austrian pine | 84,964,004 | 4.0 | 12,659,027.0 | 3.5 | 714,858.0 | 7.9 | 5.6 |
| Scots pine | 26,177,724 | 1.2 | 3,775,430.0 | 1.0 | 176,870.0 | 1.9 | 4.7 |
| Douglas-fir | 1,641,064 | 0.1 | 511,151.0 | 0.1 | 16,141.0 | 0.2 | 3.2 |
| Weymouth pine | 2,079,983 | 0.1 | 355,416.0 | 0.1 | 18,708.0 | 0.2 | 5.3 |
| Larch | 995,956 | 0.0 | 107,760.0 | 0.0 | 5,167.0 | 0.1 | 4.8 |
| Yew | 12,732 | 0.0 | 2,395.0 | 0.0 | 83.0 | 0.0 | 3.5 |
| Other conifers | 309,482 | 0.0 | 30,516.0 | 0.0 | 1,620.0 | 0.0 | 5.3 |
| **Total conifers** | **187,510,260** | **8.9** | **44,557,162.0** | **12.3** | **1,738,547.0** | **19.1** | **3.9** |
| **TOTAL** | **2,114,635,852** | **100.0** | **362,487,418.0** | **100.0** | **9,079,772.0** | **100.0** | **2.5** |

**Table 8.** Forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| 1 | Beech forests | 660,400.0 | 29.4 | 480,793,686 | 22.7 | 728 | 153,836,670.0 | 42.4 | 232.9 | 2,928,838.0 | 32.3 | 4.4 | 1.9 |
| 2 | Turkey oak forests | 345,200.0 | 15.3 | 342,945,561 | 16.3 | 993 | 49,564,926.0 | 13.7 | 143.6 | 1,161,647.0 | 12.7 | 3.4 | 2.3 |
| 3 | Sessile oak forests | 173,200.0 | 7.7 | 163,395,654 | 7.7 | 943 | 21,596.056.0 | 6.0 | 124.7 | 541,823.0 | 6.0 | 3.1 | 2.5 |
| 4 | Hungarian oak forests | 159,600.0 | 7.1 | 178,122,326 | 8.4 | 1,116 | 21,086,655.0 | 5.8 | 132.1 | 533,060.0 | 5.9 | 3.3 | 2.5 |
| 5 | Spruce forests | 86,400.0 | 3.8 | 66,535,201 | 3.1 | 770 | 18,926,036.0 | 5.2 | 219.1 | 607,062.0 | 6.7 | 7.0 | 3.2 |
| 6 | Pine forests | 126,000.0 | 5.6 | 122,672,069 | 5.8 | 974 | 16,450,802.0 | 4.5 | 130.6 | 887,641.0 | 9.8 | 7.0 | 5.4 |
| 7 | Forests of birch, aspen and black locust | 223,200.0 | 9.9 | 244,614,970 | 11.6 | 1,096 | 13,402,128.0 | 3.7 | 60.0 | 617,187.0 | 6.8 | 2.8 | 4.6 |
| 8 | Hornbeam forests | 118,800.0 | 5.3 | 175,449,242 | 8.3 | 1,477 | 13,266,577.0 | 3.7 | 111.7 | 297,748.0 | 3.3 | 2.5 | 2.2 |
| 9 | Common oak forests | 32,400.0 | 1.4 | 16,359,940 | 0.8 | 505 | 10,118,764.0 | 2.8 | 312.3 | 177,854.0 | 2.0 | 5.5 | 1.8 |
| 10 | Fir forests | 25,600.0 | 1.1 | 17,989,412 | 0.9 | 703 | 9,838,863.0 | 2.7 | 384.3 | 225,515.0 | 2.5 | 8.8 | 2.3 |
| 11 | Poplar forests | 48,000.0 | 2.1 | 16,648,664 | 0.8 | 347 | 7,816,476.0 | 2.2 | 162.8 | 398,269.0 | 4.3 | 8.3 | 5.1 |
| 12 | Lime forests | 30,400.0 | 1.3 | 30,556,001 | 1.4 | 1,005 | 6,133,564.0 | 1.7 | 201.8 | 120,698.0 | 1.3 | 4.0 | 2.0 |
| 13 | Forest of narrow-leaved ash | 25,200.0 | 1.1 | 23,527,690 | 1.1 | 934 | 5,978,815.0 | 1.6 | 237.3 | 162,518.0 | 1.8 | 6.4 | 2.7 |
| 14 | Forests of oriental hornbeam, hop hornbeam and flowering ash | 87,200.0 | 3.9 | 129,961,443 | 6.1 | 1,490 | 4,794,933.0 | 1.3 | 55.0 | 133,127.0 | 1.4 | 1.5 | 2.8 |
| 15 | Forests of other broadleaves | 53,600.0 | 2.4 | 57,254,930 | 2.7 | 1,068 | 3,283,554.0 | 0.9 | 61.3 | 102,053.0 | 1.1 | 1.9 | 3.1 |
| 16 | Willow forests | 22,400.0 | 1.0 | 9,714,986 | 0.5 | 434 | 2,174,792.0 | 0.6 | 97.1 | 52,369.0 | 0.6 | 2.3 | 2.4 |
| 17 | Forests of ash and maple | 12,800.0 | 0.6 | 14,736,590 | 0.7 | 1,151 | 1,583,276.0 | 0.4 | 123.7 | 43,111.0 | 0.5 | 3.4 | 2.7 |
| 18 | Forests of other conifers | 5,200.0 | 0.2 | 5,974,626 | 0.3 | 1,149 | 1,054,331.0 | 0.3 | 202.8 | 42,235.0 | 0.5 | 8.1 | 4.0 |
| 19 | Pubescent oak forests | 10,400.0 | 0.5 | 12,554,416 | 0.6 | 1,207 | 907,212.0 | 0.3 | 87.2 | 27,532.0 | 0.3 | 2.6 | 3.0 |
| 20 | Alder forests | 6,400.0 | 0.3 | 4,828,446 | 0.2 | 754 | 672,989.0 | 0.2 | 105.2 | 19,486.0 | 0.2 | 3.0 | 2.9 |
| **Total** | | **2,252,400.0** | **100.0** | **2,114,635,853** | **100.0** | **939** | **362,487,418.0** | **100.0** | **160.9** | **9,079,772.0** | **100.0** | **4.0** | **2.5** |

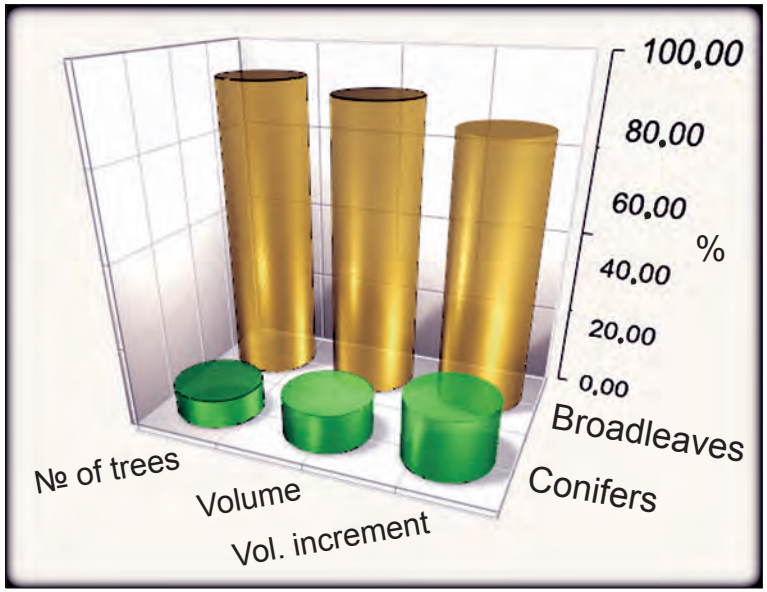



**Diagram 7.** Forests by tree species

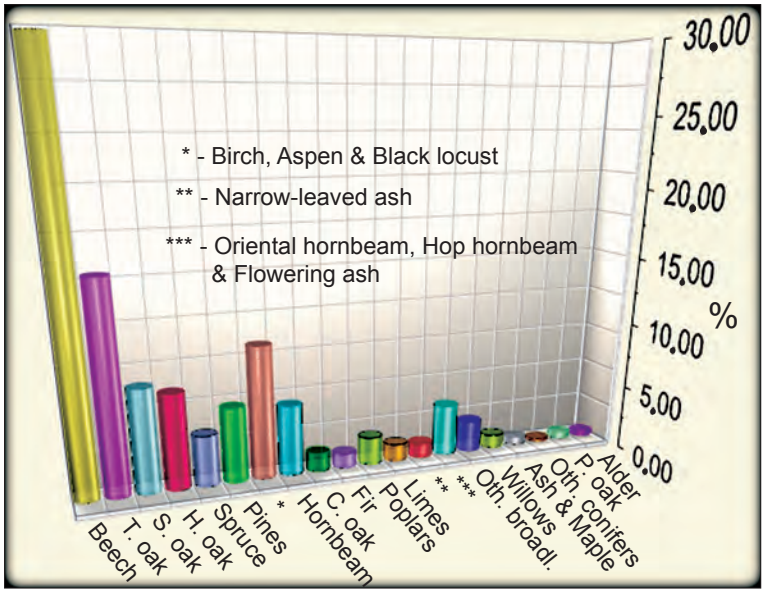



**Diagram 8.** Forests by stand categories (area)

**Table 8.1.** Alder forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 6,400.0 | 100.0 | 4,828,446 | 100.0 | 754 | 672,989.0 | 100.0 | 105.2 | 19,486.0 | 100.0 | 3.0 | 2.9 |
| **TOTAL** | **6,400.0** | **100.0** | **4,828,446** | **100.0** | **754** | **672,989.0** | **100.0** | **105.2** | **19,486.0** | **100.0** | **3.0** | **2.9** |

**Table 8.2.** Alder forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 4,400.0 | 68.8 | 4,187,473 | 86.7 | 952 | 454,030.4 | 67.5 | 103.2 | 13,664.1 | 70.1 | 3.1 | 3.0 |
| Insufficiently stocked stands | 2,000.0 | 31.2 | 640,973 | 13.3 | 320 | 218,958.6 | 32.5 | 109.5 | 5,821.9 | 29.9 | 2.9 | 2.7 |
| **TOTAL** | **6,400.0** | **100.0** | **4,828,446** | **100.0** | **754** | **672,989.0** | **100.0** | **105.2** | **19,486.0** | **100.0** | **3.0** | **2.9** |

**Table 8.3.** Alder forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 4,000.0 | 62.5 | 3,744,785 | 77.6 | 936 | 414,022.0 | 61.5 | 103.5 | 13,644.0 | 70.0 | 3.4 | 3.3 |
| Mixed broadleaf stands | 2,400.0 | 37.5 | 1,083,661 | 22.4 | 452 | 258,967.0 | 38.5 | 107.9 | 5,842.0 | 30.0 | 2.4 | 2.3 |
| **TOTAL** | **6,400.0** | **100.0** | **4,828,446** | **100.0** | **754** | **672,989.0** | **100.0** | **105.2** | **19,486.0** | **100.0** | **3.0** | **2.9** |

**Table 8.4.** Alder forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Alder | 533,703 | 41,527 | 302,693 | 177,417 | 12,066 | | |
| Turkey oak | 52,218 | | 20,106 | 12,438 | 19,674 | | |
| Hornbeam | 21,019 | 891 | 13,768 | 6,360 | | | |
| White ash | 20,039 | | 9,737 | 10,302 | | | |
| Common walnut | 10,988 | | 10,988 | | | | |
| Other broadleaves | 9,845 | 6,690 | 3,155 | | | | |
| Cherry | 8,714 | | 5,185 | 3,529 | | | |
| Willow | 6,479 | 4,584 | 1,895 | | | | |
| Black locust | 5,660 | | 5,660 | | | | |
| Field maple | 3,681 | | 3,681 | | | | |
| Smooth-leaved elm | 643 | | 643 | | | | |
| **TOTAL** | **672,989** | **53,692** | **377,511** | **210,046** | **31,740** | | |

**Table 8.5.** Willow forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 18,800.0 | 83.9 | 7,581,775 | 78.0 | 403 | 1,665,180.0 | 76.6 | 88.6 | 37,329.0 | 71.3 | 2.0 | 2.2 |
| Artificially established stand | 3,600.0 | 16.1 | 2,133,211 | 22.0 | 593 | 509,612.0 | 23.4 | 141.6 | 15,040.0 | 28.7 | 4.2 | 3.0 |
| **TOTAL** | **22,400.0** | **100.0** | **9,714,986** | **100.0** | **434** | **2,174,792.0** | **100.0** | **97.1** | **52,369.0** | **100.0** | **2.3** | **2.4** |

**Table 8.6.** Willow forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 10,000.0 | 44.6 | 7,151,800 | 73.6 | 715 | 1,109,472.5 | 51.0 | 110.9 | 30,686.9 | 58.6 | 3.1 | 2.8 |
| Insufficiently stocked stands | 9,600.0 | 42.9 | 2,313,717 | 23.8 | 241 | 957,183.9 | 44.0 | 99.7 | 19,475.3 | 37.2 | 2.0 | 2.0 |
| Devastated stands | 2,800.0 | 12.5 | 249,469 | 2.6 | 89 | 108,135.6 | 5.0 | 38.6 | 2,206.7 | 4.2 | 0.8 | 2.0 |
| **TOTAL** | **22,400.0** | **100.0** | **9,714,986** | **100.0** | **434** | **2,174,792.0** | **100.0** | **97.1** | **52,369.0** | **100.0** | **2.3** | **2.4** |

**Table 8.7.** Willow forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 15,600.0 | 69.6 | 6,846,006 | 70.5 | 439 | 1,525,477.0 | 70.1 | 97.8 | 35,144.0 | 67.1 | 2.3 | 2.3 |
| Mixed broadleaf stands | 6,800.0 | 30.4 | 2,868,980 | 29.5 | 422 | 649,315.0 | 29.9 | 95.5 | 17,225.0 | 32.9 | 2.5 | 2.7 |
| **TOTAL** | **22,400.0** | **100.0** | **9,714,986** | **100.0** | **434** | **2,174,792.0** | **100.0** | **97.1** | **52,369.0** | **100.0** | **2.3** | **2.4** |

**Table 8.8.** Willow forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Willow | 1,725,535 | 26,983 | 765,527 | 560,249 | 254,057 | 65,425 | 53,294 |
| Narrow-leaved ash | 114,815 | | 52,379 | 62,436 | | | |
| Other broadleaves | 55,456 | 6,791 | 39,658 | 9,007 | | | |
| Common walnut | 39,628 | 7,498 | 23,664 | 8,466 | | | |
| Euramerican poplar | 39,570 | | 19,950 | 19,620 | | | |
| Smooth-leaved elm | 38,424 | | 1,371 | 37,053 | | | |
| Black locust | 34,742 | 6,045 | 22,029 | 6,668 | | | |
| Black poplar | 31,124 | | 7,476 | 23,648 | | | |
| Hornbeam | 23,900 | 13,864 | 10,036 | | | | |
| White ash | 19,702 | 19,084 | 618 | | | | |
| White poplar | 14,881 | | 1,001 | | 13,880 | | |
| Alder | 14,546 | | 14,546 | | | | |
| Field maple | 8,879 | 6,154 | 2,725 | | | | |
| Cherry | 7,722 | | 1,734 | 5,988 | | | |
| Aspen | 5,869 | | | 5,869 | | | |
| **Total** | **2,174,792** | **86,419** | **962,713** | **739,004** | **267,937** | **65,425** | **53,294** |

**Table 8.9.** Poplar forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees*·*ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Artificially established stand | 35,600.0 | 74.2 | 10,282,634 | 61.8 | 289 | 6,240,393.0 | 79.8 | 175.3 | 338,159.0 | 84.9 | 9.5 | 5.4 |
| Natural coppice stands | 12,400.0 | 25.8 | 6,366,031 | 38.2 | 513 | 1,576,083.0 | 20.2 | 127.1 | 60,110.0 | 15.1 | 4.8 | 3.8 |
| **Total** | **48,000.0** | **100.0** | **16,648,665** | **100.0** | **347** | **7,816,476.0** | **100.0** | **162.8** | **398,269.0** | **100.0** | **8.3** | **5.1** |

**Table 8.10.** Poplar forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 29,200.0 | 60.9 | 12,805,153 | 76.9 | 439 | 3,859,465.5 | 49.4 | 132.2 | 252,433.1 | 63.4 | 8.6 | 6.5 |
| Insufficiently stocked stands | 13,600.0 | 28.3 | 3,489,162 | 21.0 | 257 | 3,399,563.6 | 43.5 | 250.0 | 121,510.7 | 30.5 | 8.9 | 3.6 |
| Devastated stands | 5,200.0 | 10.8 | 354,350 | 2.1 | 68 | 557,446.9 | 7.1 | 107.2 | 24,325.2 | 6.1 | 4.7 | 4.4 |
| **Total** | **48,000.0** | **100.0** | **16,648,665** | **100.0** | **347** | **7,816,476.0** | **100.0** | **162.8** | **398,269.0** | **100.0** | **8.3** | **5.1** |

**Table 8.11.** Poplar forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 43,200.0 | 90.0 | 12,243,616 | 73.5 | 283 | 7,235,412.0 | 92.6 | 167.5 | 376,002.0 | 94.4 | 8.7 | 5.2 |
| Mixed broadleaf stands | 4,800.0 | 10.0 | 4,405,049 | 26.5 | 918 | 581,064.0 | 7.4 | 121.1 | 22,267.0 | 5.6 | 4.6 | 3.8 |
| **Total** | **48,000.0** | **100.0** | **16,648,665** | **100.0** | **347** | **7,816,476.0** | **100.0** | **162.8** | **398,269.0** | **100.0** | **8.3** | **5.1** |

**Table 8.12.** Poplar forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Euramerican poplar | 6,055,191 | 22,069 | 838,251 | 2,907,793 | 1,824,317 | 462,761 | |
| Black poplar | 878,949 | 6,989 | 75,255 | 344,070 | 342,361 | 48,547 | 61,727 |
| White poplar | 400,847 | 11,459 | 122,787 | 134,009 | 132,592 | | |
| Other broadleaves | 114,636 | 30,360 | 60,126 | | | 24,150 | |
| White ash | 88,861 | 31,378 | 46,846 | 10,637 | | | |
| Smooth-leaved elm | 70,165 | 24,856 | 45,309 | | | | |
| Willow | 68,017 | 4,669 | 26,807 | 12,649 | 23,892 | | |
| Black locust | 66,469 | 8,785 | 57,684 | | | | |
| Common oak | 28,434 | | | | 28,434 | | |
| Narrow-leaved ash | 19,897 | 3,933 | 9,051 | 6,913 | | | |
| Common walnut | 13,157 | 3,820 | 5,540 | 3,797 | | | |
| Black walnut | 7,097 | | 7,097 | | | | |
| Ash-leaved maple | 3,268 | | 3,268 | | | | |
| Alder | 1,490 | | 1,490 | | | | |
| **TOTAL** | **7,816,476** | **148,318** | **1,299,510** | **3,419,868** | **2,351,595** | **535,458** | **61,727** |

**Table 8.13.** Narrow-leaved ash forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees*·*ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 12,800.0 | 50.8 | 9,051,437 | 38.5 | 707 | 3,563,722.0 | 59.6 | 278.4 | 89,390.0 | 55.0 | 7.0 | 2.5 |
| Natural coppice stands | 12,400.0 | 49.2 | 14,476,253 | 61.5 | 1,167 | 2,415,093.0 | 40.4 | 194.8 | 73,127.0 | 45.0 | 5.9 | 3.0 |
| **TOTAL** | **25,200.0** | **100.0** | **23,527,690** | **100.0** | **934** | **5,978,815.0** | **100.0** | **237.3** | **162,517.0** | **100.0** | **6.4** | **2.7** |

**Table 8.14.** Narrow-leaved ash forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 18,400.0 | 73.0 | 21,377,330 | 90.8 | 1,162 | 4,396,097.5 | 73.5 | 238.9 | 130,048.2 | 80.0 | 7.1 | 3.0 |
| Insufficiently stocked stands | 6,400.0 | 25.4 | 2,113,578 | 9.0 | 330 | 1,561,169.3 | 26.1 | 243.9 | 31,846.3 | 19.6 | 5.0 | 2.0 |
| Devastated stand | 400.0 | 1.6 | 36,782 | 0.2 | 92 | 21,548.2 | 0.4 | 53.9 | 622.5 | 0.4 | 1.6 | 2.9 |
| **TOTAL** | **25,200.0** | **100.0** | **23,527,690** | **100.0** | **934** | **5,978,815.0** | **100.0** | **237.3** | **162,517.0** | **100.0** | **6.4** | **2.7** |

**Table 8.15.** Narrow-leaved ash forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 15,200.0 | 60.3 | 13,569,862 | 57.7 | 893 | 3,672,654.0 | 61.4 | 241.6 | 105,594.0 | 65.0 | 6.9 | 2.9 |
| Mixed broadleaf stands | 10,000.0 | 39.7 | 9,957,828 | 42.3 | 996 | 2,306,161.0 | 38.6 | 230.6 | 56,923.0 | 35.0 | 5.7 | 2.5 |
| **TOTAL** | **25,200.0** | **100.0** | **23,527,690** | **100.0** | **934** | **5,978,815.0** | **100.0** | **237.3** | **162,517.0** | **100.0** | **6.4** | **2.7** |

**Table 8.16.** Narrow-leaved ash forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Narrow-leaved ash | 4,480,068 | 252,077 | 2,148,984 | 1,412,703 | 598,107 | 68,197 | |
| Common oak | 460,804 | | 59,873 | 157,554 | 243,377 | | |
| Smooth-leaved elm | 305,486 | 50,576 | 188,723 | 49,613 | 16,574 | | |
| Field maple | 179,537 | 38,650 | 108,414 | 32,473 | | | |
| Hornbeam | 166,897 | 6,267 | 117,544 | 32,470 | 10,616 | | |
| Other broadleaves | 118,944 | 4,725 | 69,500 | 19,014 | 25,705 | | |
| White poplar | 94,055 | | | 11,839 | 82,216 | | |
| Black locust | 79,315 | 15,181 | 53,347 | 10,787 | | | |
| Willow | 45,649 | | 22,912 | 22,737 | | | |
| Euramerican poplar | 28,368 | | 15,271 | | 13,097 | | |
| Alder | 19,693 | 2,334 | 17,359 | | | | |
| **TOTAL** | **5,978,815** | **369,810** | **2,801,926** | **1,749,190** | **989,692** | **68,197** | |

**Table 8.17.** Common oak forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 28,800.0 | 88.9 | 13,699,955 | 83.7 | 476 | 9,695,688.0 | 95.8 | 336.7 | 163,603.0 | 92.0 | 5.7 | 1.7 |
| Natural coppice stands | 3,600.0 | 11.1 | 2,659,985 | 16.3 | 739 | 423,076.0 | 4.2 | 117.5 | 14,251.0 | 8.0 | 4.0 | 3.4 |
| **Total** | **32,400.0** | **100.0** | **16,359,940** | **100.0** | **505** | **10,118,764.0** | **100.0** | **312.3** | **177,854.0** | **100.0** | **5.5** | **1.8** |

**Table 8.18.** Common oak forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 13,600.0 | 42.0 | 11,841,349 | 72.4 | 871 | 4,023,475.1 | 39.8 | 295.8 | 85,360.1 | 48.0 | 6.3 | 2.1 |
| Insufficiently stocked stands | 18,000.0 | 55.6 | 4,458,528 | 27.3 | 248 | 5,972,621.6 | 59.0 | 331.8 | 90,639.4 | 51.0 | 5.0 | 1.5 |
| Devastated stands | 800.0 | 2.4 | 60,064 | 0.3 | 75 | 122,667.3 | 1.2 | 153.3 | 1,854.5 | 1.0 | 2.3 | 1.5 |
| **Total** | **32,400.0** | **100.0** | **16,359,940** | **100.0** | **505** | **10,118,764.0** | **100.0** | **312.3** | **177,854.0** | **100.0** | **5.5** | **1.8** |

**Table 8.19.** Common oak forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 22,400.0 | 69.1 | 11,094,048 | 67.8 | 495 | 7,117,492.0 | 70.3 | 317.7 | 126,675.0 | 71.2 | 5.7 | 1.8 |
| Mixed broadleaf stands | 10,000.0 | 30.9 | 5,265,892 | 32.2 | 527 | 3,001,272.0 | 29.7 | 300.1 | 51,179.0 | 28.8 | 5.1 | 1.7 |
| **Total** | **32,400.0** | **100.0** | **16,359,940** | **100.0** | **505** | **10,118,764.0** | **100.0** | **312.3** | **177,854.0** | **100.0** | **5.5** | **1.8** |

**Table 8.20.** Common oak forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Common oak | 8,488,725 | 167,162 | 1,173,461 | 4,303,131 | 2,396,100 | 316,578 | 132,293 |
| Narrow-leaved ash | 964,267 | | 307,319 | 492,992 | 131,044 | 32,912 | |
| Hornbeam | 165,679 | 5,164 | 104,292 | 45,534 | 10,689 | | |
| Turkey oak | 116,797 | | | 66,049 | 50,748 | | |
| Field maple | 103,986 | 2,051 | 75,899 | 26,036 | | | |
| White poplar | 85,521 | | 61,747 | 23,774 | | | |
| Smooth-leaved elm | 73,523 | 22,550 | 47,612 | 3,361 | | | |
| Other broadleaves | 57,249 | 11,586 | 39,361 | 6,302 | | | |
| Black locust | 25,255 | 2,391 | 22,864 | | | | |
| Small-leaved lime | 24,682 | 3,127 | 21,555 | | | | |
| Hungarian oak | 7,436 | | 7,436 | | | | |
| Cherry | 5,647 | | 5,647 | | | | |
| **TOTAL** | **10,118,764** | **214,031** | **1,867,190** | **4,967,179** | **2,588,581** | **349,490** | **132,293** |

**Table 8.21.** Hornbeam forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees*·$ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 113,600.0 | 95.6 | 171,215,013 | 97.6 | 1,507 | 12,352,163.0 | 93.1 | 108.7 | 279,226.0 | 93.8 | 2.5 | 2.3 |
| Natural high stands | 5,200.0 | 4.4 | 4,234,229 | 2.4 | 814 | 914,414.0 | 6.9 | 175.8 | 18,522.0 | 6.2 | 3.6 | 2.0 |
| **TOTAL** | **118,800.0** | **100.0** | **175,449,242** | **100.0** | **1,477** | **13,266,577.0** | **100.0** | **111.7** | **297,748.0** | **100.0** | **2.5** | **2.2** |

**Table 8.22.** Hornbeam forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 101,600.0 | 85.5 | 170,224,344 | 97.0 | 1,675 | 11,680,132.9 | 88.0 | 115.0 | 275,203.8 | 92.4 | 2.7 | 2.4 |
| Insufficiently stocked stands | 16,400.0 | 13.8 | 5,158,407 | 2.9 | 315 | 1,520,189.8 | 11.5 | 92.7 | 21,941.4 | 7.4 | 1.3 | 1.4 |
| Devastated stand | 800.0 | 0.7 | 66,491 | 0.1 | 83 | 66,254.3 | 0.5 | 82.8 | 602.8 | 0.2 | 0.8 | 0.9 |
| **TOTAL** | **118,800.0** | **100.0** | **175,449,242** | **100.0** | **1,477** | **13,266,577.0** | **100.0** | **111.7** | **297,748.0** | **100.0** | **2.5** | **2.2** |

**Table 8.23.** Hornbeam forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Mixed broadleaf stands | 75,200.0 | 63.3 | 110,500,997 | 63.0 | 1,469 | 8,956,140.0 | 67.5 | 119.1 | 204,233.0 | 68.6 | 2.7 | 2.3 |
| Pure broadleaf stands | 42,800.0 | 36.0 | 62,652,170 | 35.7 | 1,464 | 4,218,318.0 | 31.8 | 98.6 | 89,884.0 | 30.2 | 2.1 | 2.1 |
| Mixed broadleaf and coniferous stands | 800.0 | 0.7 | 2,296,075 | 1.3 | 2,870 | 92,119.0 | 0.7 | 115.1 | 3,631.0 | 1.2 | 4.5 | 3.9 |
| **TOTAL** | **118,800.0** | **100.0** | **175,449,242** | **100.0** | **1,477** | **13,266,577.0** | **100.0** | **111.7** | **297,748.0** | **100.0** | **2.5** | **2.2** |

**Table 8.24.** Hornbeam forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Hornbeam | 7,967,395 | 1,768,596 | 4,371,396 | 1,147,044 | 499,909 | 120,379 | 60,071 |
| Beech | 1,145,668 | 64,709 | 579,877 | 296,311 | 157,721 | 47,050 | |
| Turkey oak | 1,023,391 | 36,089 | 506,710 | 363,031 | 117,561 | | |
| Sessile oak | 679,456 | 39,000 | 323,063 | 207,456 | 109,937 | | |
| Flowering ash | 353,478 | 162,649 | 165,759 | 25,070 | | | |
| Other broadleaves | 343,520 | 42,907 | 194,885 | 96,153 | 9,575 | | |
| Field maple | 333,146 | 51,787 | 243,710 | 37,649 | | | |
| Large-leaved lime | 240,634 | 5,418 | 116,997 | 118,219 | | | |
| Hungarian oak | 231,178 | 6,904 | 123,558 | 86,856 | 13,860 | | |
| Black locust | 155,657 | 5,432 | 91,484 | 58,741 | | | |
| Maple | 121,902 | 11,360 | 76,694 | 20,108 | 13,740 | | |
| Cherry | 105,344 | 2,886 | 44,277 | 46,473 | 11,708 | | |
| Aspen | 72,711 | 14,274 | 58,437 | | | | |
| Common oak | 54,830 | | 10,560 | 44,270 | | | |
| Turkish hazel | 52,853 | | 15,740 | 29,629 | 7,484 | | |
| White ash | 48,589 | | 21,970 | 9,940 | 16,679 | | |
| Narrow-leaved ash | 44,526 | | 25,306 | 19,220 | | | |
| Norway maple | 35,612 | 7,710 | 18,207 | 9,695 | | | |
| Oriental hornbeam | 32,205 | 17,415 | 11,034 | 3,756 | | | |
| Alder | 30,669 | | 10,801 | 19,868 | | | |
| Hop hornbeam | 30,514 | 8,842 | 21,672 | | | | |
| Birch | 27,841 | 6,508 | 17,280 | 4,053 | | | |
| Pubescent oak | 27,818 | | 27,818 | | | | |
| Smooth-leaved elm | 23,518 | 7,413 | 8,041 | 8,064 | | | |
| Small-leaved lime | 19,875 | 5,970 | 4,762 | 9,143 | | | |
| Common walnut | 11,190 | 4,951 | | 6,239 | | | |
| Silver lime | 10,908 | | 7,283 | 3,625 | | | |
| Ash-leaved maple | 9,694 | 8,050 | 1,644 | | | | |
| **Total broadleaves** | **13,234,123** | **2,278,870** | **7,098,965** | **2,670,613** | **958,174** | **167,429** | **60,071** |
| Spruce | 32,454 | 6,508 | 25,946 | | | | |
| **Total conifers** | **32,454** | **6,508** | **25,946** | | | | |
| **TOTAL** | **13,266,577** | **2,285,378** | **7,124,911** | **2,670,613** | **958,174** | **167,429** | **60,071** |

**Table 8.25.** Turkey oak forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 325,600.0 | 94.3 | 327,961,330 | 95.6 | 1,007 | 44,395,932.0 | 89.6 | 136.4 | 1,059,227.0 | 91.2 | 3.3 | 2.4 |
| Natural high stands | 19,600.0 | 5.7 | 14,984,231 | 4.4 | 765 | 5,168,994.0 | 10.4 | 263.7 | 102,420.0 | 8.8 | 5.2 | 2.0 |
| **TOTAL** | **345,200.0** | **100.0** | **342,945,561** | **100.0** | **993** | **49,564,926.0** | **100.0** | **143.6** | **1,161,647.0** | **100.0** | **3.4** | **2.3** |

**Table 8.26.** Turkey oak forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 256,800.0 | 74.4 | 318,124,035 | 92.7 | 1,239 | 42,485,262.6 | 85.7 | 165.4 | 1,032,639.0 | 88.9 | 4.0 | 2.4 |
| Insufficiently stocked stands | 82,000.0 | 23.8 | 24,226,324 | 7.1 | 295 | 6,899,372.5 | 13.9 | 84.1 | 125,846.7 | 10.8 | 1.5 | 1.8 |
| Devastated stand | 6,400.0 | 1.8 | 595,202 | 0.2 | 93 | 180,290.9 | 0.4 | 28.2 | 3,161.3 | 0.3 | 0.5 | 1.8 |
| **TOTAL** | **345,200.0** | **100.0** | **342,945,561** | **100.0** | **993** | **49,564,926.0** | **100.0** | **143.6** | **1,161,647.0** | **100.0** | **3.4** | **2.3** |

**Table 8.27.** Turkey oak forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 185,200.0 | 53.7 | 177,558,933 | 51.8 | 959 | 29,116,194.0 | 58.7 | 157.2 | 673,344.0 | 58.0 | 3.6 | 2.3 |
| Mixed broadleaf stands | 156,400.0 | 45.3 | 158,264,200 | 46.1 | 1,012 | 20,111,505.0 | 40.6 | 128.6 | 474,633.0 | 40.8 | 3.0 | 2.4 |
| Mixed broadleaf and coniferous stands | 3,600.0 | 1.0 | 7,122,428 | 2.1 | 1,978 | 337,227.0 | 0.7 | 93.7 | 13,670.0 | 1.2 | 3.8 | 4.1 |
| **TOTAL** | **345,200.0** | **100.0** | **342,945,561** | **100.0** | **993** | **49,564,926.0** | **100.0** | **143.6** | **1,161,647.0** | **100.0** | **3.4** | **2.3** |

**Table 8.28.** Turkey oak forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Turkey oak | 36,773,103 | 3,228,498 | 22,900,899 | 8,725,855 | 1,578,978 | 198,381 | 140,492 |
| Hungarian oak | 4,486,715 | 482,613 | 3,318,457 | 640,884 | 44,761 | | |
| Sessile oak | 2,116,770 | 143,437 | 1,333,468 | 494,130 | 113,884 | 31,851 | |
| Hornbeam | 1,622,800 | 564,727 | 975,483 | 82,590 | | | |
| Beech | 912,506 | 62,318 | 459,579 | 315,099 | 75,510 | | |
| Flowering ash | 579,294 | 227,905 | 334,260 | 17,129 | | | |
| Field maple | 531,351 | 144,647 | 306,559 | 57,652 | 22,493 | | |
| Black locust | 521,149 | 62,983 | 384,909 | 73,257 | | | |
| Other broadleaves | 357,793 | 63,492 | 242,619 | 51,682 | | | |
| Oriental hornbeam | 268,877 | 191,909 | 76,968 | | | | |
| Cherry | 186,508 | 33,275 | 105,579 | 47,654 | | | |
| Pubescent oak | 184,974 | 37,207 | 135,427 | 12,340 | | | |
| Large-leaved lime | 137,041 | 15,378 | 58,653 | 63,010 | | | |
| Common oak | 124,935 | 6,041 | 31,169 | 87,725 | | | |
| Smooth-leaved elm | 104,828 | 41,140 | 51,442 | 12,246 | | | |
| Silver lime | 103,761 | | 52,867 | 35,207 | 15,687 | | |
| Aspen | 97,414 | 11,997 | 81,709 | 3,708 | | | |
| Hop hornbeam | 84,651 | 19,551 | 54,611 | 10,489 | | | |
| Narrow-leaved ash | 55,456 | | 47,802 | 7,654 | | | |
| Birch | 45,031 | 17,302 | 20,456 | 7,273 | | | |
| White ash | 29,988 | 7,569 | 18,613 | 3,806 | | | |
| Small-leaved lime | 27,473 | | 27,473 | | | | |
| Turkish hazel | 22,740 | | 16,894 | 5,846 | | | |
| Alder | 18,968 | | 10,932 | 8,036 | | | |
| Wild service tree | 15,148 | 5,404 | 9,744 | | | | |
| Maple | 13,903 | 6,890 | 7,013 | | | | |
| Common walnut | 13,026 | | 6,784 | 6,242 | | | |
| **Total broadleaves** | **49,436,199** | **5,374,283** | **31,070,369** | **10,769,514** | **1,851,313** | **230,232** | **140,492** |
| Austrian pine | 59,285 | 4,669 | 40,444 | 14,172 | | | |
| Spruce | 28,728 | 20,230 | 8,498 | | | | |
| Scots pine | 17,782 | 9,620 | 8,162 | | | | |
| Douglas-fir | 10,415 | | 10,415 | | | | |
| Weymouth pine | 9,688 | 9,054 | 634 | | | | |
| Other conifers | 2,829 | 2,829 | | | | | |
| **Total conifers** | **128,727** | **46,402** | **68,153** | **14,172** | | | |
| **TOTAL** | **49,564,926** | **5,420,685** | **31,138,522** | **10,783,686** | **1,851,313** | **230,232** | **140,492** |

**Table 8.29.** Hungarian oak forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 141,600.0 | 88.7 | 164,284,178 | 92.2 | 1,160 | 17,626,416.0 | 83.6 | 124.5 | 458,248.0 | 86.0 | 3.2 | 2.6 |
| Natural high stands | 18,000.0 | 11.3 | 13,838,148 | 7.8 | 769 | 3,460,239.0 | 16.4 | 192.2 | 74,812.0 | 14.0 | 4.2 | 2.2 |
| **Total** | **159,600.0** | **100.0** | **178,122,326** | **100.0** | **1,116** | **21,086,655.0** | **100.0** | **132.1** | **533,060.0** | **100.0** | **3.3** | **2.5** |

**Table 8.30.** Hungarian oak forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 134,000.0 | 84.0 | 170,796,883 | 95.9 | 1,275 | 18,730,949.9 | 88.9 | 139.8 | 491,736.9 | 92.2 | 3.7 | 2.6 |
| Insufficiently stocked stands | 23,600.0 | 14.8 | 7,144,169 | 4.0 | 303 | 2,307,651.3 | 10.9 | 97.8 | 40,511.3 | 7.6 | 1.7 | 1.8 |
| Devastated stand | 2,000.0 | 1.2 | 181,274 | 0.1 | 91 | 48,053.8 | 0.2 | 24.0 | 811.8 | 0.2 | 0.4 | 1.7 |
| **Total** | **159,600.0** | **100.0** | **178,122,326** | **100.0** | **1,116** | **21,086,655.0** | **100.0** | **132.1** | **533,060.0** | **100.0** | **3.3** | **2.5** |

**Table 8.31.** Hungarian oak forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Mixed broadleaf stands | 84,800.0 | 53.1 | 99,521,429 | 55.9 | 1,174 | 10,872,028.0 | 51.5 | 128.2 | 278,909.0 | 52.3 | 3.3 | 2.6 |
| Pure broadleaf stands | 74,000.0 | 46.4 | 78,176,484 | 43.9 | 1,056 | 10,052,960.0 | 47.7 | 135.9 | 250,717.0 | 47.0 | 3.4 | 2.5 |
| Mixed broadleaf and coniferous stands | 800.0 | 0.5 | 424,413 | 0.2 | 531 | 161,667.0 | 0.8 | 202.1 | 3,434.0 | 0.6 | 4.3 | 2.1 |
| **Total** | **159,600.0** | **100.0** | **178,122,326** | **100.0** | **1,116** | **21,086,655.0** | **100.0** | **132.1** | **533,060.0** | **100.0** | **3.3** | **2.5** |

**Table 8.32.** Hungarian oak forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Hungarian oak | 15,115,415 | 2,074,219 | 10,313,909 | 2,422,729 | 274,981 | 29,577 | |
| Turkey oak | 4,033,598 | 399,431 | 2,983,573 | 543,094 | 107,500 | | |
| Sessile oak | 395,946 | 48,864 | 221,411 | 88,636 | 37,035 | | |
| Hornbeam | 329,085 | 141,460 | 166,722 | 20,903 | | | |
| Black locust | 288,362 | 81,011 | 175,579 | 31,772 | | | |
| Beech | 253,838 | 24,050 | 89,835 | 100,663 | 39,290 | | |
| Flowering ash | 159,101 | 73,336 | 81,587 | 4,178 | | | |
| Oriental hornbeam | 99,200 | 72,773 | 26,427 | | | | |
| Field maple | 96,868 | 8,969 | 69,553 | 18,346 | | | |
| Other broadleaves | 74,270 | 19,382 | 50,872 | 4,016 | | | |
| Large-leaved lime | 64,230 | 1,415 | 13,825 | 48,990 | | | |
| Cherry | 43,099 | 14,968 | 28,131 | | | | |
| Aspen | 25,695 | 5,532 | 16,100 | 4,063 | | | |
| Alder | 18,412 | | 11,198 | 7,214 | | | |
| Pubescent oak | 17,161 | 3,820 | 13,341 | | | | |
| Small-leaved lime | 9,949 | | 9,949 | | | | |
| White ash | 4,920 | | 4,920 | | | | |
| Silver lime | 4,025 | | 4,025 | | | | |
| **Total broadleaves** | **21,033,172** | **2,969,230** | **14,280,957** | **3,294,604** | **458,806** | **29,577** | |
| Austrian pine | 53,483 | | 39,659 | 13,824 | | | |
| **Total conifers** | **53,483** | | **39,659** | **13,824** | | | |
| **TOTAL** | **21,086,655** | **2,969,230** | **14,320,616** | **3,308,428** | **458,806** | **29,577** | |

**Table 8.33.** Pubescent oak forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 10,400.0 | 100.0 | 12,554,416 | 100.0 | 1,207 | 907,212.0 | 100.0 | 87.2 | 27,532.0 | 100.0 | 2.6 | 3.0 |
| **TOTAL** | **10,400.0** | **100.0** | **12,554,416** | **100.0** | **1,207** | **907,212.0** | **100.0** | **87.2** | **27,532.0** | **100.0** | **2.6** | **3.0** |

**Table 8.34.** Pubescent oak forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 8,000.0 | 76.9 | 11,824,542 | 94.2 | 1,478 | 818,117.6 | 90.2 | 102.3 | 25,552.7 | 92.8 | 3.2 | 3.1 |
| Insufficiently stocked stands | 2,000.0 | 19.3 | 676,939 | 5.4 | 338 | 86,724.8 | 9.5 | 43.4 | 1,913.8 | 7.0 | 1.0 | 2.2 |
| Devastated stand | 400.0 | 3.8 | 52,935 | 0.4 | 132 | 2,369.6 | 0.3 | 5.9 | 65.5 | 0.2 | 0.2 | 2.7 |
| **TOTAL** | **10,400.0** | **100.0** | **12,554,416** | **100.0** | **1,207** | **907,212.0** | **100.0** | **87.2** | **27,532.0** | **100.0** | **2.6** | **3.0** |

**Table 8.35.** Pubescent oak forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 5,200.0 | 50.0 | 5,395,981 | 43.0 | 1,038 | 483,476.0 | 53.3 | 93.0 | 13,806.0 | 50.1 | 2.7 | 2.9 |
| Mixed broadleaf stands | 4,400.0 | 42.3 | 5,967,249 | 47.5 | 1,356 | 363,438.0 | 40.1 | 82.6 | 10,782.0 | 39.2 | 2.5 | 3.0 |
| Mixed broadleaf and coniferous stands | 800.0 | 7.7 | 1,191,186 | 9.5 | 1,489 | 60,298.0 | 6.6 | 75.4 | 2,944.0 | 10.7 | 3.7 | 4.9 |
| **TOTAL** | **10,400.0** | **100.0** | **12,554,416** | **100.0** | **1,207** | **907,212.0** | **100.0** | **87.2** | **27,532.0** | **100.0** | **2.6** | **3.0** |

**Table 8.36.** Pubescent oak forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Pubescent oak | 602,973 | 100,360 | 258,063 | 165,543 | 29,468 | | 49,539 |
| Flowering ash | 77,527 | 47,039 | 30,488 | | | | |
| Turkey oak | 74,152 | | 62,081 | 12,071 | | | |
| Oriental hornbeam | 37,137 | 6,225 | 30,912 | | | | |
| Hop hornbeam | 34,789 | 3,367 | 31,422 | | | | |
| Silver lime | 21,253 | 19,721 | 1,532 | | | | |
| Sessile oak | 10,049 | 2,617 | 7,432 | | | | |
| Hornbeam | 10,007 | 4,937 | 5,070 | | | | |
| Hungarian oak | 7,837 | | 7,837 | | | | |
| Field maple | 5,987 | | 5,987 | | | | |
| Other broadleaves | 3,238 | 1,669 | 1,569 | | | | |
| Turkish hazel | 2,997 | | 2,997 | | | | |
| Cherry | 736 | 736 | | | | | |
| Black locust | 410 | | 410 | | | | |
| **Total broadleaves** | **889,091** | **186,671** | **445,800** | **177,614** | **29,468** | | **49,539** |
| Austrian pine | 11,520 | 7,074 | 4,446 | | | | |
| Scots pine | 6,601 | 5,234 | 1,367 | | | | |
| **Total conifers** | **18,121** | **12,308** | **5,813** | | | | |
| **TOTAL** | **907,212** | **198,979** | **451,613** | **177,614** | **29,468** | | **49,539** |

**Table 8.37.** Forests of oriental hornbeam, hop hornbeam and flowering ash by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 87,200.0 | 100.0 | 129,961,443 | 100.0 | 1,490 | 4,794,933.0 | 100.0 | 55.0 | 133,127.0 | 100.0 | 1.5 | 2.7 |
| **Total** | **87,200.0** | **100.0** | **129,961,443** | **100.0** | **1,490** | **4,794,933.0** | **100.0** | **55.0** | **133,127.0** | **100.0** | **1.5** | **2.8** |

**Table 8.38.** Forests of oriental hornbeam, hop hornbeam and flowering ash by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 63,600.0 | 72.9 | 123,441,391 | 95.0 | 1,941 | 4,488,316.3 | 93.6 | 70.6 | 126.016.0 | 94.7 | 2.0 | 2.8 |
| Insufficiently stocked stands | 22,800.0 | 26.2 | 6,520,052 | 5.0 | 286 | 306,616.7 | 6.4 | 13.4 | 7,111.0 | 5.3 | 0.3 | 2.3 |
| Devastated stand | 800.0 | 0.9 | | | | | | | | | | |
| **Total** | **87,200.0** | **100.0** | **129,961,443** | **100.0** | **1,490** | **4,794,933.0** | **100.0** | **55.0** | **133,127.0** | **100.0** | **1.5** | **2.8** |

**Table 8.39.** Forests of oriental hornbeam, hop hornbeam and flowering ash by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Mixed broadleaf stands | 46,000.0 | 52.8 | 76,541,470 | 58.9 | 1,664 | 3,103,531.0 | 64.7 | 67.5 | 85,828.0 | 64.5 | 1.9 | 2.8 |
| Pure broadleaf stands | 41,200.0 | 47.2 | 53,419,973 | 41.1 | 1,297 | 1,691,402.0 | 35.3 | 41.1 | 47,299.0 | 35.5 | 1.1 | 2.8 |
| **Total** | **87,200.0** | **100.0** | **129,961,443** | **100.0** | **1,490** | **4,794,933.0** | **100.0** | **55.0** | **133,127.0** | **100.0** | **1.5** | **2.8** |

**Table 8.40.** Forests of oriental hornbeam, hop hornbeam and flowering ash by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Flowering ash | 1,347,925 | 620,682 | 653,694 | 47,456 | 26,093 | | |
| Oriental hornbeam | 1,024,800 | 753,814 | 251,178 | 10,862 | 8,946 | | |
| Hop hornbeam | 973,676 | 196,079 | 713,763 | 45,725 | 18,109 | | |
| Hornbeam | 262,144 | 71,712 | 149,897 | 34,368 | 6,167 | | |
| Turkey oak | 218,173 | | 173,097 | 17,109 | 27,967 | | |
| Sessile oak | 178,654 | 25,521 | 120,089 | 15,806 | 17,238 | | |
| Beech | 164,513 | 8,814 | 29,589 | 61,517 | 64,593 | | |
| Field maple | 154,659 | 54,891 | 83,114 | 16,654 | | | |
| Other broadleaves | 113,227 | 12,449 | 83,110 | 11,981 | 5,687 | | |
| Black locust | 53,063 | 19,834 | 33,229 | | | | |
| Hungarian oak | 49,674 | 10,044 | 36,455 | 3,175 | | | |
| Maple | 47,029 | 11,940 | 35,089 | | | | |
| Pubescent oak | 38,081 | | 23,160 | 14,921 | | | |
| Small-leaved lime | 37,673 | | 27,987 | 9,686 | | | |
| Turkish hazel | 32,635 | | 21,079 | 11,556 | | | |
| Large-leaved lime | 30,548 | | 7,295 | 7,362 | 15,891 | | |
| Cherry | 24,904 | | 13,954 | 10,950 | | | |
| White ash | 17,673 | 2,150 | 5,196 | | 10,327 | | |
| Aspen | 11,477 | | 11,477 | | | | |
| Wild service tree | 11,077 | 9,238 | 1,839 | | | | |
| Silver lime | 3,327 | | 3,327 | | | | |
| **TOTAL** | **4,794,933** | **1,797,168** | **2,477,618** | **319,128** | **201,018** | | |

**Table 8.41.** Lime forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 30,400.0 | 100.0 | 30,556,001 | 100.0 | 1,005 | 6,133,564.0 | 100.0 | 201.8 | 120,698.0 | 100.0 | 4.0 | 2.0 |
| **TOTAL** | **30,400.0** | **100.0** | **30,556,001** | **100.0** | **1,005** | **6,133,564.0** | **100.0** | **201.8** | **120,698.0** | **100.0** | **4.0** | **2.0** |

**Table 8.42.** Lime forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 21,200.0 | 69.8 | 27,871,421 | 91.2 | 1,315 | 3,965,408.4 | 64.6 | 187.0 | 89,715.2 | 74.3 | 4.2 | 2.3 |
| Insufficiently stocked stands | 8,800.0 | 28.9 | 2,646,383 | 8.7 | 301 | 2,163,435.8 | 35.3 | 245.8 | 30,883.3 | 25.6 | 3.5 | 1.4 |
| Devastated stand | 400.0 | 1.3 | 38,197 | 0.1 | 95 | 4,719.8 | 0.1 | 11.8 | 99.5 | 0.1 | 0.2 | 2.1 |
| **TOTAL** | **30,400.0** | **100.0** | **30,556,001** | **100.0** | **1,005** | **6,133,564.0** | **100.0** | **201.8** | **120,698.0** | **100.0** | **4.0** | **2.0** |

**Table 8.43.** Lime forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Mixed broadleaf stands | 16,000.0 | 52.7 | 11,556,679 | 37.8 | 722 | 3,208,710.0 | 52.3 | 200.5 | 57,949.0 | 48.0 | 3.6 | 1.8 |
| Pure broadleaf stands | 13,200.0 | 43.4 | 17,178,204 | 56.2 | 1,301 | 2,601,668.0 | 42.4 | 197.1 | 53,593.0 | 44.4 | 4.1 | 2.1 |
| Mixed broadleaf and coniferous stands | 1,200.0 | 3.9 | 1,821,118 | 6.0 | 1,518 | 323,186.0 | 5.3 | 269.3 | 9,156.0 | 7.6 | 7.6 | 2.8 |
| **TOTAL** | **30,400.0** | **100.0** | **30,556,001** | **100.0** | **1,005** | **6,133,564.0** | **100.0** | **201.8** | **120,698.0** | **100.0** | **4.0** | **2.0** |

**Table 8.44.** Lime forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Large-leaved lime | 2,160,556 | 161,330 | 847,042 | 743,913 | 362,661 | | 45,610 |
| Silver lime | 1,335,969 | 38,056 | 284,615 | 804,304 | 208,994 | | |
| Small-leaved lime | 664,013 | 96,328 | 159,470 | 297,215 | 111,000 | | |
| Hornbeam | 399,909 | 57,558 | 245,477 | 88,183 | 8,691 | | |
| Beech | 299,179 | 2,674 | 47,456 | 125,360 | 123,689 | | |
| Sessile oak | 292,254 | 5,503 | 92,790 | 155,285 | 38,676 | | |
| Turkey oak | 218,841 | | 22,972 | 136,652 | 59,217 | | |
| Other broadleaves | 131,211 | 5,829 | 87,344 | 38,038 | | | |
| Field maple | 90,173 | 1,839 | 82,316 | 6,018 | | | |
| Black locust | 78,725 | 19,706 | 48,303 | 10,716 | | | |
| Hungarian oak | 78,349 | 8,460 | 23,561 | 46,328 | | | |
| White ash | 67,850 | | 1,407 | 34,277 | 32,166 | | |
| Flowering ash | 53,887 | | 53,887 | | | | |
| Aspen | 40,562 | | | 15,536 | 25,026 | | |
| Common oak | 38,984 | | 23,640 | 15,344 | | | |
| Norway maple | 37,817 | | 33,214 | 4,603 | | | |
| Hop hornbeam | 26,865 | | 4,806 | 22,059 | | | |
| Maple | 14,337 | | 7,605 | 6,732 | | | |
| Cherry | 11,135 | | 6,337 | 4,798 | | | |
| Birch | 4,072 | | 4,072 | | | | |
| Common walnut | 2,205 | | 2,205 | | | | |
| Oriental hornbeam | 1,473 | | 1,473 | | | | |
| Wild service tree | 1,423 | | 1,423 | | | | |
| Turkish hazel | 1,401 | 1,401 | | | | | |
| **Total broadleaves** | **6,051,192** | **398,684** | **2,081,415** | **2,555,361** | **970,120** | | **45,610** |
| Austrian pine | 53,465 | 3,395 | 7,251 | 42,819 | | | |
| Other conifers | 27,686 | | 27,686 | | | | |
| Spruce | 1,221 | | 1,221 | | | | |
| **Total conifers** | **82,372** | **3,395** | **36,158** | **42,819** | | | |
| **TOTAL** | **6,133,564** | **402,079** | **2,117,573** | **2,598,180** | **970,120** | | **45,610** |

**Table 8.45.** Sessile oak forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 128,400.0 | 74.1 | 134,474,340 | 82.3 | 1,047 | 13,391,912.0 | 62.0 | 104.3 | 364,689.0 | 67.3 | 2.8 | 2.7 |
| Natural high stands | 44,800.0 | 25.9 | 28,921,314 | 17.7 | 646 | 8,204,144.0 | 38.0 | 183.1 | 177,133.5 | 32.7 | 4.0 | 2.2 |
| **Total** | **173,200.0** | **100.0** | **163,395,654** | **100.0** | **943** | **21,596,056.0** | **100.0** | **124.7** | **541,822.5** | **100.0** | **3.1** | **2.5** |

**Table 8.46.** Sessile oak forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 127,600.0 | 73.7 | 151,911,129 | 93.0 | 1,191 | 16,878,212.6 | 78.2 | 132.3 | 460,287.9 | 85.0 | 3.6 | 2.7 |
| Insufficiently stocked stands | 40,400.0 | 23.3 | 11,173,289 | 6.8 | 277 | 4,597,654.6 | 21.2 | 113.8 | 79,328.4 | 14.6 | 2.0 | 1.7 |
| Devastated stands | 5,200.0 | 3.0 | 311,236 | 0.2 | 60 | 120,188.8 | 0.6 | 23.1 | 2,206.2 | 0.4 | 0.4 | 1.8 |
| **Total** | **173,200.0** | **100.0** | **163,395,654** | **100.0** | **943** | **21,596,056.0** | **100.0** | **124.7** | **541,822.5** | **100.0** | **3.1** | **2.5** |

**Table 8.47.** Sessile oak forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 99,600.0 | 57.5 | 81,551,503 | 49.9 | 819 | 11,846,633.0 | 54.9 | 118.9 | 309,662.0 | 57.2 | 3.1 | 2.6 |
| Mixed broadleaf stands | 70,800.0 | 40.9 | 79,792,821 | 48.8 | 1,127 | 9,434,826.0 | 43.6 | 133.3 | 223,129.0 | 41.1 | 3.2 | 2.4 |
| Mixed broadleaf and coniferous stands | 2,800.0 | 1.6 | 2,051,330 | 1.3 | 733 | 314,597.0 | 1.5 | 112.4 | 9,031.5 | 1.7 | 3.2 | 2.9 |
| **Total** | **173,200.0** | **100.0** | **163,395,654** | **100.0** | **943** | **21,596,056.0** | **100.0** | **124.7** | **541,822.5** | **100.0** | **3.1** | **2.5** |

**Table 8.48.** Sessile oak forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Sessile oak | 15,658,099 | 906,608 | 7,706,687 | 4,678,806 | 1,901,585 | 275,533 | 188,880 |
| Turkey oak | 2,003,663 | 69,250 | 1,134,968 | 589,003 | 210,442 | | |
| Hornbeam | 963,619 | 275,098 | 484,186 | 88,567 | 115,768 | | |
| Beech | 755,889 | 66,421 | 431,940 | 191,408 | 44,413 | 21,707 | |
| Flowering ash | 442,895 | 183,158 | 239,070 | 20,667 | | | |
| Large-leaved lime | 314,357 | 7,682 | 114,459 | 88,779 | 78,841 | 24,596 | |
| Hungarian oak | 282,763 | 23,470 | 202,230 | 37,579 | 19,484 | | |
| Field maple | 155,526 | 36,607 | 112,197 | 6,722 | | | |
| Other broadleaves | 134,494 | 24,758 | 91,598 | 18,138 | | | |
| Oriental hornbeam | 117,839 | 82,393 | 35,446 | | | | |
| Silver lime | 114,811 | 7,187 | 73,321 | 34,303 | | | |
| Hop hornbeam | 74,359 | 23,385 | 48,351 | 2,623 | | | |
| Small-leaved lime | 66,623 | 10,313 | 17,418 | 38,892 | | | |
| Black locust | 63,823 | 15,208 | 42,571 | 6,044 | | | |
| White ash | 59,967 | 9,507 | 26,783 | 23,677 | | | |
| Cherry | 50,443 | 7,922 | 42,521 | | | | |
| Norway maple | 38,935 | | 24,362 | 7,652 | 6,921 | | |
| Wild service tree | 38,561 | 10,497 | 20,793 | 7,271 | | | |
| Aspen | 36,005 | | 36,005 | | | | |
| Pubescent oak | 26,767 | 12,308 | 10,009 | 4,450 | | | |
| Common walnut | 20,493 | | 11,913 | 8,580 | | | |
| Birch | 14,739 | 4,612 | 10,127 | | | | |
| Wych elm | 7,353 | | 7,353 | | | | |
| Maple | 3,646 | 1,698 | 1,948 | | | | |
| **Total broadleaves** | **21,445,671** | **1,778,082** | **10,926,256** | **5,853,161** | **2,377,454** | **321,836** | **188,880** |
| Austrian pine | 150,385 | | 54,716 | 81,642 | 14,026 | | |
| **Total conifers** | **150,385** | | **54,716** | **81,642** | **14,026** | | |
| **TOTAL** | **21,596,056** | **1,778,082** | **10,980,972** | **5,934,803** | **2,391,480** | **321,836** | **188,880** |

**Table 8.49.** Forests of birch, aspen and black locust by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 197,200.0 | 88.4 | 218,711,121 | 89.4 | 1,109 | 11,488,103.0 | 85.7 | 58.3 | 526,178.0 | 85.3 | 2.7 | 4.6 |
| Natural high stands | 18,400.0 | 8.2 | 15,564,154 | 6.4 | 846 | 1,331,776.0 | 10.0 | 72.4 | 64,406.0 | 10.4 | 3.5 | 4.8 |
| Artificially established stands | 7,600.0 | 3.4 | 10,339,695 | 4.2 | 1,360 | 582,249.0 | 4.3 | 76.6 | 26,603.0 | 4.3 | 3.5 | 4.6 |
| **TOTAL** | **223,200.0** | **100.0** | **244,614,970** | **100.0** | **1,096** | **13,402,128.0** | **100.0** | **60.0** | **617,187.0** | **100.0** | **2.8** | **4.6** |

**Table 8.50.** Forests of birch, aspen and black locust by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 181,200.0 | 81.2 | 233,719,397 | 95.5 | 1,290 | 11,768,793.3 | 87.8 | 64.9 | 560,545.3 | 90.8 | 3.1 | 4.8 |
| Insufficiently stocked stands | 38,000.0 | 17.0 | 10,757,880 | 4.4 | 283 | 1,616,237.2 | 12.1 | 42.5 | 55,999.6 | 9.1 | 1.5 | 3.5 |
| Devastated stands | 4,000.0 | 1.8 | 137,693 | 0.1 | 34 | 17,097.5 | 0.1 | 4.3 | 642.1 | 0.1 | 0.2 | 3.8 |
| **TOTAL** | **223,200.0** | **100.0** | **244,614,970** | **100.0** | **1,096** | **13,402,128.0** | **100.0** | **60.0** | **617,187.0** | **100.0** | **2.8** | **4.6** |

**Table 8.51.** Forests of birch, aspen and black locust by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 165,600.0 | 74.2 | 180,668,207 | 73.9 | 1,091 | 9,542,719.0 | 71.2 | 57.6 | 456,471.0 | 74.0 | 2.8 | 4.8 |
| Mixed broadleaf stands | 56,800.0 | 25.4 | 63,902,907 | 26.1 | 1,125 | 3,853,275.0 | 28.8 | 67.8 | 160,411.0 | 26.0 | 2.8 | 4.2 |
| Mixed broadleaf and coniferous stands | 800.0 | 0.4 | 43,856 | 0.0 | 55 | 6,134.0 | 0.0 | 7.7 | 305.0 | 0.0 | 0.4 | 5.0 |
| **TOTAL** | **223,200.0** | **100.0** | **244,614,970** | **100.0** | **1,096** | **13,402,128.0** | **100.0** | **60.0** | **617,187.0** | **100.0** | **2.8** | **4.6** |

**Table 8.52.** Forests of birch, aspen and black locust by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Black locust | 9,352,167 | 2,523,412 | 5,818,564 | 909,023 | 101,168 | | |
| Aspen | 1,162,349 | 178,623 | 828,028 | 155,698 | | | |
| Birch | 473,575 | 53,589 | 330,254 | 89,732 | | | |
| Turkey oak | 350,892 | 30,006 | 179,302 | 126,415 | 15,169 | | |
| Other broadleaves | 312,134 | 96,912 | 174,390 | 30,393 | 10,439 | | |
| Hornbeam | 225,330 | 68,617 | 145,509 | 11,204 | | | |
| Smooth-leaved elm | 221,017 | 105,311 | 93,606 | 22,100 | | | |
| Beech | 167,908 | 11,742 | 123,769 | 32,397 | | | |
| Cherry | 165,217 | 28,733 | 96,936 | 39,548 | | | |
| Hungarian oak | 140,632 | 18,717 | 68,667 | 40,336 | 12,912 | | |
| Field maple | 136,371 | 23,803 | 82,668 | 29,900 | | | |
| Black poplar | 107,290 | | 12,746 | 16,908 | 77,636 | | |
| Sessile oak | 105,011 | 10,412 | 71,097 | 23,502 | | | |
| Narrow-leaved ash | 71,593 | | 17,248 | 54,345 | | | |
| Flowering ash | 70,090 | 25,473 | 44,617 | | | | |
| Common walnut | 64,656 | 11,346 | 39,637 | 13,673 | | | |
| Alder | 54,828 | 6,451 | 14,179 | 21,607 | 12,591 | | |
| Common oak | 40,669 | | | 24,247 | 16,422 | | |
| Large-leaved lime | 34,898 | 2,745 | 27,315 | 4,838 | | | |
| White ash | 32,198 | 3,211 | 16,393 | 12,594 | | | |
| Small-leaved lime | 24,448 | 16,085 | 5,027 | 3,336 | | | |
| European hackberry | 20,990 | 12,407 | 3,186 | 5,397 | | | |
| European white elm | 17,534 | 11,742 | 5,792 | | | | |
| White poplar | 11,847 | 5,192 | | 6,655 | | | |
| Turkish hazel | 11,509 | 6,904 | 4,605 | | | | |
| Oriental hornbeam | 10,392 | 2,433 | 7,959 | | | | |
| Pubescent oak | 7,129 | 3,395 | 3,734 | | | | |
| Silver lime | 1,210 | | 1,210 | | | | |
| Hop hornbeam | 1,178 | | 1,178 | | | | |
| **Total broadleaves** | **13,395,063** | **3,257,261** | **8,217,616** | **1,673,848** | **246,337** | | |
| Austrian pine | 5,440 | | 1,598 | 3,842 | | | |
| Spruce | 1,625 | | 1,625 | | | | |
| **Total conifers** | **7,065** | | **3,223** | **3,842** | | | |
| **TOTAL** | **13,402,128** | **3,257,261** | **8,220,839** | **1,677,690** | **246,337** | | |

**Table 8.53.** Forests of ash and maple by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 7,600.0 | 59.4 | 10,673,201 | 72.4 | 1,404 | 706,515.0 | 44.6 | 93.0 | 21,952.0 | 50.9 | 2.9 | 3.1 |
| Natural high stands | 4,400.0 | 34.4 | 3,323,495 | 22.6 | 755 | 676,958.0 | 42.8 | 153.9 | 15,528.0 | 36.0 | 3.5 | 2.3 |
| Artificially established stands | 800.0 | 6.2 | 739,894 | 5.0 | 925 | 199,802.0 | 12.6 | 249.8 | 5,632.0 | 13.1 | 7.0 | 2.8 |
| **TOTAL** | **12,800.0** | **100.0** | **14,736,590** | **100.0** | **1,151** | **1,583,275.0** | **100.0** | **123.7** | **43,112.0** | **100.0** | **3.4** | **2.7** |

**Table 8.54.** Forests of ash and maple by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 9,600.0 | 75.0 | 13,939,484 | 94.6 | 1,452 | 1,201,427.0 | 75.9 | 125.1 | 36,414.1 | 84.4 | 3.8 | 3.0 |
| Insufficiently stocked stands | 2,400.0 | 18.8 | 743,347 | 5.0 | 310 | 301,209.0 | 19.0 | 125.5 | 5,850.5 | 13.6 | 2.4 | 1.9 |
| Devastated stands | 800.0 | 6.2 | 53,759 | 0.4 | 67 | 80,638.0 | 5.1 | 100.8 | 847.4 | 2.0 | 1.1 | 1.1 |
| **TOTAL** | **12,800.0** | **100.0** | **14,736,590** | **100.0** | **1,151** | **1,583,275.0** | **100.0** | **123.7** | **43,112.0** | **100.0** | **3.4** | **2.7** |

**Table 8.55.** Forests of ash and maple by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Mixed broadleaf stands | 8,000.0 | 62.5 | 7,074,792 | 48.0 | 884 | 1,163,925.0 | 73.5 | 145.5 | 26,873.0 | 62.3 | 3.4 | 2.3 |
| Pure broadleaf stands | 4,800.0 | 37.5 | 7,661,798 | 52.0 | 1,596 | 419,350.0 | 26.5 | 87.4 | 16,239.0 | 37.7 | 3.4 | 3.9 |
| **TOTAL** | **12,800.0** | **100.0** | **14,736,590** | **100.0** | **1,151** | **1,583,275.0** | **100.0** | **123.7** | **43,112.0** | **100.0** | **3.4** | **2.7** |

**Table 8.56.** Forests of ash and maple by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Maple | 633,231 | 116,699 | 268,569 | 159,844 | 40,307 | | 47,812 |
| White ash | 310,537 | 42,470 | 182,005 | 49,426 | 36,636 | | |
| Hornbeam | 174,889 | 33,104 | 114,097 | 27,688 | | | |
| Beech | 143,514 | | 44,941 | 85,454 | 13,119 | | |
| Norway maple | 91,058 | | 36,893 | 38,107 | 16,058 | | |
| Large-leaved lime | 53,089 | | 19,111 | 33,978 | | | |
| Flowering ash | 32,830 | 15,548 | 17,282 | | | | |
| Wych elm | 24,382 | 2,405 | 21,977 | | | | |
| Sessile oak | 22,268 | 3,395 | 3,209 | 15,664 | | | |
| Other broadleaves | 20,930 | 4,131 | 13,223 | 3,576 | | | |
| Cherry | 17,749 | | 3,402 | 14,347 | | | |
| Field maple | 14,061 | | 1,105 | 12,956 | | | |
| Turkey oak | 11,583 | | | 11,583 | | | |
| Hungarian oak | 8,904 | | 8,904 | | | | |
| Oriental hornbeam | 7,418 | 3,650 | 3,768 | | | | |
| Hop hornbeam | 7,323 | | 7,323 | | | | |
| Balkan maple | 4,089 | 4,089 | | | | | |
| Birch | 1,946 | | 1,946 | | | | |
| Turkish hazel | 1,923 | | 1,923 | | | | |
| Black locust | 1,553 | 990 | 563 | | | | |
| **TOTAL** | **1,583,275** | **226,481** | **750,240** | **452,622** | **106,120** | | **47,812** |

**Table 8.57.** Beech forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 350,800.0 | 53.1 | 185,872,066 | 38.7 | 530 | 94,298,763.0 | 61.3 | 268.8 | 1,762,121.0 | 60.2 | 5.0 | 1.9 |
| Natural coppice stands | 309,600.0 | 46.9 | 294,921,620 | 61.3 | 953 | 59,537,907.0 | 38.7 | 192.3 | 1,166,717.0 | 39.8 | 3.8 | 2.0 |
| **Total** | **660,400.0** | **100.0** | **480,793,686** | **100.0** | **728** | **153,836,670.0** | **100.0** | **232.9** | **2,928,838.0** | **100.0** | **4.4** | **1.9** |

**Table 8.58.** Beech forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 395,200.0 | 59.8 | 414,501,502 | 86.2 | 1,049 | 88,311,686.6 | 57.4 | 223.5 | 1,929,090.0 | 65.9 | 4.9 | 2.2 |
| Insufficiently stocked stands | 246,800.0 | 37.4 | 64,927,790 | 13.5 | 263 | 62,699,840.9 | 40.8 | 254.1 | 965,313.0 | 32.9 | 3.9 | 1.5 |
| Devastated stand | 18,400.0 | 2.8 | 1,364,393 | 0.3 | 74 | 2,825,142.5 | 1.8 | 153.5 | 34,435.0 | 1.2 | 1.9 | 1.2 |
| **Total** | **660,400.0** | **100.0** | **480,793,686** | **100.0** | **728** | **153,836,670.0** | **100.0** | **232.9** | **2,928,838.0** | **100.0** | **4.4** | **1.9** |

**Table 8.59.** Beech forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 569,600.0 | 86.3 | 400,648,560 | 83.3 | 703 | 135,915,846.0 | 88.3 | 238.6 | 2,552,603.0 | 87.2 | 4.5 | 1.9 |
| Mixed broadleaf stands | 81,200.0 | 12.3 | 71,966,041 | 15.0 | 886 | 14,600,255.0 | 9.5 | 179.8 | 304,889.0 | 10.4 | 3.8 | 2.1 |
| Mixed broadleaf and coniferous stands | 9,600.0 | 1.4 | 8,179,085 | 1.7 | 852 | 3,320,569.0 | 2.2 | 345.9 | 71,346.0 | 2.4 | 7.4 | 2.1 |
| **Total** | **660,400.0** | **100.0** | **480,793,686** | **100.0** | **728** | **153,836,670.0** | **100.0** | **232.9** | **2,928,838.0** | **100.0** | **4.4** | **1.9** |

**Table 8.60.** Beech forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 140,802,267 | 3,626,187 | 43,207,432 | 49,463,038 | 31,622,867 | 8,626,190 | 4,256,553 |
| Hornbeam | 2,612,217 | 279,495 | 1,618,998 | 522,151 | 165,082 | 26,491 | |
| Sessile oak | 1,777,706 | 42,880 | 737,924 | 719,407 | 226,367 | 51,128 | |
| Turkey oak | 1,702,195 | 72,978 | 814,075 | 655,822 | 159,320 | | |
| Aspen | 545,187 | 6,677 | 269,948 | 253,073 | 15,489 | | |
| Field maple | 515,015 | 50,859 | 352,262 | 88,285 | 23,609 | | |
| Hungarian oak | 477,346 | 4,173 | 310,496 | 63,877 | 76,521 | 22,279 | |
| Maple | 471,207 | 6,578 | 188,163 | 251,114 | 25,352 | | |
| Other broadleaves | 431,667 | 68,939 | 244,641 | 78,731 | 39,356 | | |
| Large-leaved lime | 407,488 | | 110,369 | 216,981 | 80,138 | | |
| Cherry | 396,017 | 12,676 | 210,957 | 124,198 | 48,186 | | |
| Black locust | 238,904 | 45,846 | 186,212 | 6,846 | | | |
| Norway maple | 214,537 | 5,107 | 96,313 | 74,455 | 38,662 | | |
| Hop hornbeam | 212,582 | 22,720 | 174,205 | 15,657 | | | |
| Flowering ash | 205,742 | 58,923 | 107,209 | 39,610 | | | |
| Silver lime | 182,206 | | 32,912 | 81,162 | 68,132 | | |
| Birch | 173,823 | 7,074 | 109,645 | 41,857 | 15,247 | | |
| White ash | 164,449 | 11,572 | 61,637 | 61,598 | 29,642 | | |
| Wych elm | 133,118 | 5,305 | 50,777 | 77,036 | | | |
| Balkan maple | 91,229 | 13,369 | 54,610 | 13,036 | 10,214 | | |
| Alder | 71,369 | | 29,688 | 10,852 | 30,829 | | |
| Small-leaved lime | 67,747 | | 10,075 | 37,078 | 20,594 | | |
| Turkish hazel | 46,754 | 24,998 | 14,509 | 7,247 | | | |
| Oriental hornbeam | 44,789 | 13,971 | 20,078 | | 10,740 | | |
| Wild service tree | 44,054 | | 25,760 | 18,294 | | | |
| Pubescent oak | 37,369 | | 23,153 | 14,216 | | | |
| Mountain ash | 3,377 | | | 3,377 | | | |
| Common walnut | 2,083 | | 2,083 | | | | |
| **Total broadleaves** | **152,072,443** | **4,380,327** | **49,064,131** | **52,938,998** | **32,706,347** | **8,726,088** | **4,256,553** |
| Spruce | 884,461 | 31,407 | 184,289 | 361,999 | 306,766 | | |
| Fir | 687,632 | | 190,613 | 330,340 | 166,679 | | |
| Austrian pine | 172,671 | | 86,731 | 85,940 | | | |
| Scots pine | 17,068 | | 12,796 | 4,272 | | | |
| Yew | 2,395 | | 2,395 | | | | |
| **Total conifers** | **1,764,227** | **31,407** | **476,824** | **782,551** | **473,445** | | |
| **TOTAL** | **153,836,670** | **4,411,734** | **49,540,955** | **53,721,549** | **33,179,792** | **8,726,088** | **4,256,553** |

**Table 8.61.** Pine forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Artificially established stands | 86,000.0 | 68.3 | 90,978,071 | 74.2 | 1,058 | 11,160,760.0 | 67.8 | 129.8 | 615,546.0 | 69.3 | 7.2 | 5.5 |
| Natural high stands | 40,000.0 | 31.7 | 31,693,998 | 25.8 | 792 | 5,290,042.0 | 32.2 | 132.3 | 272,095.0 | 30.7 | 6.8 | 5.1 |
| **Total** | **126,000.0** | **100.0** | **122,672,069** | **100.0** | **974** | **16,450,802.0** | **100.0** | **130.6** | **887,641.0** | **100.0** | **7.0** | **5.4** |

**Table 8.62.** Pine forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 101,600.0 | 80.6 | 116,364,606 | 94.9 | 1,145 | 14,851,757.4 | 90.3 | 146.2 | 827,374.9 | 93.2 | 8.1 | 5.6 |
| Insufficiently stocked stands | 22,400.0 | 17.8 | 6,149,143 | 5.0 | 275 | 1,562,647.4 | 9.5 | 69.8 | 58,693.8 | 6.6 | 2.6 | 3.8 |
| Devastated stands | 2,000.0 | 1.6 | 158,321 | 0.1 | 79 | 36,397.2 | 0.2 | 18.2 | 1,572.3 | 0.2 | 0.8 | 4.3 |
| **Total** | **126,000.0** | **100.0** | **122,672,069** | **100.0** | **974** | **16,450,802.0** | **100.0** | **130.6** | **887,641.0** | **100.0** | **7.0** | **5.4** |

**Table 8.63.** Pine forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Pure coniferous stands | 106,800.0 | 84.8 | 104,657,691 | 85.3 | 980 | 13,984,610.0 | 85.0 | 130.9 | 780,267.0 | 87.9 | 7.3 | 5.6 |
| Mixed broadleaf and coniferous stands | 13,200.0 | 10.5 | 11,858,990 | 9.7 | 898 | 1,363,097.0 | 8.3 | 103.3 | 58,868.0 | 6.6 | 4.5 | 4.3 |
| Mixed stands of conifers | 6,000.0 | 4.7 | 6,155,388 | 5.0 | 1,026 | 1,103,095.0 | 6.7 | 183.8 | 48,506.0 | 5.5 | 8.1 | 4.4 |
| **Total** | **126,000.0** | **100.0** | **122,672,069** | **100.0** | **974** | **16,450,802.0** | **100.0** | **130.6** | **887,641.0** | **100.0** | **7.0** | **5.4** |

**Table 8.64.** Pine forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Austrian pine | 11,736,440 | 977,005 | 7,558,103 | 2,922,559 | 249,104 | 29,669 | |
| Scots pine | 3,376,821 | 250,119 | 2,362,520 | 749,899 | 14,283 | | |
| Spruce | 300,834 | 42,583 | 117,778 | 87,709 | 52,764 | | |
| Fir | 5,718 | | 1,019 | 4,699 | | | |
| **Total conifers** | **15,419,813** | **1,269,707** | **10,039,420** | **3,764,866** | **316,151** | **29,669** | |
| Sessile oak | 225,116 | 48,510 | 139,939 | 26,888 | 9,779 | | |
| Beech | 182,105 | 12,350 | 80,234 | 50,928 | 38,593 | | |
| Turkey oak | 166,924 | 30,147 | 126,634 | 10,143 | | | |
| Black locust | 75,406 | 40,899 | 31,657 | 2,850 | | | |
| Other broadleaves | 71,972 | 10,837 | 53,148 | 7,987 | | | |
| Birch | 61,720 | 11,233 | 47,670 | 2,817 | | | |
| Flowering ash | 52,391 | 32,524 | 19,867 | | | | |
| Hungarian oak | 48,210 | 7,286 | 28,242 | 3,898 | 8,784 | | |
| Large-leaved lime | 40,795 | | 40,795 | | | | |
| Hop hornbeam | 32,355 | 2,122 | 26,902 | 3,331 | | | |
| Maple | 21,683 | | 12,653 | 9,030 | | | |
| Aspen | 14,679 | 4,640 | 6,872 | 3,167 | | | |
| Pubescent oak | 13,896 | | 13,896 | | | | |
| Hornbeam | 10,751 | | 10,751 | | | | |
| Cherry | 9,059 | | 9,059 | | | | |
| Small-leaved lime | 2,391 | | 2,391 | | | | |
| Field maple | 1,033 | 1,033 | | | | | |
| Silver lime | 502 | | 502 | | | | |
| **Total broadleaves** | **1,030,989** | **201,581** | **651,212** | **121,039** | **57,156** | | |
| **TOTAL** | **16,450,802** | **1,471,288** | **10,690,632** | **3,885,905** | **373,307** | **29,669** | |

**Table 8.65.** Fir forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Natural high stands | 24,400.0 | 95.3 | 16,563,384 | 92.1 | 679 | 9,511,196.0 | 96.7 | 389.8 | 216,909.0 | 96.2 | 8.9 | 2.3 |
| Artificially established stand | 1,200.0 | 4.7 | 1,426,028 | 7.9 | 1,188 | 327,667.0 | 3.3 | 273.1 | 8,606.0 | 3.8 | 7.2 | 2.6 |
| **Total** | **25,600.0** | **100.0** | **17,989,412** | **100.0** | **703** | **9,838,863.0** | **100.0** | **384.3** | **225,515.0** | **100.0** | **8.8** | **2.3** |

**Table 8.66.** Fir forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 16,800.0 | 65.6 | 15,262,879 | 84.8 | 909 | 7,402,176.6 | 75.2 | 440.6 | 176,290.0 | 78.2 | 10.5 | 2.4 |
| Insufficiently stocked stands | 8,800.0 | 34.4 | 2,726,534 | 15.2 | 310 | 2,436,686.4 | 24.8 | 276.9 | 49,225.0 | 21.8 | 5.6 | 2.0 |
| **Total** | **25,600.0** | **100.0** | **17,989,412** | **100.0** | **703** | **9,838,863.0** | **100.0** | **384.3** | **225,515.0** | **100.0** | **8.8** | **2.3** |

**Table 8.67.** Fir forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Pure coniferous stands | 12,400.0 | 48.4 | 8,126,841 | 45.2 | 655 | 4,956,670.0 | 50.4 | 399.7 | 118,610.0 | 52.6 | 9.6 | 2.4 |
| Mixed broadleaf and coniferous stands | 10,800.0 | 42.2 | 8,193,212 | 45.5 | 759 | 4,050,522.0 | 41.1 | 375.0 | 85,705.0 | 38.0 | 7.9 | 2.1 |
| Mixed stands of conifers | 2,400.0 | 9.4 | 1,669,359 | 9.3 | 696 | 831,671.0 | 8.5 | 346.5 | 21,200.0 | 9.4 | 8.8 | 2.5 |
| **Total** | **25,600.0** | **100.0** | **17,989,412** | **100.0** | **703** | **9,838,863.0** | **100.0** | **384.3** | **225,515.0** | **100.0** | **8.8** | **2.3** |

**Table 8.68.** Fir forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Fir | 6,954,606 | 109,900 | 2,428,384 | 2,800,078 | 1,571,695 | 44,549 | |
| Spruce | 985,016 | 47,676 | 378,612 | 506,839 | 51,889 | | |
| Scots pine | 110,235 | | 41,837 | 53,382 | 15,016 | | |
| Austrian pine | 65,706 | | 22,706 | 24,385 | 18,615 | | |
| **Total conifers** | **8,115,565** | **157,576** | **2,871,539** | **3,384,684** | **1,657,215** | **44,549** | |
| Beech | 1,369,475 | 13,977 | 319,928 | 466,615 | 517,076 | 51,879 | |
| Aspen | 240,178 | | 161,576 | 78,602 | | | |
| Maple | 74,994 | | 16,663 | | 58,331 | | |
| Hornbeam | 19,960 | 6,281 | | | 13,679 | | |
| Wych elm | 11,892 | | 5,677 | 6,215 | | | |
| Other broadleaves | 6,799 | 5,234 | 1,565 | | | | |
| **Total broadleaves** | **1,723,298** | **25,492** | **505,409** | **551,432** | **589,086** | **51,879** | |
| **TOTAL** | **9,838,863** | **183,068** | **3,376,948** | **3,936,116** | **2,246,301** | **96,428** | |

**Table 8.69.** Spruce forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees*·$ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 54,000.0 | 62.5 | 32,679,468 | 49.1 | 605 | 15,395,326.0 | 81.3 | 285.1 | 431,019.0 | 71.0 | 8.0 | 2.8 |
| Artificially established stands | 32,400.0 | 37.5 | 33,855,733 | 50.9 | 1,045 | 3,530,710.0 | 18.7 | 109.0 | 176,043.0 | 29.0 | 5.4 | 5.0 |
| **TOTAL** | **86,400.0** | **100.0** | **66,535,201** | **100.0** | **770** | **18,926,036.0** | **100.0** | **219.1** | **607,062.0** | **100.0** | **7.0** | **3.2** |

**Table 8.70.** Spruce forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 57,200.0 | 66.2 | 58,918,748 | 88.6 | 1,030 | 12,749,431.2 | 67.4 | 222.9 | 455,063.2 | 75.0 | 8.0 | 3.6 |
| Insufficiently stocked stands | 27,200.0 | 31.5 | 7,469,323 | 11.2 | 275 | 6,040,016.2 | 31.9 | 222.1 | 148,462.4 | 24.4 | 5.5 | 2.5 |
| Devastated stands | 2,000.0 | 2.3 | 147,130 | 0.2 | 74 | 136,588.6 | 0.7 | 68.3 | 3,536.4 | 0.6 | 1.8 | 2.6 |
| **TOTAL** | **86,400.0** | **100.0** | **66,535,201** | **100.0** | **770** | **18,926,036.0** | **100.0** | **219.1** | **607,062.0** | **100.0** | **7.0** | **3.2** |

**Table 8.71.** Spruce forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure coniferous stands | 72,000.0 | 83.3 | 53,461,812 | 80.4 | 743 | 15,292,057.0 | 80.8 | 212.4 | 502,052.0 | 82.7 | 7.0 | 3.3 |
| Mixed stands of conifers | 5,600.0 | 6.5 | 4,678,129 | 7.0 | 835 | 2,092,800.0 | 11.1 | 373.7 | 58,034.0 | 9.6 | 10.4 | 2.8 |
| Mixed broadleaf and coniferous stands | 8,800.0 | 10.2 | 8,395,260 | 12.6 | 954 | 1,541,179.0 | 8.1 | 175.1 | 46,976.0 | 7.7 | 5.3 | 3.0 |
| **TOTAL** | **86,400.0** | **100.0** | **66,535,201** | **100.0** | **770** | **18,926,036.0** | **100.0** | **219.1** | **607,062.0** | **100.0** | **7.0** | **3.2** |

**Table 8.72.** Spruce forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Spruce | 16,575,026 | 1,546,241 | 5,949,889 | 6,301,436 | 2,474,743 | 183,776 | 118,941 |
| Fir | 656,966 | 24,474 | 216,005 | 375,494 | 40,993 | | |
| Austrian pine | 348,916 | | 70,029 | 211,600 | 67,287 | | |
| Scots pine | 240,738 | 14,738 | 111,214 | 114,786 | | | |
| Douglas-fir | 29,686 | | 29,686 | | | | |
| **Total conifers** | **17,851,332** | **1,585,453** | **6,376,823** | **7,003,316** | **2,583,023** | **183,776** | **118,941** |
| Beech | 625,034 | 30,699 | 188,207 | 308,836 | 97,292 | | |
| Turkey oak | 81,257 | 23,711 | 37,525 | 20,021 | | | |
| Birch | 66,873 | 29,780 | 27,024 | 10,069 | | | |
| Aspen | 64,286 | 3,027 | 23,174 | 38,085 | | | |
| Hornbeam | 63,645 | 36,627 | 18,543 | 8,475 | | | |
| Other broadleaves | 58,894 | 30,317 | 25,327 | 3,250 | | | |
| Sessile oak | 45,802 | 11,176 | 7,837 | | 26,789 | | |
| Cherry | 30,490 | 1,754 | 19,369 | 9,367 | | | |
| Large-leaved lime | 18,886 | 18,886 | | | | | |
| Maple | 10,679 | | 10,679 | | | | |
| White ash | 4,342 | | 4,342 | | | | |
| Oriental hornbeam | 3,837 | 3,537 | 300 | | | | |
| Flowering ash | 678 | | 678 | | | | |
| **Total broadleaves** | **1,074,704** | **189,514** | **363,005** | **398,103** | **124,081** | | |
| **TOTAL** | **18,926,036** | **1,774,967** | **6,739,828** | **7,401,419** | **2,707,104** | **183,776** | **118,941** |

**Table 8.73.** Forests of other broadleaves by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 51,200.0 | 95.5 | 56,380,638 | 98.5 | 1,101 | 3,101,836.0 | 94.5 | 60.6 | 96,296.0 | 94.4 | 1.9 | 3.1 |
| Artificially established stands | 2,400.0 | 4.5 | 874,292 | 1.5 | 364 | 181,718.0 | 5.5 | 75.7 | 5,757.0 | 5.6 | 2.4 | 3.2 |
| **TOTAL** | **53,600.0** | **100.0** | **57,254,930** | **100.0** | **1,068** | **3,283,554.0** | **100.0** | **61.3** | **102,053.0** | **100.0** | **1.9** | **3.1** |

**Table 8.74.** Forests of other broadleaves by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 34,800.0 | 64.9 | 52,202,885 | 91.2 | 1,500 | 2,585,215.6 | 78.8 | 74.3 | 84,588.5 | 82.9 | 2.4 | 3.3 |
| Insufficiently stocked stands | 16,000.0 | 29.9 | 4,781,379 | 8.3 | 299 | 631,635.9 | 19.2 | 39.5 | 15,928.4 | 15.6 | 1.0 | 2.5 |
| Devastated stands | 2,800.0 | 5.2 | 270,666 | 0.5 | 97 | 66,702.5 | 2.0 | 23.8 | 1,536.1 | 1.5 | 0.5 | 2.3 |
| **TOTAL** | **53,600.0** | **100.0** | **57,254,930** | **100.0** | **1,068** | **3,283,554.0** | **100.0** | **61.3** | **102,053.0** | **100.0** | **1.9** | **3.1** |

**Table 8.75.** Forests of other broadleaves by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Mixed broadleaf stands | 27,200.0 | 50.7 | 36,073,048 | 63.0 | 1,326 | 2,062,828.0 | 62.8 | 75.8 | 65,003.0 | 63.7 | 2.4 | 3.2 |
| Pure broadleaf stands | 26,400.0 | 49.3 | 21,181,882 | 37.0 | 802 | 1,220,726.0 | 37.2 | 46.2 | 37,050.0 | 36.3 | 1.4 | 3.0 |
| **TOTAL** | **53,600.0** | **100.0** | **57,254,930** | **100.0** | **1,068** | **3,283,554.0** | **100.0** | **61.3** | **102,053.0** | **100.0** | **1.9** | **3.1** |

**Table 8.76.** Forests of other broadleaves by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Field maple | 832,673 | 229,660 | 467,873 | 112,400 | 22,740 | | |
| Other broadleaves | 525,720 | 169,278 | 267,227 | 89,215 | | | |
| Smooth-leaved elm | 260,337 | 142,914 | 74,564 | 42,859 | | | |
| Cherry | 211,422 | 48,383 | 113,546 | 49,493 | | | |
| Black locust | 172,903 | 19,325 | 104,419 | 49,159 | | | |
| Black walnut | 147,753 | | 79,538 | 68,215 | | | |
| Common walnut | 137,013 | 18,108 | 55,389 | 31,484 | 32,032 | | |
| Turkey oak | 126,075 | 12,449 | 69,440 | 44,186 | | | |
| Flowering ash | 124,432 | 53,377 | 59,037 | 12,018 | | | |
| Hornbeam | 116,593 | 30,147 | 78,743 | 7,703 | | | |
| Ash-leaved maple | 79,314 | 31,364 | 47,950 | | | | |
| Oriental hornbeam | 69,563 | 49,600 | 19,963 | | | | |
| Willow | 66,409 | 4,697 | 9,566 | | 13,512 | 38,634 | |
| White ash | 49,013 | 47,435 | 1,578 | | | | |
| Hungarian oak | 47,142 | 3,721 | 19,943 | 13,278 | 10,200 | | |
| Narrow-leaved ash | 41,691 | 6,791 | 15,131 | 19,769 | | | |
| Aspen | 40,532 | 2,829 | 23,706 | 3,573 | 10,424 | | |
| European hackberry | 34,598 | 5,036 | 16,164 | 13,398 | | | |
| Turkish hazel | 34,580 | 6,295 | 28,285 | | | | |
| Large-leaved lime | 33,338 | | 30,354 | 2,984 | | | |
| Sessile oak | 29,988 | 1,019 | 23,010 | 5,959 | | | |
| Beech | 28,541 | | 20,937 | 7,604 | | | |
| Maple | 20,744 | 11,148 | 4,031 | 5,565 | | | |
| European white elm | 14,763 | 7,079 | 7,684 | | | | |
| Euramerican poplar | 14,733 | | 14,733 | | | | |
| White ash | 6,720 | | 6,720 | | | | |
| Birch | 5,155 | | | 5,155 | | | |
| Common oak | 4,993 | 3,707 | 1,286 | | | | |
| Hop hornbeam | 2,401 | | 2,401 | | | | |
| Silver lime | 1,126 | | 1,126 | | | | |
| **Total broadleaves** | **3,280,266** | **904,362** | **1,664,344** | **584,017** | **88,908** | **38,634** | |
| Scots pine | 3,288 | | 3,288 | | | | |
| **Total conifers** | **3,288** | | **3,288** | | | | |
| **TOTAL** | **3,283,554** | **904,362** | **1,667,632** | **584,017** | **88,908** | **38,634** | |

**Table 8.77.** Forests of other conifers by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Artificially established stands | 5,200.0 | 100.0 | 5,974,626 | 100.0 | 1,149 | 1,054,331.0 | 100.0 | 202.8 | 42,235.0 | 100.0 | 8.1 | 4.0 |
| **TOTAL** | **5,200.0** | **100.0** | **5,974,626** | **100.0** | **1,149** | **1,054,331.0** | **100.0** | **202.8** | **42,235.0** | **100.0** | **8.1** | **4.0** |

**Table 8.78.** Forests of other conifers by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 4,400.0 | 84.6 | 5,762,419 | 96.4 | 1,310 | 889,552.6 | 84.4 | 202.2 | 38,624.4 | 91.5 | 8.8 | 4.3 |
| Insufficiently stocked stands | 800.0 | 15.4 | 212,207 | 3.6 | 265 | 164,778.4 | 15.6 | 206.0 | 3,610.6 | 8.5 | 4.5 | 2.2 |
| **TOTAL** | **5,200.0** | **100.0** | **5,974,626** | **100.0** | **1,149** | **1,054,331.0** | **100.0** | **202.8** | **42,235.0** | **100.0** | **8.1** | **4.0** |

**Table 8.79.** Forests of other conifers by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure coniferous stands | 4,400.0 | 84.6 | 4,889,543 | 81.8 | 1,111 | 931,852.0 | 88.4 | 211.8 | 37,454.0 | 88.7 | 8.5 | 4.0 |
| Mixed broadleaf and coniferous stands | 800.0 | 15.4 | 1,085,083 | 18.2 | 1,356 | 122,479.0 | 11.6 | 153.1 | 4,781.0 | 11.3 | 6.0 | 3.9 |
| **TOTAL** | **5,200.0** | **100.0** | **5,974,626** | **100.0** | **1,149** | **1,054,331.0** | **100.0** | **202.8** | **42,235.0** | **100.0** | **8.1** | **4.0** |

**Table 8.80.** Forests of other conifers by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Douglas-fir | 471,051 | 13,085 | 327,914 | 130,052 | | | |
| Weymouth pine | 345,728 | 4,810 | 266,930 | 73,988 | | | |
| Larch | 107,760 | 24,616 | 74,511 | 8,633 | | | |
| Scots pine | 2,898 | | 2,898 | | | | |
| Austrian pine | 1,715 | | 1,715 | | | | |
| Spruce | 1,184 | | 1,184 | | | | |
| **Total conifers** | **930,336** | **42,511** | **675,152** | **212,673** | | | |
| Black locust | 30,379 | 2,801 | 19,348 | 8,230 | | | |
| Turkey oak | 27,583 | 11,657 | 15,926 | | | | |
| Field maple | 18,361 | 14,854 | 3,507 | | | | |
| Cherry | 18,063 | | 1,019 | | 17,044 | | |
| Wych elm | 10,334 | | 10,334 | | | | |
| Sessile oak | 5,770 | | 5,770 | | | | |
| Flowering ash | 5,489 | 5,489 | | | | | |
| Hungarian oak | 4,864 | | 4,864 | | | | |
| Hornbeam | 1,402 | | 1,402 | | | | |
| Aspen | 1,358 | | 1,358 | | | | |
| Beech | 392 | | 392 | | | | |
| **Total broadleaves** | **123,995** | **34,801** | **63,920** | **8,230** | **17,044** | | |
| **TOTAL** | **1,054,331** | **77,312** | **739,072** | **220,903** | **17,044** | | |

**Table 9.** Forests by structural form

| Stand structural form | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Even-aged stands | 2.063,200.0 | 91.6 | 2,019,911,240 | 95.5 | 979 | 300,847,554.9 | 83.0 | 145.8 | 7,841,461.0 | 86.3 | 3.8 | 2.6 |
| Uneven-aged stands | 169,200.0 | 7.5 | 81,435,613 | 3.8 | 481 | 52,873,251.3 | 14.6 | 312.5 | 1,048,795.0 | 11.6 | 6.2 | 2.0 |
| Selection stands | 18,800.0 | 0.8 | 12,983,423 | 0.6 | 691 | 8,099,889.7 | 2.2 | 430.8 | 180.014.5 | 2.0 | 9.6 | 2.2 |
| Virgin forests | 1,200.0 | 0.1 | 305,578 | 0.1 | 255 | 666,721.7 | 0.2 | 555.6 | 9,502.5 | 0.1 | 7.9 | 1.4 |
| **Total** | **2,252,400.0** | **100.0** | **2,114,635,853** | **100.0** | **939** | **362,487,417.6** | **100.0** | **160.9** | **9,079,773.0** | **100.0** | **4.0** | **2.5** |

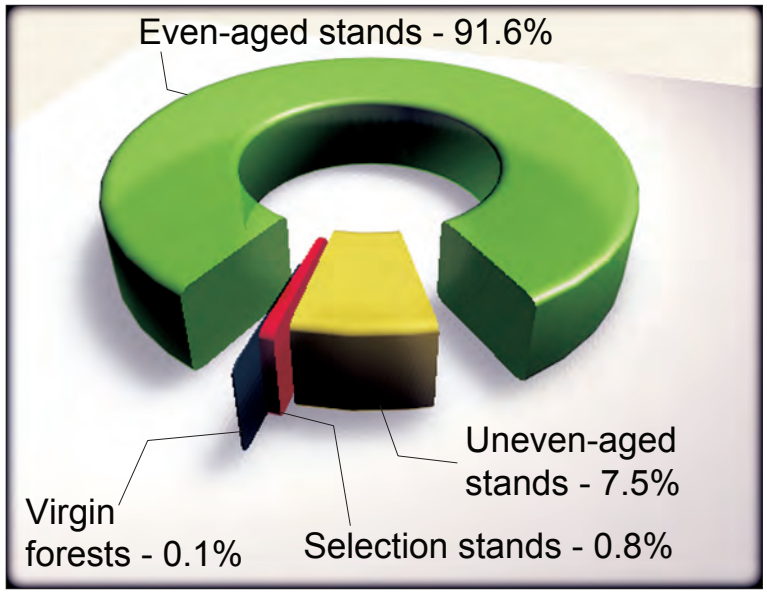



**Diagram 9.** Forests by structural form (area)

**Table 9.1.** Even-aged forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural coppice stands | 1,456,400.0 | 70.6 | 1,587,605,791 | 78.6 | 1,090 | 181,188,914.0 | 60.2 | 124.4 | 4,458,193.0 | 56.9 | 3.1 | 2.5 |
| Natural high stands | 432,000.0 | 20.9 | 275,701,267 | 13.6 | 638 | 95,871,400.0 | 31.9 | 221.9 | 2,149,647.0 | 27.4 | 5.0 | 2.2 |
| Artificially established stands | 174,800.0 | 8.5 | 156,604,182 | 7.8 | 896 | 23,787,241.0 | 7.9 | 136.1 | 1,233,621.0 | 15.7 | 7.1 | 5.2 |
| **Total** | **2,063,200.0** | **100.0** | **2,019,911,240** | **100.0** | **979** | **300,847,555.0** | **100.0** | **145.8** | **7,841,461.0** | **100.0** | **3.8** | **2.6** |

**Table 9.2.** Even-aged forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 1,501,600.0 | 72.8 | 1,874,725,971 | 92.8 | 1,248 | 221,251,257.9 | 73.6 | 147.3 | 6,407,792.3 | 81.7 | 4.3 | 2.9 |
| Insufficiently stocked stands | 511,600.0 | 24.8 | 141,500,595 | 7.0 | 277 | 75,873,852.6 | 25.2 | 148.3 | 1,364,968.2 | 17.4 | 2.7 | 1.8 |
| Devastated stands | 50,000.0 | 2.4 | 3,684,674 | 0.2 | 74 | 3,722,444.5 | 1.2 | 74.4 | 68,700.5 | 0.9 | 1.4 | 1.8 |
| **Total** | **2,063,200.0** | **100.0** | **2,019,911,240** | **100.0** | **979** | **300,847,555.0** | **100.0** | **145.8** | **7,841,461.0** | **100.0** | **3.8** | **2.6** |

**Table 9.3.** Even-aged forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 1,200,000.0 | 58.2 | 1,075,452,817 | 53.2 | 896 | 188,238,210.3 | 62.6 | 156.9 | 4,439,988.0 | 56.6 | 3.7 | 2.4 |
| Mixed broadleaf stands | 652,000.0 | 31.6 | 738,652,127 | 36.6 | 1,133 | 82,252,664.1 | 27.4 | 126.2 | 2,000,178.0 | 25.5 | 3.1 | 2.4 |
| Pure coniferous stands | 165,600.0 | 8.0 | 154,731,109 | 7.7 | 934 | 23,256,988.3 | 7.7 | 140.4 | 1,145,326.0 | 14.6 | 6.9 | 4.9 |
| Mixed broadleaf and coniferous stands | 35,600.0 | 1.7 | 40,793,407 | 2.0 | 1,146 | 4,650,133.2 | 1.5 | 130.6 | 165,287.0 | 2.1 | 4.6 | 3.6 |
| Mixed stands of conifers | 10,000.0 | 0.5 | 10,281,780 | 0.5 | 1,028 | 2,449,559.1 | 0.8 | 245.0 | 90,682.0 | 1.2 | 9.1 | 3.7 |
| **Total** | **2,063,200.0** | **100.0** | **2,019,911,240** | **100.0** | **979** | **300,847,555.0** | **100.0** | **145.8** | **7,841,461.0** | **100.0** | **3.8** | **2.6** |

**Table 9.4.** Even-aged forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 373,179,264 | 18.5 | 104,573,986.0 | 34.8 | 1,996,166.0 | 25.5 | 1.9 |
| Turkey oak | 233,576,877 | 11.6 | 46,664,132.0 | 15.5 | 1,029,204.0 | 13.1 | 2.2 |
| Sessile oak | 129,364,745 | 6.4 | 21,227,230.0 | 7.1 | 547,225.0 | 7.0 | 2.6 |
| Hungarian oak | 153,047,148 | 7.6 | 20,889,428.0 | 6.9 | 516,883.0 | 6.6 | 2.5 |
| Hornbeam | 252,027,667 | 12.5 | 14,822,760.0 | 4.9 | 329,047.0 | 4.2 | 2.2 |
| Black locust | 218,845,449 | 10.8 | 11,243,944.0 | 3.7 | 516,857.0 | 6.6 | 4.6 |
| Common oak | 10,996,463 | 0.5 | 9,242,373.0 | 3.1 | 157,886.0 | 2.0 | 1.7 |
| Euramer. poplar | 6,489,959 | 0.3 | 6,137,862.0 | 2.0 | 338,272.0 | 4.3 | 5.5 |
| Narrow-leaved ash | 15,416,856 | 0.8 | 5,792,311.0 | 1.9 | 153,519.0 | 2.0 | 2.7 |
| Large-leaved lime | 16,655,518 | 0.8 | 3,481,413.0 | 1.2 | 69,682.0 | 0.9 | 2.0 |
| Flowering ash | 103,590,010 | 5.1 | 3,476,647.0 | 1.2 | 101,656.0 | 1.3 | 2.9 |
| Field maple | 47,260,092 | 2.3 | 3,118,275.0 | 1.0 | 72,075.0 | 0.9 | 2.3 |
| Other broadleaves | 45,424,310 | 2.2 | 2,910,076.0 | 1.0 | 89,372.0 | 1.1 | 3.1 |
| Aspen | 21,674,391 | 1.1 | 2,008,677.0 | 0.7 | 92,646.0 | 1.2 | 4.6 |
| Willow | 6,662,601 | 0.3 | 1,912,086.0 | 0.6 | 42,819.0 | 0.5 | 2.2 |
| Silver lime | 5,935,585 | 0.3 | 1,718,564.0 | 0.6 | 31,459.0 | 0.4 | 1.8 |
| Oriental hornbeam | 88,431,541 | 4.4 | 1,716,480.0 | 0.6 | 55,048.0 | 0.7 | 3.2 |
| Hop hornbeam | 21,767,727 | 1.1 | 1,437,186.0 | 0.5 | 33,238.0 | 0.4 | 2.3 |
| Maple | 10,381,341 | 0.5 | 1,223,552.0 | 0.4 | 34,645.0 | 0.4 | 2.8 |
| Cherry | 12,176,495 | 0.6 | 1,208,460.0 | 0.4 | 30,572.0 | 0.4 | 2.5 |
| Smooth-leaved elm | 18,665,149 | 0.9 | 1,097,943.0 | 0.4 | 43,101.0 | 0.5 | 3.9 |
| Black poplar | 1,457,553 | 0.1 | 1,017,364.0 | 0.3 | 42,236.0 | 0.5 | 4.2 |
| Pubescent oak | 12,128,717 | 0.6 | 956,167.0 | 0.3 | 28,564.0 | 0.4 | 3.0 |
| Small-leaved lime | 7,459,042 | 0.4 | 883,033.0 | 0.3 | 19,115.0 | 0.2 | 2.2 |
| Birch | 11,223,746 | 0.6 | 803,107.0 | 0.3 | 33,210.0 | 0.4 | 4.1 |
| Alder | 5,054,322 | 0.3 | 757,598.0 | 0.3 | 22,720.0 | 0.3 | 3.0 |

**Table 9.4.** Even-aged forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| White ash | 5,925,261 | 0.3 | 754,788.0 | 0.3 | 21,044.0 | 0.3 | 2.8 |
| White poplar | 1,987,969 | 0.1 | 607,150.0 | 0.2 | 24,716.0 | 0.3 | 4.1 |
| Norway maple | 1,607,553 | 0.1 | 357,366.0 | 0.1 | 9,085.0 | 0.1 | 2.5 |
| Common walnut | 2,546,708 | 0.1 | 314,440.0 | 0.1 | 10,033.0 | 0.1 | 3.2 |
| Turkish hazel | 2,523,181 | 0.1 | 207,391.0 | 0.1 | 6,521.0 | 0.1 | 3.1 |
| White ash | 6,482,204 | 0.3 | 157,576.0 | 0.1 | 4,453.0 | 0.1 | 2.8 |
| Black walnut | 336,701 | 0.0 | 154,850.0 | 0.1 | 4,169.0 | 0.1 | 2.7 |
| Wych elm | 537,867 | 0.0 | 111,805.0 | 0.0 | 2,322.0 | 0.0 | 2.1 |
| Wild service tree | 1,952,301 | 0.1 | 101,649.0 | 0.0 | 2,371.0 | 0.0 | 2.3 |
| Ash-leaved maple | 1,090,309 | 0.1 | 92,276.0 | 0.0 | 2,693.0 | 0.0 | 2.9 |
| Balkan maple | 805,210 | 0.0 | 80,090.0 | 0.0 | 2,942.0 | 0.0 | 3.7 |
| Europ. hackberry | 940,783 | 0.0 | 55,588.0 | 0.0 | 1,694.0 | 0.0 | 3.0 |
| Europ. white elm | 783,258 | 0.0 | 32,297.0 | 0.0 | 1,548.0 | 0.0 | 4.8 |
| Mountain ash | 5,659 | 0.0 | 3,377.0 | 0.0 | 36.0 | 0.0 | 1.1 |
| **Total broadleaves** | **1,856,417,532** | **91.9** | **273,351,297.0** | **90.9** | **6,520,844.0** | **83.2** | **2.4** |
| Austrian pine | 84,687,556 | 4.2 | 12,456,841.0 | 4.1 | 709,562.0 | 9.0 | 5.7 |
| Spruce | 45,062,627 | 2.2 | 9,415,935.0 | 3.1 | 369,743.0 | 4.7 | 3.9 |
| Scots pine | 25,980,663 | 1.3 | 3,654,434.0 | 1.2 | 173,903.0 | 2.2 | 4.8 |
| Fir | 2,723,645 | 0.1 | 961,810.0 | 0.3 | 25,690.0 | 0.3 | 2.7 |
| Douglas-fir | 1,641,064 | 0.1 | 511,151.0 | 0.2 | 16,141.0 | 0.2 | 3.2 |
| Weymouth pine | 2,079,983 | 0.1 | 355,416.0 | 0.1 | 18,708.0 | 0.2 | 5.3 |
| Larch | 995,956 | 0.0 | 107,760.0 | 0.0 | 5,167.0 | 0.1 | 4.8 |
| Yew | 12,732 | 0.0 | 2,395.0 | 0.0 | 83.0 | 0.0 | 3.5 |
| Other conifers | 309,482 | 0.0 | 30,516.0 | 0.0 | 1,620.0 | 0.0 | 5.3 |
| **Total conifers** | **163,493,708** | **8.1** | **27,496,258.0** | **9.1** | **1,320,617.0** | **16.8** | **4.8** |
| **TOTAL** | **2,019,911,240** | **100.0** | **300,847,555.0** | **100.0** | **7,841,461.0** | **100.0** | **2.6** |

**Table 9.5.** Even-aged forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| 1 | Beech forests | 517,600.0 | 25.1 | 412,882,500 | 20.5 | 798 | 110,106,392.0 | 36.6 | 212.7 | 2,114,013.0 | 27.0 | 4.1 | 1.9 |
| 2 | Turkey oak forests | 345,200.0 | 16.7 | 342,945,561 | 17.0 | 993 | 49,564,925.0 | 16.4 | 143.6 | 1,161,647.0 | 14.8 | 3.4 | 2.3 |
| 3 | Sessile oak forests | 173,200.0 | 8.4 | 163,395,654 | 8.1 | 943 | 21,596,056.0 | 7.2 | 124.7 | 541,823.0 | 6.9 | 3.1 | 2.5 |
| 4 | Hungarian oak forests | 159,600.0 | 7.7 | 178,122,326 | 8.8 | 1,116 | 21,086,655.0 | 7.0 | 132.1 | 533,060.0 | 6.8 | 3.3 | 2.5 |
| 5 | Pine forests | 126,000.0 | 6.1 | 122,672,069 | 6.1 | 974 | 16,450,802.0 | 5.5 | 130.6 | 887,641.0 | 11.3 | 7.0 | 5.4 |
| 6 | Forests of birch, aspen and black locust | 223,200.0 | 10.8 | 244,614,971 | 12.1 | 1,096 | 13,402,128.0 | 4.5 | 60.0 | 617,187.0 | 7.9 | 2.8 | 4.6 |
| 7 | Hornbeam forests | 118,800.0 | 5.8 | 175,449,242 | 8.7 | 1,477 | 13,266,577.0 | 4.4 | 111.7 | 297,748.0 | 3.8 | 2.5 | 2.2 |
| 8 | Common oak forests | 32,400.0 | 1.6 | 16,359,940 | 0.8 | 505 | 10,118,764.0 | 3.4 | 312.3 | 177,854.0 | 2.3 | 5.5 | 1.8 |
| 9 | Spruce forests | 61,600.0 | 3.0 | 54,322,210 | 2.7 | 882 | 9,906,605.0 | 3.3 | 160.8 | 382,601.0 | 4.9 | 6.2 | 3.9 |
| 10 | Poplar forests | 48,000.0 | 2.3 | 16,648,664 | 0.8 | 347 | 7,816,476.0 | 2.6 | 162.8 | 398,269.0 | 5.1 | 8.3 | 5.1 |
| 11 | Lime forests | 30,400.0 | 1.5 | 30,556,001 | 1.5 | 1,005 | 6,133,564.0 | 2.0 | 201.8 | 120,698.0 | 1.5 | 4.0 | 2.0 |
| 12 | Forest of narrow-leaved ash | 25,200.0 | 1.2 | 23,527,690 | 1.2 | 934 | 5,978,815.0 | 2.0 | 237.3 | 162,518.0 | 2.1 | 6.4 | 2.7 |
| 13 | Forests of oriental hornbeam, hop hornbeam and flowering ash | 87,200.0 | 4.2 | 129,961,443 | 6.4 | 1,490 | 4,794,933.0 | 1.6 | 55.0 | 133,127.0 | 1.7 | 1.5 | 2.8 |
| 14 | Forests of other broadleaves | 53,600.0 | 2.6 | 57,254,930 | 2.8 | 1,068 | 3,283,554.0 | 1.1 | 61.3 | 102,053.0 | 1.3 | 1.9 | 3.1 |
| 15 | Willow forests | 22,400.0 | 1.1 | 9,714,986 | 0.5 | 434 | 2,174,792.0 | 0.7 | 97.1 | 52,369.0 | 0.7 | 2.3 | 2.4 |
| 16 | Forests of ash and maple | 12,800.0 | 0.6 | 14,736,590 | 0.7 | 1,151 | 1,583,276.0 | 0.5 | 123.7 | 43,111.0 | 0.5 | 3.4 | 2.7 |
| 17 | Forests of other conifers | 5,200.0 | 0.3 | 5,974,626 | 0.3 | 1,149 | 1,054,331.0 | 0.4 | 202.8 | 42,235.0 | 0.5 | 8.1 | 4.0 |
| 18 | Fir forests | 4,000.0 | 0.2 | 3,388,975 | 0.2 | 847 | 948,710.0 | 0.3 | 237.2 | 26,489.0 | 0.3 | 6.6 | 2.8 |
| 19 | Pubescent oak forests | 10,400.0 | 0.5 | 12,554,416 | 0.6 | 1,207 | 907,212.0 | 0.3 | 87.2 | 27,532.0 | 0.4 | 2.6 | 3.0 |
| 20 | Alder forests | 6,400.0 | 0.3 | 4,828,446 | 0.2 | 754 | 672,988.0 | 0.2 | 105.2 | 19,486.0 | 0.2 | 3.0 | 2.9 |
| **TOTAL** | | **2,063,200.0** | **100.0** | **2,019,911,240** | **100.0** | **979** | **300,847,555.0** | **100.0** | **145.8** | **7,841,461.0** | **100.0** | **3.8** | **2.6** |

**Table 9.6.** Even-aged forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 104,573,985 | 3,405,032 | 38,268,637 | 36,135,025 | 18,720,077 | 5,155,234 | 2,889,980 |
| Turkey oak | 46,664,132 | 3,914,217 | 28,909,465 | 11,210,804 | 2,290,773 | 198,381 | 140,492 |
| Sessile oak | 21,227,231 | 1,288,944 | 10,685,582 | 6,284,248 | 2,421,064 | 358,513 | 188,880 |
| Hungarian oak | 20,889,429 | 2,639,607 | 14,433,598 | 3,342,909 | 443,738 | 29,577 | |
| Hornbeam | 14,822,759 | 3,355,435 | 8,408,191 | 2,051,850 | 800,341 | 146,871 | 60,071 |
| Black locust | 11,243,943 | 2,869,851 | 7,098,831 | 1,174,093 | 101,168 | | |
| Common oak | 9,242,373 | 176,910 | 1,299,989 | 4,632,270 | 2,684,333 | 316,578 | 132,293 |
| Euramer. poplar | 6,137,863 | 22,069 | 888,205 | 2,927,414 | 1,837,414 | 462,761 | |
| Narrow-leaved ash | 5,792,311 | 262,800 | 2,623,220 | 2,076,032 | 729,150 | 101,109 | |
| Large-leaved lime | 3,481,413 | 212,854 | 1,358,894 | 1,319,673 | 519,786 | 24,596 | 45,610 |
| Flowering ash | 3,476,647 | 1,506,103 | 1,783,640 | 160,811 | 26,093 | | |
| Field maple | 3,118,275 | 665,804 | 1,949,803 | 433,826 | 68,842 | | |
| Other broadleaves | 2,910,076 | 616,287 | 1,732,043 | 455,082 | 82,514 | 24,150 | |
| Aspen | 2,008,676 | 227,600 | 1,320,125 | 410,013 | 50,938 | | |
| Willow | 1,912,086 | 40,932 | 826,706 | 595,634 | 291,461 | 104,059 | 53,294 |
| Silver lime | 1,718,565 | 64,964 | 462,718 | 949,970 | 240,913 | | |
| Oriental hornbeam | 1,716,480 | 1,197,720 | 484,456 | 14,618 | 19,686 | | |
| Hop hornbeam | 1,437,186 | 276,067 | 1,046,290 | 96,720 | 18,109 | | |
| Maple | 1,223,552 | 166,313 | 564,434 | 365,594 | 79,399 | | 47,812 |
| Cherry | 1,208,460 | 146,636 | 657,788 | 351,687 | 52,349 | | |
| Smooth-leaved elm | 1,097,943 | 394,761 | 511,311 | 175,297 | 16,574 | | |
| Black poplar | 1,017,365 | 6,989 | 95,478 | 384,627 | 419,997 | 48,547 | 61,727 |
| Pubescent oak | 956,166 | 157,089 | 508,600 | 211,470 | 29,468 | | 49,539 |
| Small-leaved lime | 883,032 | 131,823 | 276,032 | 364,177 | 111,000 | | |
| Birch | 803,107 | 128,427 | 519,827 | 139,606 | 15,247 | | |
| Alder | 757,599 | 50,313 | 406,806 | 244,994 | 55,486 | | |
| White ash | 754,787 | 76,479 | 347,237 | 205,620 | 125,451 | | |
| White poplar | 607,151 | 16,651 | 185,535 | 176,277 | 228,688 | | |
| Norway maple | 357,365 | 12,817 | 200,297 | 121,273 | 22,978 | | |
| Common walnut | 314,440 | 45,723 | 158,204 | 78,481 | 32,032 | | |
| Turkish hazel | 207,391 | 39,598 | 106,032 | 54,277 | 7,484 | | |
| White ash | 157,576 | 97,898 | 49,041 | 10,637 | | | |
| Black walnut | 154,850 | | 86,635 | 68,215 | | | |
| Wych elm | 111,805 | 2,405 | 62,625 | 46,775 | | | |
| Wild service tree | 101,649 | 25,139 | 54,583 | 21,927 | | | |
| Ash-leaved maple | 92,276 | 39,414 | 52,862 | | | | |
| Balkan maple | 80,090 | 17,458 | 54,610 | 8,022 | | | |
| Europ. hackberry | 55,587 | 17,443 | 19,349 | 18,795 | | | |
| Europ. white elm | 32,297 | 18,822 | 13,475 | | | | |
| Mountain ash | 3,377 | | | 3,377 | | | |
| **Total broadleaves** | **273,351,295** | **24,335,394** | **128,511,154** | **77,322,120** | **32,542,553** | **6,970,376** | **3,669,698** |
| Austrian pine | 12,456,841 | 992,142 | 7,814,517 | 3,290,096 | 330,417 | 29,669 | |
| Spruce | 9,415,935 | 1,543,565 | 4,607,379 | 2,635,061 | 629,930 | | |
| Scots pine | 3,654,435 | 279,712 | 2,523,264 | 837,176 | 14,283 | | |
| Fir | 961,811 | 44,493 | 541,130 | 336,040 | 40,148 | | |
| Douglas-fir | 511,152 | 13,085 | 368,015 | 130,052 | | | |
| Weymouth pine | 355,416 | 13,864 | 267,564 | 73,988 | | | |
| Larch | 107,760 | 24,616 | 74,511 | 8,633 | | | |
| Yew | 2,395 | | 2,395 | | | | |
| Other conifers | 30,515 | 2,829 | 27,686 | | | | |
| **Total conifers** | **27,496,260** | **2,914,306** | **16,226,461** | **7,311,046** | **1,014,778** | **29,669** | |
| **TOTAL** | **300,847,555** | **27,249,700** | **144,737,615** | **84,633,166** | **33,557,331** | **7,000,045** | **3,669,698** |

**Table 9.7.** Uneven-aged forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 169,200.0 | 100.0 | 81,435,613 | 100.0 | 481 | 52,873,251.0 | 100.0 | 312.5 | 1,048,795.0 | 100.0 | 6.2 | 2.0 |
| **TOTAL** | **169,200.0** | **100.0** | **81,435,613** | **100.0** | **481** | **52,873,251.0** | **100.0** | **312.5** | **1,048,795.0** | **100.0** | **6.2** | **2.0** |

**Table 9.8.** Uneven-aged forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 74,400.0 | 44.0 | 56,165,740 | 69.0 | 755 | 25,213,159.5 | 47.7 | 338.9 | 569,830.6 | 54.3 | 7.7 | 2.3 |
| Insufficiently stocked stands | 89,600.0 | 53.0 | 24,876,583 | 30.5 | 278 | 26,988,294.4 | 51.0 | 301.2 | 469,140.0 | 44.7 | 5.2 | 1.7 |
| Devastated stands | 5,200.0 | 3.0 | 393,290 | 0.5 | 76 | 671,797.1 | 1.3 | 129.2 | 9,824.4 | 0.9 | 1.9 | 1.5 |
| **TOTAL** | **169,200.0** | **100.0** | **81,435,613** | **100.0** | **481** | **52,873,251.0** | **100.0** | **312.5** | **1,048,795.0** | **100.0** | **6.2** | **2.0** |

**Table 9.9.** Uneven-aged forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 126,800.0 | 74.9 | 57,833,618 | 71.0 | 456 | 38,169,416.0 | 72.2 | 301.0 | 708,234.0 | 67.5 | 5.6 | 1.9 |
| Pure stand conifers | 22,000.0 | 13.0 | 11,084,051 | 13.6 | 504 | 8,137,633.0 | 15.4 | 369.9 | 204,842.0 | 19.5 | 9.3 | 2.5 |
| Mixed broadleaf and coniferous stands | 8,400.0 | 5.0 | 4,906,216 | 6.0 | 584 | 3,144,012.0 | 5.9 | 374.3 | 62,872.0 | 6.0 | 7.5 | 2.0 |
| Mixed broadleaf stands | 8,800.0 | 5.2 | 6,090,914 | 7.5 | 692 | 2,274,577.0 | 4.3 | 258.5 | 45,899.0 | 4.4 | 5.2 | 2.0 |
| Mixed stands of conifers | 3,200.0 | 1.9 | 1,520,814 | 1.9 | 475 | 1,147,613.0 | 2.2 | 358.6 | 26,948.0 | 2.6 | 8.4 | 2.3 |
| **TOTAL** | **169,200.0** | **100.0** | **81,435,613** | **100.0** | **481** | **52,873,251.0** | **100.0** | **312.5** | **1,048,795.0** | **100.0** | **6.2** | **2.0** |

**Table 9.10.** Uneven-aged forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 60,832,567 | 74.7 | 40,282,532.0 | 76.2 | 753,008.0 | 71.8 | 1.9 |
| Hornbeam | 2,088,973 | 2.6 | 320,801.0 | 0.6 | 5,429.0 | 0.5 | 1.7 |
| Turkey oak | 511,743 | 0.6 | 316,314.0 | 0.6 | 5,672.0 | 0.5 | 1.8 |
| Sessile oak | 630,002 | 0.8 | 315,660.0 | 0.6 | 6,510.0 | 0.6 | 2.1 |
| Maple | 437,097 | 0.5 | 144,853.0 | 0.3 | 3,305.0 | 0.3 | 2.3 |
| Hungarian oak | 168,655 | 0.2 | 97,036.0 | 0.2 | 1,884.0 | 0.2 | 1.9 |
| Cherry | 471,099 | 0.6 | 80,653.0 | 0.2 | 1,744.0 | 0.2 | 2.2 |
| Wych elm | 329,628 | 0.4 | 63,382.0 | 0.1 | 1,636.0 | 0.2 | 2.6 |
| Field maple | 355,092 | 0.4 | 63,029.0 | 0.1 | 1,077.0 | 0.1 | 1.7 |
| Small-leaved lime | 66,491 | 0.1 | 61,841.0 | 0.1 | 1,041.0 | 0.1 | 1.7 |
| Norway maple | 86,297 | 0.1 | 60,594.0 | 0.1 | 826.0 | 0.1 | 1.4 |
| Silver lime | 22,635 | 0.0 | 60,531.0 | 0.1 | 703.0 | 0.1 | 1.2 |
| Large-leaved lime | 107,823 | 0.1 | 54,448.0 | 0.1 | 969.0 | 0.1 | 1.8 |
| Hop hornbeam | 183,912 | 0.2 | 43,508.0 | 0.1 | 728.0 | 0.1 | 1.7 |

**Table 9.10.** Uneven-aged forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Other broadleaves | 840,973 | 1.0 | 237,745.0 | 0.4 | 817.0 | 0.1 | 0.3 |
| Flowering ash | 196,645 | 0.2 | 29,111.0 | 0.1 | 502.0 | 0.0 | 1.7 |
| Balkan maple | 11,318 | 0.0 | 15,228.0 | 0.0 | 236.0 | 0.0 | 1.5 |
| White ash | 57,277 | 0.1 | 12,486.0 | 0.0 | 355.0 | 0.0 | 2.8 |
| Wild service tree | 31,124 | 0.0 | 8,616.0 | 0.0 | 109.0 | 0.0 | 1.3 |
| Oriental hornbeam | 12,732 | 0.0 | 1,049.0 | 0.0 | 26.0 | 0.0 | 2.5 |
| **Total broadleaves** | **67,442,083** | **82.8** | **42,269,417.0** | **79.9** | **786,575.0** | **75.0** | **1.9** |
| Spruce | 10,975,536 | 13.5 | 8,706,247.0 | 16.5 | 217,486.0 | 20.7 | 2.5 |
| Fir | 2,666,729 | 3.3 | 1,683,850.0 | 3.2 | 38,919.0 | 3.7 | 2.3 |
| Austrian pine | 202,304 | 0.2 | 137,185.0 | 0.3 | 3,753.0 | 0.4 | 2.7 |
| Scots pine | 148,961 | 0.2 | 76,552.0 | 0.1 | 2,062.0 | 0.2 | 2.7 |
| **Total conifers** | **13,993,530** | **17.2** | **10,603,834.0** | **20.1** | **262,220.0** | **25.0** | **2.5** |
| **TOTAL** | **81,435,613** | **100.0** | **52,873,251.0** | **100.0** | **1,048,795.0** | **100.0** | **2.0** |

**Table 9.11.** Uneven-aged forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| 1 | Beech forests | 141,600.0 | 83.7 | 67,605,609 | 83.0 | 477 | 43,063,557.0 | 81.4 | 304.1 | 805,322.0 | 76.8 | 5.7 | 1.9 |
| 2 | Spruce forests | 24,800.0 | 14.7 | 12,212,990 | 15.0 | 492 | 9,019,431.0 | 17.1 | 363.7 | 224,461.0 | 21.4 | 9.1 | 2.5 |
| 3 | Fir forests | 2,800.0 | 1.6 | 1,617,014 | 2.0 | 578 | 790,263.0 | 1.5 | 282.2 | 19,012.0 | 1.8 | 6.8 | 2.4 |
| **TOTAL** | | **169,200.0** | **100.0** | **81,435,613** | **100.0** | **481** | **52,873,251.0** | **100.0** | **312.5** | **1,048,795.0** | **100.0** | **6.2** | **2.0** |

**Table 9.12.** Uneven-aged forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 40,282,534 | 504,930 | 7,034,012 | 14,829,999 | 13,260,152 | 3,365,631 | 1,287,810 |
| Hornbeam | 320,802 | 9,111 | 223,722 | 71,389 | 16,580 | | |
| Turkey oak | 316,314 | | 137,844 | 122,667 | 55,803 | | |
| Sessile oak | 315,660 | | 108,144 | 147,291 | 60,225 | | |
| Maple | 144,853 | | 58,054 | 86,799 | | | |
| Hungarian oak | 97,036 | | 40,961 | 16,032 | 17,764 | 22,279 | |
| Cherry | 80,654 | 4,697 | 46,709 | 4,658 | 24,590 | | |
| Wych elm | 63,382 | 5,305 | 27,816 | 30,261 | | | |
| Field maple | 63,029 | | 51,764 | 11,265 | | | |
| Small-leaved lime | 61,841 | | 10,075 | 31,172 | 20,594 | | |
| Norway maple | 60,593 | | 8,692 | 13,239 | 38,662 | | |
| Silver lime | 60,531 | | | 8,632 | 51,899 | | |
| Large-leaved lime | 54,448 | | 27,320 | 9,383 | 17,745 | | |
| Hop hornbeam | 43,508 | | 40,344 | 3,164 | | | |
| Other broadleaves | 237,743 | 1,669 | 121,316 | 106,511 | 8,247 | | |
| Flowering ash | 29,110 | | 23,794 | 5,316 | | | |
| Balkan maple | 15,228 | | | 5,014 | 10,214 | | |
| White ash | 12,486 | | 12,486 | | | | |
| Wild service tree | 8,616 | | 4,977 | 3,639 | | | |
| Oriental hornbeam | 1,049 | | 1,049 | | | | |
| **Total broadleaves** | **42,269,417** | **525,712** | **7,979,079** | **15,506,431** | **13,582,475** | **3,387,910** | **1,287,810** |
| Spruce | 8,706,248 | 103,404 | 1,858,060 | 4,204,874 | 2,237,193 | 183,776 | 118,941 |
| Fir | 1,683,850 | 10,752 | 490,979 | 999,820 | 182,299 | | |
| Austrian pine | 137,184 | | 50,882 | 86,302 | | | |
| Scots pine | 76,552 | | 12,923 | 63,629 | | | |
| **Total conifers** | **10,603,834** | **114,156** | **2,412,844** | **5,354,625** | **2,419,492** | **183,776** | **118,941** |
| **TOTAL** | **52,873,251** | **639,868** | **10,391,923** | **20,861,056** | **16,001,967** | **3,571,686** | **1,406,751** |

**Table 9.13.** Selection forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 18,800.0 | 100.0 | 12,983,423 | 100.0 | 691 | 8,099,890.0 | 100.0 | 430.8 | 180,015.0 | 100.0 | 9.6 | 2.2 |
| **TOTAL** | **18,800.0** | **100.0** | **12,983,423** | **100.0** | **691** | **8,099,890.0** | **100.0** | **430.8** | **180,015.0** | **100.0** | **9.6** | **2.2** |

**Table 9.14.** Selection forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 13,200.0 | 70.2 | 11,337,057 | 87.3 | 859 | 6,184,564.1 | 76.4 | 468.5 | 143,712.4 | 79.8 | 10.9 | 2.3 |
| Insufficiently stocked stands | 5,600.0 | 29.8 | 1,646,366 | 12.7 | 294 | 1,915,325.9 | 23.6 | 342.0 | 36,302.6 | 20.2 | 6.5 | 1.9 |
| **TOTAL** | **18,800.0** | **100.0** | **12,983,423** | **100.0** | **691** | **8,099,890.0** | **100.0** | **430.8** | **180,015.0** | **100.0** | **9.6** | **2.2** |

**Table 9.15.** Selection forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Mixed broadleaf and coniferous stands | 10,000.0 | 53.2 | 6,962,414 | 53.6 | 696 | 3,898,928.0 | 48.1 | 389.9 | 81,690.0 | 45.4 | 8.2 | 2.1 |
| Pure coniferous stands | 8,000.0 | 42.6 | 5,320,727 | 41.0 | 665 | 3,770,568.0 | 46.6 | 471.3 | 88,216.0 | 49.0 | 11.0 | 2.3 |
| Mixed stands of conifers | 800.0 | 4.2 | 700,282 | 5.4 | 875 | 430,394.0 | 5.3 | 538.0 | 10,109.0 | 5.6 | 12.6 | 2.3 |
| **TOTAL** | **18,800.0** | **100.0** | **12,983,423** | **100.0** | **691** | **8,099,890.0** | **100.0** | **430.8** | **180,015.0** | **100.0** | **9.6** | **2.2** |

**Table 9.16.** Selection forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Fir | 8,406,842 | 64.8 | 5,659,264.0 | 69.9 | 135,243.0 | 75.1 | 2.4 |
| Spruce | 1,493,934 | 11.5 | 688,365.0 | 8.5 | 18,017.0 | 10.0 | 2.6 |
| Austrian pine | 74,145 | 0.6 | 65,001.0 | 0.8 | 1,544.0 | 0.9 | 2.4 |
| Scots pine | 48,100 | 0.4 | 44,443.0 | 0.5 | 906.0 | 0.5 | 2.0 |
| **Total conifers** | **10,023,021** | **77.2** | **6,457,073.0** | **79.7** | **155,710.0** | **86.5** | **2.4** |
| Beech | 2,879,183 | 22.2 | 1,552,296.0 | 19.2 | 23,207.0 | 12.9 | 1.5 |
| Maple | 44,436 | 0.3 | 64,950.0 | 0.8 | 786.0 | 0.4 | 1.2 |
| Hornbeam | 5,659 | 0.0 | 13,679.0 | 0.2 | 96.0 | 0.1 | 0.7 |
| Wych elm | 31,124 | 0.2 | 11,892.0 | 0.1 | 216.0 | 0.1 | 1.8 |
| **Total broadleaves** | **2,960,402** | **22.8** | **1,642,817.0** | **20.3** | **24,305.0** | **13.5** | **1.5** |
| **TOTAL** | **12,983,423** | **100.0** | **8,099,890.0** | **100.0** | **180,015.0** | **100.0** | **2.2** |

**Table 9.17.** Selection forests by stand categories

| Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees*·$ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Fir forests | 18,800.0 | 100.0 | 12,983,423 | 100.0 | 691 | 8,099,890.0 | 100.0 | 430.8 | 180,015.0 | 100.0 | 9.6 | 2.2 |
| **TOTAL** | **18,800.0** | **100.0** | **12,983,423** | **100.0** | **691** | **8,099,890.0** | **100.0** | **430.8** | **180,015.0** | **100.0** | **9.6** | **2.2** |

**Table 9.18.** Selection forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Fir | 5,659,264 | 79,131 | 1,803,912 | 2,174,752 | 1,556,920 | 44,549 | |
| Spruce | 688,365 | 47,676 | 203,601 | 418,049 | 19,039 | | |
| Austrian pine | 65,001 | | 22,001 | 24,385 | 18,615 | | |
| Scots pine | 44,444 | | 7,894 | 21,534 | 15,016 | | |
| **Total conifers** | **6,457,074** | **126,807** | **2,037,408** | **2,638,720** | **1,609,590** | **44,549** | |
| Beech | 1,552,296 | 13,977 | 424,147 | 545,217 | 517,076 | 51,879 | |
| Maple | 64,949 | | 6,618 | | 58,331 | | |
| Hornbeam | 13,679 | | | | 13,679 | | |
| Wych elm | 11,892 | | 5,677 | 6,215 | | | |
| **Total broadleaves** | **1,642,816** | **13,977** | **436,442** | **551,432** | **589,086** | **51,879** | |
| **TOTAL** | **8,099,890** | **140,784** | **2,473,850** | **3,190,152** | **2,198,676** | **96,428** | |

**Table 9.19.** Virgin forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees*·$ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 1,200.0 | 100.0 | 305,578 | 100.0 | 255 | 666,722.0 | 100.0 | 555.6 | 9,503.0 | 100.0 | 7.9 | 1.4 |
| **TOTAL** | **1,200.0** | **100.0** | **305,578** | **100.0** | **255** | **666,722.0** | **100.0** | **555.6** | **9,503.0** | **100.0** | **7.9** | **1.4** |

**Table 9.20.** Virgin forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees*·$ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Insufficiently stocked stands | 1,200.0 | 100.0 | 305,578 | 100.0 | 255 | 666,722.0 | 100.0 | 555.6 | 9,503.0 | 100.0 | 7.9 | 1.4 |
| **TOTAL** | **1,200.0** | **100.0** | **305,578** | **100.0** | **255** | **666,722.0** | **100.0** | **555.6** | **9,503.0** | **100.0** | **7.9** | **1.4** |

**Table 9.21.** Virgin forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 1,200.0 | 100.0 | 305,578 | 100.0 | 255 | 666,722.0 | 100.0 | 555.6 | 9,503.0 | 100.0 | 7.9 | 1.4 |
| **TOTAL** | **1,200.0** | **100.0** | **305,578** | **100.0** | **255** | **666,722.0** | **100.0** | **555.6** | **9,503.0** | **100.0** | **7.9** | **1.4** |

**Table 9.22.** Virgin forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 292,846 | 95.8 | 663,567.0 | 99.5 | 9,433.0 | 99.3 | 1.4 |
| Cherry | 12,732 | 4.2 | 3,155.0 | 0.5 | 70.0 | 0.7 | 2.2 |
| **TOTAL** | **305,578** | **100.0** | **666,722.0** | **100.0** | **9,503.0** | **100.0** | **1.4** |

**Table 9.23.** Virgin forests by stand categories

| Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Beech forests | 1,200.0 | 100.0 | 305,578 | 100.0 | 255 | 666,722.0 | 100.0 | 555.6 | 9,503.0 | 100.0 | 7.9 | 1.4 |
| **TOTAL** | **1,200.0** | **100.0** | **305,578** | **100.0** | **255** | **666,722.0** | **100.0** | **555.6** | **9,503.0** | **100.0** | **7.9** | **1.4** |

**Table 9.24.** Virgin forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 663,567 | | 40,270 | 73,590 | 296,861 | 174,082 | 78,763 |
| Cherry | 3,155 | | 3,155 | | | | |
| **TOTAL** | **666,722** | | **43,425** | **73,590** | **296,861** | **174,082** | **78,763** |

**Table 10.** High even-aged forests by development stages

| Stand development stage | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Regeneration | 18,400.0 | 3.0 | | | | | | | | | | |
| Sapling | 100,000.0 | 16.6 | 115,144,031 | 26.5 | 1,151 | 7,721,229.6 | 6.5 | 77.2 | 516,898.9 | 15.3 | 5.2 | 6.7 |
| Middle-aged stands | 332,800.0 | 54.8 | 271,000,142 | 62.3 | 814 | 69,383,662.3 | 58.0 | 208.5 | 2,037,853.0 | 60.3 | 6.1 | 2.9 |
| Mature stands | 155,600.0 | 25.6 | 48,481,594 | 11.2 | 312 | 42,472,554.0 | 35.5 | 273.0 | 824,722.1 | 24.4 | 5.3 | 1.9 |
| **Total** | **606,800.0** | **100.0** | **434,625,767** | **100.0** | **716** | **119,577,445.9** | **100.0** | **197.1** | **3,379,474.0** | **100.0** | **5.6** | **2.8** |

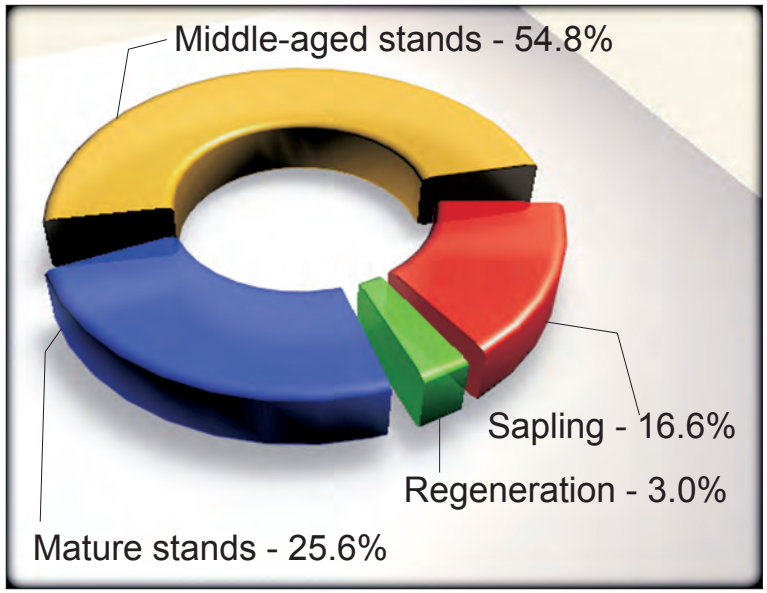



**Diagram 10.** High even-aged forests by development stages (area)

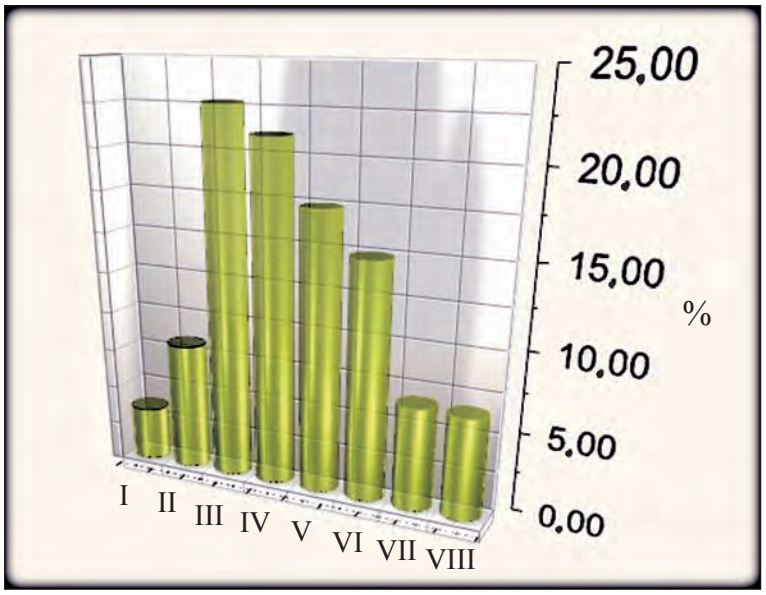



**Diagram 11.** Forests by age classes (area)

**Table 11.** Forests by age classes

| Age class | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| I | 70,400.0 | 3.4 | 2,428,172 | 0.1 | 34 | 101,147.6 | 0.0 | 1.4 | 8,705.9 | 0.1 | 0.1 | 8.6 |
| II | 166,400.0 | 8.1 | 175,255,563 | 8.7 | 1,053 | 8,608,328.5 | 2.8 | 51.7 | 484,897.5 | 6.2 | 2.9 | 5.6 |
| III | 465,200.0 | 22.5 | 612,388,286 | 30.3 | 1,316 | 45,887,884.3 | 15.3 | 98.6 | 1,716,627.0 | 21.9 | 3.7 | 3.7 |
| IV | 430,800.0 | 20.9 | 500,810,804 | 24.8 | 1,163 | 57,970,262.2 | 19.3 | 134.6 | 1,693,274.0 | 21.6 | 3.9 | 2.9 |
| V | 355,600.0 | 17.2 | 357,860,519 | 17.7 | 1,006 | 60,717,576.3 | 20.2 | 170.7 | 1,549,517.0 | 19.8 | 4.4 | 2.6 |
| VI | 303,600.0 | 14.7 | 221,426,801 | 11.0 | 729 | 64,685,750.4 | 21.5 | 213.1 | 1,287,792.0 | 16.4 | 4.2 | 2.0 |
| VII | 133,200.0 | 6.5 | 90,870,721 | 4.5 | 682 | 29,896,235.4 | 9.9 | 224.4 | 579,512.8 | 7.4 | 4.4 | 1.9 |
| VIII | 138,000.0 | 6.7 | 58,870,374 | 2.9 | 427 | 32,980,370.3 | 11.0 | 239.0 | 521,134.8 | 6.6 | 3.8 | 1.6 |
| **TOTAL** | **2,063,200.0** | **100.0** | **2,019,911,240** | **100.0** | **979** | **300,847,554.9** | **100.0** | **145.8** | **7,841,461.0** | **100.0** | **3.8** | **2.6** |

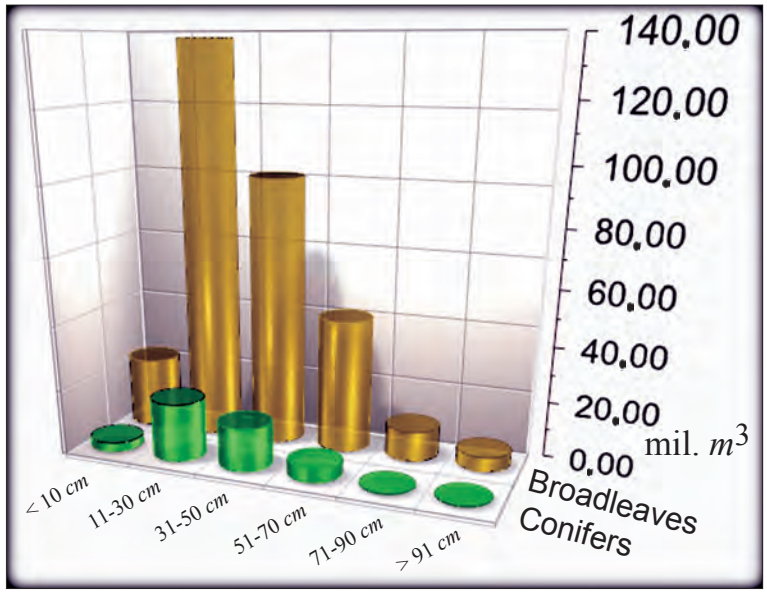



**Diagram 12.** Forest volume structure by diameter classes

**Table 12.** Forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 146,850,828 | 3,923,941 | 45,624,116 | 51,505,229 | 32,794,163 | 8,746,826 | 4,256,553 |
| Turkey oak | 46,980,446 | 3,914,217 | 29,047,309 | 11,333,471 | 2,346,576 | 198,381 | 140,492 |
| Sessile oak | 21,542,891 | 1,288,944 | 10,793,726 | 6,431,539 | 2,481,289 | 358,513 | 188,880 |
| Hungarian oak | 20,986,465 | 2,639,607 | 14,474,559 | 3,358,941 | 461,503 | 51,855 | |
| Hornbeam | 15,157,240 | 3,364,546 | 8,631,913 | 2,123,239 | 830,600 | 146,871 | 60,071 |
| Black locust | 11,243,943 | 2,869,851 | 7,098,831 | 1,174,093 | 101,168 | | |
| Common oak | 9,242,373 | 176,910 | 1,299,989 | 4,632,270 | 2,684,333 | 316,578 | 132,293 |
| Euramer. poplar | 6,137,863 | 22,069 | 888,205 | 2,927,414 | 1,837,414 | 462,761 | |
| Narrow-leaved ash | 5,792,311 | 262,800 | 2,623,220 | 2,076,032 | 729,150 | 101,109 | |
| Large-leaved lime | 3,535,862 | 212,854 | 1,386,215 | 1,329,057 | 537,530 | 24,596 | 45,610 |
| Flowering ash | 3,505,758 | 1,506,103 | 1,807,434 | 166,128 | 26,093 | | |
| Field maple | 3,181,304 | 665,804 | 2,001,567 | 445,091 | 68,842 | | |
| Other broadleaves | 2,942,000 | 616,287 | 1,743,317 | 467,484 | 90,762 | 24,150 | |
| Aspen | 2,358,304 | 227,600 | 1,518,391 | 561,375 | 50,938 | | |
| Willow | 1,912,086 | 40,932 | 826,706 | 595,634 | 291,461 | 104,059 | 53,294 |
| Silver lime | 1,779,097 | 64,964 | 462,718 | 958,602 | 292,813 | | |
| Oriental hornbeam | 1,717,529 | 1,197,720 | 485,505 | 14,618 | 19,686 | | |
| Hop hornbeam | 1,480,695 | 276,067 | 1,086,634 | 99,885 | 18,109 | | |
| Maple | 1,433,356 | 166,313 | 629,107 | 452,393 | 137,731 | | 47,812 |
| Cherry | 1,292,269 | 151,333 | 707,652 | 356,345 | 76,939 | | |
| Smooth-leaved elm | 1,097,943 | 394,761 | 511,311 | 175,297 | 16,574 | | |
| Black poplar | 1,017,365 | 6,989 | 95,478 | 384,627 | 419,997 | 48,547 | 61,727 |
| Pubescent oak | 956,166 | 157,089 | 508,600 | 211,470 | 29,468 | | 49,539 |
| Small-leaved lime | 944,875 | 131,823 | 286,108 | 395,350 | 131,594 | | |
| Birch | 874,773 | 130,097 | 568,473 | 160,956 | 15,247 | | |
| White ash | 767,273 | 76,479 | 359,723 | 205,620 | 125,451 | | |
| Alder | 763,679 | 50,313 | 412,886 | 244,994 | 55,486 | | |
| White poplar | 607,151 | 16,651 | 185,535 | 176,277 | 228,688 | | |
| Norway maple | 417,961 | 12,817 | 208,990 | 134,513 | 61,641 | | |
| Common walnut | 314,440 | 45,723 | 158,204 | 78,481 | 32,032 | | |
| Turkish hazel | 207,391 | 39,598 | 106,032 | 54,277 | 7,484 | | |
| Wych elm | 187,080 | 7,710 | 96,119 | 83,251 | | | |
| White ash | 157,576 | 97,898 | 49,041 | 10,637 | | | |
| Black walnut | 154,850 | | 86,635 | 68,215 | | | |
| Wild service tree | 110,265 | 25,139 | 59,560 | 25,566 | | | |
| Balkan maple | 95,318 | 17,458 | 54,610 | 13,036 | 10,214 | | |
| Ash-leaved maple | 92,276 | 39,414 | 52,862 | | | | |
| Europ. hackberry | 55,587 | 17,443 | 19,349 | 18,795 | | | |
| Europ. white elm | 32,297 | 18,822 | 13,475 | | | | |
| Mountain ash | 3,377 | | | 3,377 | | | |
| **Total broadleaves** | **317,930,256** | **24,875,086** | **136,970,105** | **93,453,579** | **47,010,976** | **10,584,246** | **5,036,271** |
| Spruce | 18,810,546 | 1,694,644 | 6,669,041 | 7,257,982 | 2,886,162 | 183,776 | 118,941 |
| Fir | 8,304,924 | 134,375 | 2,836,021 | 3,510,612 | 1,779,367 | 44,549 | |
| Austrian pine | 12,659,026 | 992,142 | 7,887,400 | 3,400,783 | 349,032 | 29,669 | |
| Scots pine | 3,775,430 | 279,712 | 2,544,081 | 922,338 | 29,299 | | |
| Douglas-fir | 511,152 | 13,085 | 368,015 | 130,052 | | | |
| Weymouth pine | 355,416 | 13,864 | 267,564 | 73,988 | | | |
| Larch | 107,760 | 24,616 | 74,511 | 8,633 | | | |
| Yew | 2,395 | | 2,395 | | | | |
| Other conifers | 30,515 | 2,829 | 27,686 | | | | |
| **Total conifers** | **44,557,162** | **3,155,267** | **20,676,714** | **15,304,388** | **5,043,860** | **257,994** | **118,941** |
| **TOTAL** | **362,487,418** | **28,030,353** | **157,646,819** | **108,757,967** | **52,054,836** | **10,842,240** | **5,155,212** |

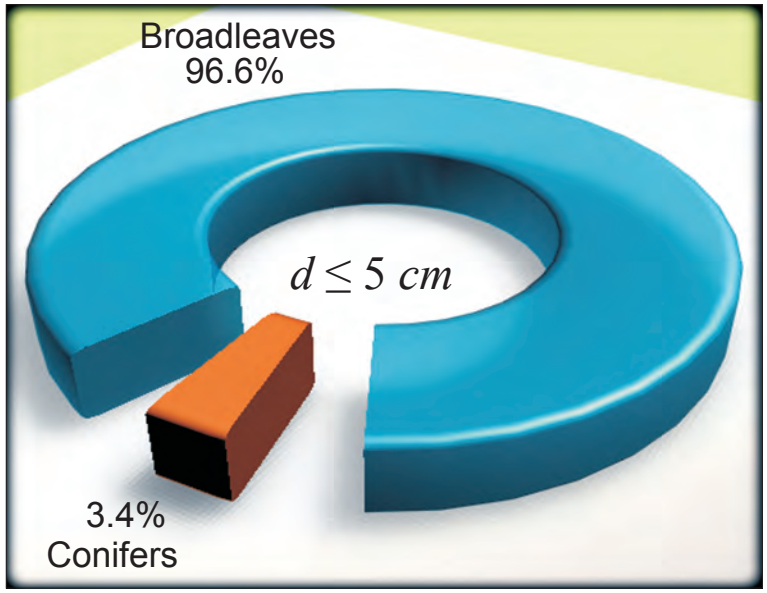



**Diagram 13.** Forests by number of trees *d≤5 cm*

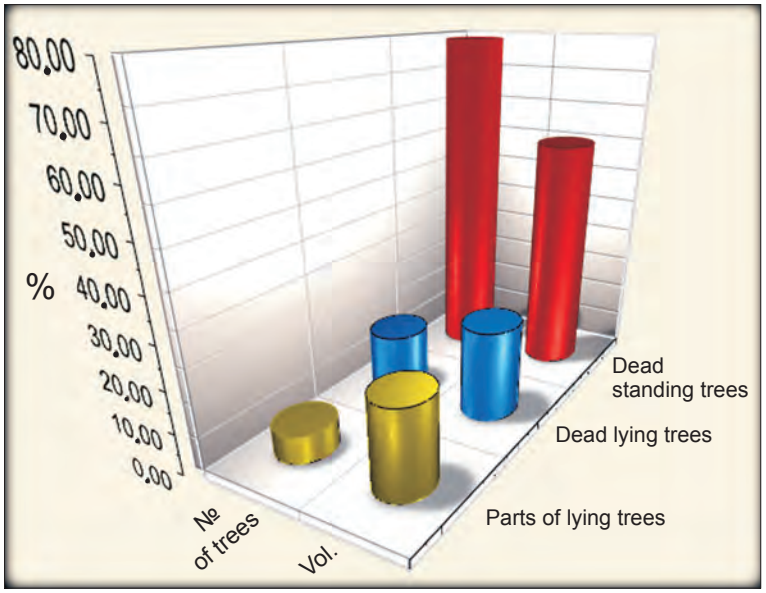



**Diagram 14.** Dead wood

**Table 13.** Thin trees *d≤5 cm*

| Tree species | Number of trees | |
|---|---|---|
| | *trees* | % |
| Broadleaves | 14,564,000 | 96.6 |
| Conifers | 510,800 | 3.4 |
| **TOTAL** | **15,074,800** | **100.0** |

**Table 14.** Dead wood

| Tree health | Number of trees | | Volume | |
|---|---|---|---|---|
| | *trees* | % | $m^3$ | % |
| Dead standing trees | 79,283,641 | 78.5 | 9,113,109.8 | 56.1 |
| Dead lying trees | 14,911,956 | 14.8 | 3,617,080.7 | 22.2 |
| Parts of lying trees | 6,791,765 | 6.7 | 3,530,223.7 | 21.7 |
| **TOTAL** | **100,987,362** | **100.0** | **16,260,414.2** | **100.0** |

# APPENDIX 3 - The growing stock of the Republic of Serbia without AP

**Table 1.** Area structure by land use

| Land use | Area | |
|---|---|---|
| | *ha* | % |
| Forest | 2,098,400.0 | 37.6 |
| Other wooded land | 338,000.0 | 6.0 |
| Barren land | 88,400.0 | 1.6 |
| Agricultural land | 1,734,800.0 | 31.0 |
| Meadows and pastures | 1,000,400.0 | 17.9 |
| Built-up land | 274,400.0 | 4.9 |
| Inland water | 57,600.0 | 1.0 |
| **TOTAL** | **5,592,000.0** | **100.0** |

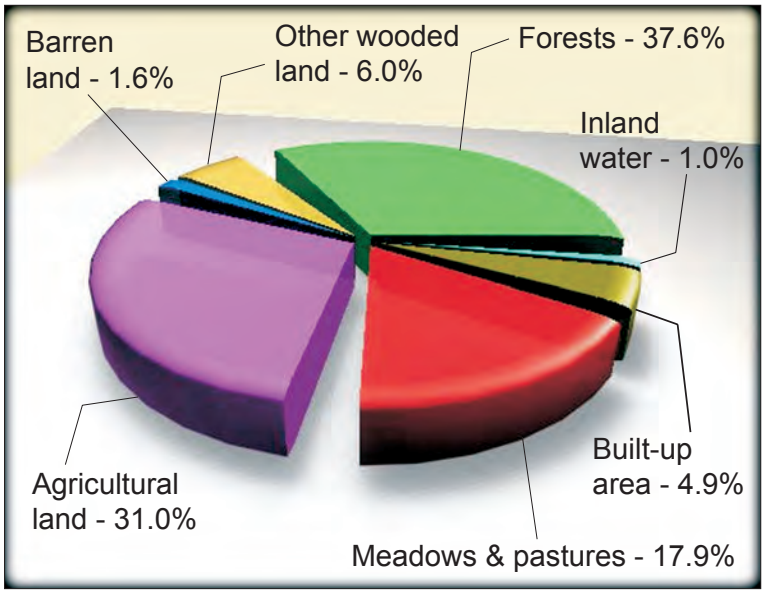



**Diagram 1.** Area structure by land use

**Table 2.** Forests by ownership

| Ownership | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| State | 1,069,200.0 | 51.0 | 966,243,155 | 48.0 | 904 | 197,442,215.2 | 59.2 | 184.7 | 4,655,502.0 | 56.6 | 4.4 | 2.4 |
| Private | 1,029,200.0 | 49.0 | 1,046,453,200 | 52.0 | 1,017 | 135,962,208.4 | 40.8 | 132.1 | 3,566,627.0 | 43.4 | 3.5 | 2.6 |
| **TOTAL** | **2,098,400.0** | **100.0** | **2,012,696,354** | **100.0** | **959** | **333,404,423.5** | **100.0** | **158.9** | **8,222,129.0** | **100.0** | **3.9** | **2.5** |

**Table 3.** Forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 583,200.0 | 27.8 | 349,386,549 | 17.4 | 599 | 145,541,066.2 | 43.7 | 249.6 | 3,168,685.0 | 38.5 | 5.4 | 2.2 |
| Natural coppice stands | 1,384,400.0 | 66.0 | 1,526,004,874 | 75.8 | 1,102 | 171,351,859.8 | 51.3 | 123.8 | 4,185,963.0 | 50.9 | 3.0 | 2.4 |
| Artificially established stands | 130,800.0 | 6.2 | 137,304,931 | 6.8 | 1,050 | 16,511,497.5 | 5.0 | 126.2 | 867,480.8 | 10.6 | 6.6 | 5.3 |
| **TOTAL** | **2,098,400.0** | **100.0** | **2,012,696,354** | **100.0** | **959** | **333,404,423.5** | **100.0** | **158.9** | **8,222,129.0** | **100.0** | **3.9** | **2.5** |

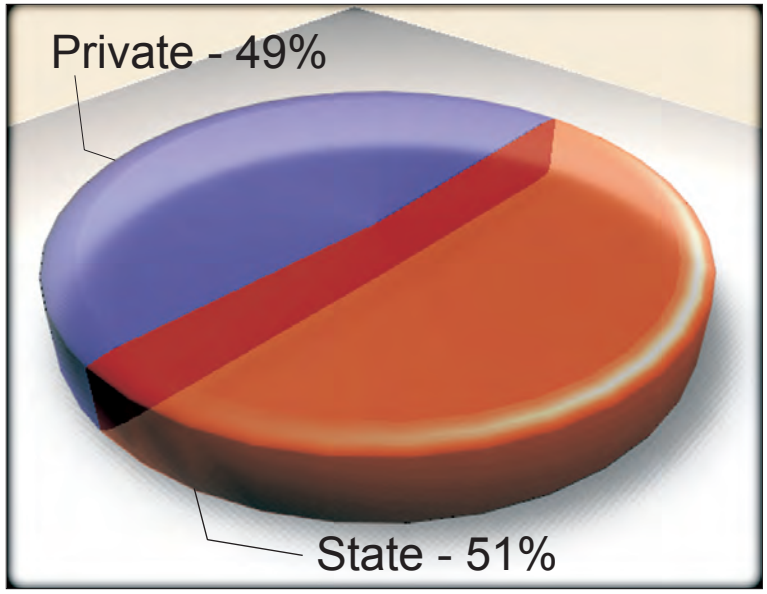



**Diagram 2.** Forests by ownership (area)

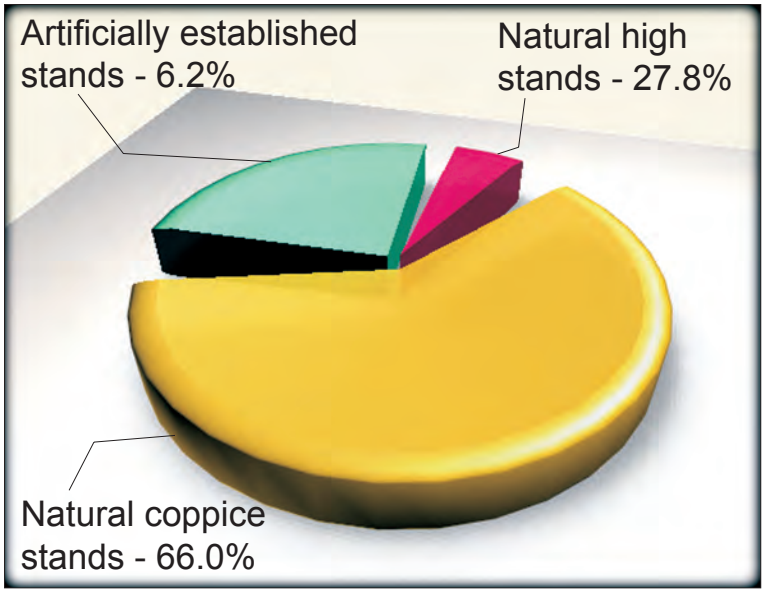



**Diagram 3.** Forests by origin (area)

**Table 4.** Forests by naturalness

| Naturalness | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Forests without anthropogenic interventions | 1,200.0 | 0.1 | 305,577 | 0.0 | 255 | 666,721.7 | 0.2 | 555.6 | 9,502.5 | 0.1 | 7.9 | 1.4 |
| Semi- natural forests | 1,966,400.0 | 93.7 | 1,875,085,846 | 93.2 | 954 | 316,226,204.3 | 94.8 | 160.8 | 7,345,146.0 | 89.3 | 3.7 | 2.3 |
| Plantations | 130,800.0 | 6.2 | 137,304,931 | 6.8 | 1,050 | 16,511,497.5 | 5.0 | 126.2 | 867,480.8 | 10.6 | 6.6 | 5.3 |
| **TOTAL** | **2,098,400.0** | **100.0** | **2,012,696,354** | **100.0** | **959** | **333,404,423.5** | **100.0** | **158.9** | **8,222,129.0** | **100.0** | **3.9** | **2.5** |

**Table 5.** Forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 1,488,000.0 | 70.9 | 1,852,755,495 | 92.0 | 1,245 | 236,480,071.1 | 70.9 | 158.9 | 6,540,741.0 | 79.5 | 4.4 | 2.8 |
| Insufficiently stocked stands | 563,200.0 | 26.8 | 156,497,427 | 7.8 | 278 | 93,225,564.9 | 28.0 | 165.5 | 1,626,552.0 | 19.8 | 2.9 | 1.7 |
| Devastated stands | 47,200.0 | 2.3 | 3,443,432 | 0.2 | 73 | 3,698,787.5 | 1.1 | 78.4 | 54,836.4 | 0.7 | 1.2 | 1.5 |
| **TOTAL** | **2,098,400.0** | **100.0** | **2,012,696,354** | **100.0** | **959** | **333,404,423.5** | **100.0** | **158.9** | **8,222,129.0** | **100.0** | **3.9** | **2.5** |

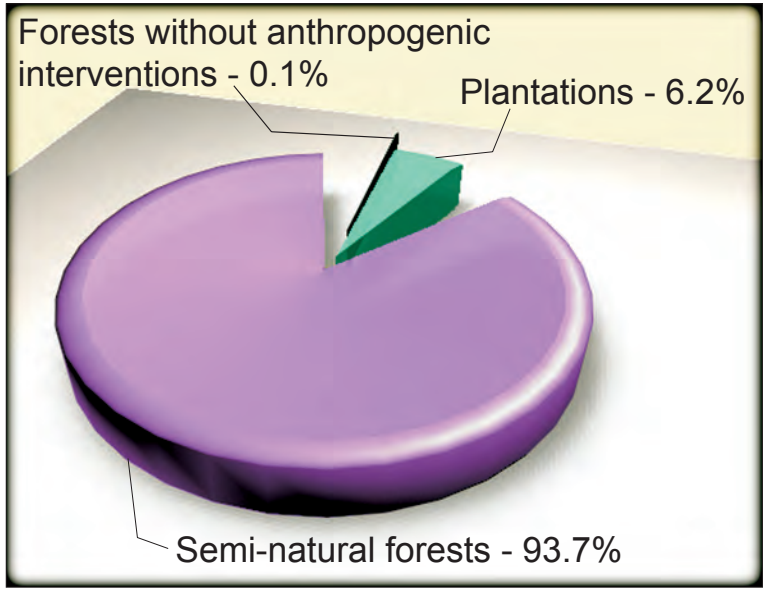



**Diagram 4.** Forests by naturalness (area)

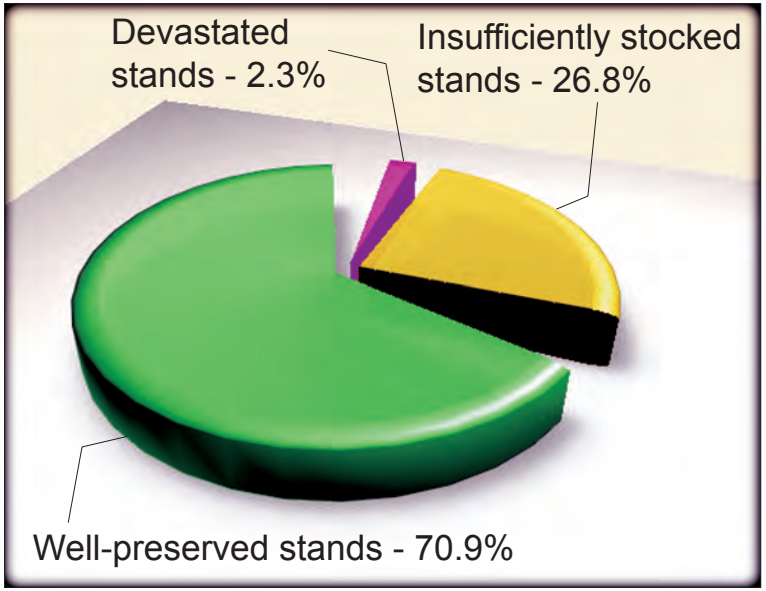



**Diagram 5.** Forests by preservation status (area)

**Table 6.** Forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 1,220,800.0 | 58.1 | 1,070,026,286 | 53.2 | 876 | 207,295,830.6 | 62.2 | 169.8 | 4,525,404.0 | 55.0 | 3.7 | 2.2 |
| Mixed broadleaf stands | 621,600.0 | 29.6 | 712,798,388 | 35.4 | 1,147 | 76,280,424.4 | 22.9 | 122.7 | 1,868,728.0 | 22.7 | 3.0 | 2.4 |
| Mixed broadleaf and coniferous stands | 52,000.0 | 2.5 | 50,511,678 | 2.5 | 971 | 11,341,991.1 | 3.4 | 218.1 | 299,116.5 | 3.6 | 5.8 | 2.6 |
| Mixed stands of conifers | 14,000.0 | 0.7 | 12,502,875 | 0.6 | 893 | 4,027,565.9 | 1.2 | 287.7 | 127,739.4 | 1.6 | 9.1 | 3.2 |
| Pure coniferous stands | 190,000.0 | 9.1 | 166,857,127 | 8.3 | 878 | 34,458,611.5 | 10.3 | 181.4 | 1,401,141.0 | 17.1 | 7.4 | 4.1 |
| **Total** | **2,098,400.0** | **100.0** | **2,012,696,354** | **100.0** | **959** | **333,404,423.5** | **100.0** | **158.9** | **8,222,129.0** | **100.0** | **3.9** | **2.5** |

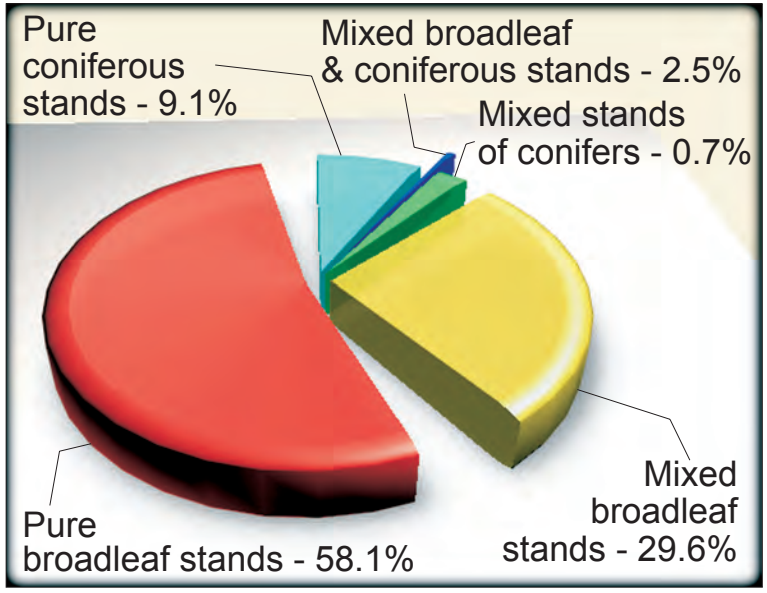



**Diagram 6.** Forests by mixture (area)

**Table 7.** Forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Beech | 435,951,350 | 21.7 | 146,333,927.0 | 43.9 | 2,773,978.0 | 33.7 | 1.9 |
| Turkey oak | 232,447,110 | 11.5 | 45,581,356.0 | 13.7 | 1,015,336.0 | 12.3 | 2.2 |
| Hungarian oak | 153,215,803 | 7.6 | 20,986,465.0 | 6.3 | 518,767.0 | 6.3 | 2.5 |
| Sessile oak | 126,553,134 | 6.3 | 20,117,359.0 | 6.0 | 522,194.0 | 6.4 | 2.6 |
| Hornbeam | 248,702,727 | 12.4 | 14,409,637.0 | 4.3 | 321,942.0 | 3.9 | 2.2 |
| Black locust | 192,697,730 | 9.6 | 9,820,713.0 | 2.9 | 449,636.0 | 5.5 | 4.6 |
| Flowering ash | 102,441,073 | 5.1 | 3,406,454.0 | 1.0 | 100,117.0 | 1.2 | 2.9 |
| Large-leaved lime | 15,405,853 | 0.8 | 3,048,590.0 | 0.9 | 62,201.0 | 0.8 | 2.0 |
| Field maple | 44,392,385 | 2.2 | 2,908,995.0 | 0.9 | 67,964.0 | 0.8 | 2.3 |
| Other broadleaves | 40,021,775 | 2.0 | 2,551,932.0 | 0.8 | 77,147.0 | 0.9 | 3.0 |
| Narrow-leaved ash | 9,159,803 | 0.5 | 2,539,128.0 | 0.8 | 72,773.0 | 0.9 | 2.9 |
| Aspen | 22,371,251 | 1.1 | 2,251,596.0 | 0.7 | 89,887.0 | 1.1 | 4.0 |
| Oriental hornbeam | 88,444,273 | 4.4 | 1,717,529.0 | 0.5 | 55,073.0 | 0.7 | 3.2 |
| Hop hornbeam | 21,951,640 | 1.1 | 1,480,694.0 | 0.4 | 33,966.0 | 0.4 | 2.3 |
| Maple | 10,857,215 | 0.5 | 1,426,624.0 | 0.4 | 38,627.0 | 0.5 | 2.7 |
| Common oak | 1,884,250 | 0.1 | 1,347,521.0 | 0.4 | 23,278.0 | 0.3 | 1.7 |
| Cherry | 12,085,307 | 0.6 | 1,224,911.0 | 0.4 | 30,948.0 | 0.4 | 2.5 |
| Willow | 2,641,411 | 0.1 | 909,214.0 | 0.3 | 17,988.0 | 0.2 | 2.0 |
| Birch | 11,322,776 | 0.6 | 858,099.0 | 0.3 | 31,431.0 | 0.4 | 3.7 |
| Pubescent oak | 11,998,564 | 0.6 | 857,250.0 | 0.3 | 26,669.0 | 0.3 | 3.1 |
| Smooth-leaved elm | 15,413,102 | 0.8 | 815,715.0 | 0.2 | 32,900.0 | 0.4 | 4.0 |
| Alder | 5,067,054 | 0.3 | 762,290.0 | 0.2 | 22,678.0 | 0.3 | 3.0 |
| White ash | 5,952,829 | 0.3 | 734,326.0 | 0.2 | 20,802.0 | 0.3 | 2.8 |
| Euramer. poplar | 917,983 | 0.0 | 626,571.0 | 0.2 | 39,313.0 | 0.5 | 6.3 |
| Black poplar | 365,396 | 0.0 | 559,031.0 | 0.2 | 13,461.0 | 0.2 | 2.4 |
| Small-leaved lime | 4,256,836 | 0.2 | 460,811.0 | 0.1 | 9,535.0 | 0.1 | 2.1 |

**Table 7.** Forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| White poplar | 1,208,463 | 0.1 | 385,323.0 | 0.1 | 17,125.0 | 0.2 | 4.4 |
| Norway maple | 1,388,273 | 0.1 | 369,749.0 | 0.1 | 8,579.0 | 0.1 | 2.3 |
| Silver lime | 1,474,735 | 0.1 | 293,866.0 | 0.1 | 5,357.0 | 0.1 | 1.8 |
| Common walnut | 2,040,242 | 0.1 | 290,550.0 | 0.1 | 8,489.0 | 0.1 | 2.9 |
| Turkish hazel | 2,523,181 | 0.1 | 207,391.0 | 0.1 | 6,521.0 | 0.1 | 3.1 |
| Wych elm | 885,886 | 0.0 | 186,394.0 | 0.1 | 4,152.0 | 0.1 | 2.2 |
| Balkan maple | 816,528 | 0.0 | 95,318.0 | 0.0 | 3,179.0 | 0.0 | 3.3 |
| Wild service tree | 1,901,371 | 0.1 | 93,126.0 | 0.0 | 2,156.0 | 0.0 | 2.3 |
| Europ. white elm | 783,258 | 0.0 | 32,297.0 | 0.0 | 1,548.0 | 0.0 | 4.8 |
| Ash-leaved maple | 154,203 | 0.0 | 9,693.0 | 0.0 | 424.0 | 0.0 | 4.4 |
| Mountain ash | 5,659 | 0.0 | 3,377.0 | 0.0 | 36.0 | 0.0 | 1.1 |
| White ash | 12,732 | 0.0 | 1,469.0 | 0.0 | 26.0 | 0.0 | 1.8 |
| **Total broadleaves** | **1,829,713,161** | **90.9** | **289,705,291.0** | **86.9** | **6,526,203.0** | **79.4** | **2.3** |
| Spruce | 57,532,098 | 2.9 | 18,810,547.0 | 5.6 | 605,246.0 | 7.4 | 3.2 |
| Austrian pine | 80,860,931 | 4.0 | 11,950,227.0 | 3.6 | 677,339.0 | 8.2 | 5.7 |
| Fir | 13,797,216 | 0.7 | 8,304,924.0 | 2.5 | 199,851.0 | 2.4 | 2.4 |
| Scots pine | 25,753,732 | 1.3 | 3,626,197.0 | 1.1 | 171,728.0 | 2.1 | 4.7 |
| Douglas-fir | 1,641,064 | 0.1 | 511,151.0 | 0.2 | 16,184.0 | 0.2 | 3.2 |
| Weymouth pine | 2,079,983 | 0.1 | 355,416.0 | 0.1 | 18,708.0 | 0.2 | 5.3 |
| Larch | 995,956 | 0.0 | 107,760.0 | 0.0 | 5,167.0 | 0.1 | 4.8 |
| Yew | 12,732 | 0.0 | 2,395.0 | 0.0 | 83.0 | 0.0 | 3.5 |
| Other conifers | 309,482 | 0.0 | 30,516.0 | 0.0 | 1,620.0 | 0.0 | 5.3 |
| **Total conifers** | **182,983,194** | **9.1** | **43,699,133.0** | **13.1** | **1,695,926.0** | **20.6** | **3.9** |
| **TOTAL** | **2,012,696,354** | **100.0** | **333,404,424.0** | **100.0** | **8,222,129.0** | **100.0** | **2.5** |

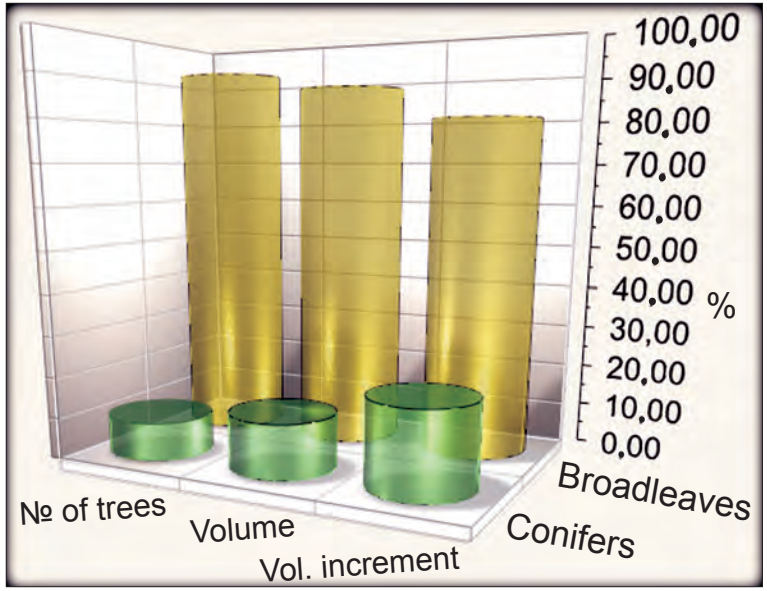



**Diagram 7.** Forests by tree species

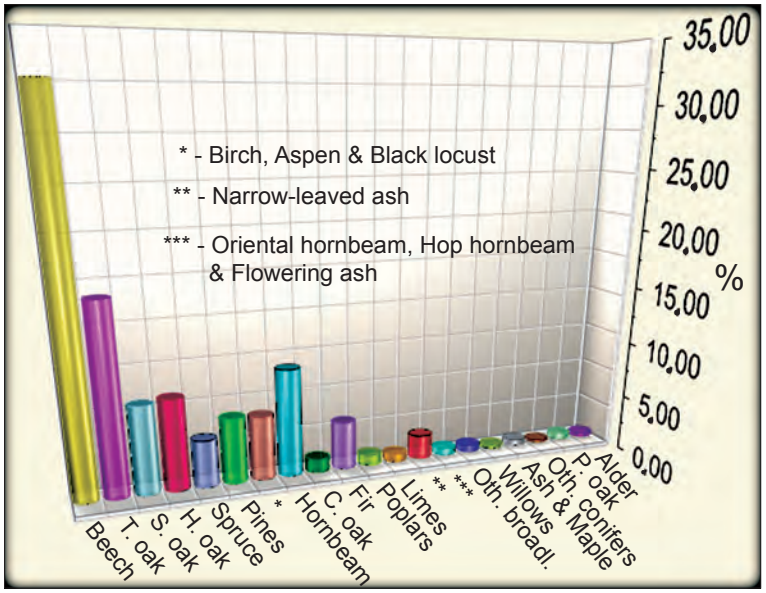



**Diagram 8.** Forests by stand categories (area)

**Table 8.** Forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| 1 | Beech forests | 657,600.0 | 31.4 | 479,776,509 | 23.9 | 730 | 153,114,171.0 | 45.9 | 232.8 | 2,917,007.0 | 35.5 | 4.4 | 1.9 |
| 2 | Turkey oak forests | 340,400.0 | 16.2 | 340,473,373 | 16.9 | 1,000 | 48,127,827.0 | 14.5 | 141.4 | 1,138,824.0 | 13.9 | 3.3 | 2.3 |
| 3 | Hungarian oak forests | 159,600.0 | 7.6 | 178,122,326 | 8.8 | 1,116 | 21,086,655.0 | 6.3 | 132.1 | 533,060.0 | 6.5 | 3.3 | 2.5 |
| 4 | Sessile oak forests | 165,600.0 | 7.9 | 157,475,743 | 7.8 | 951 | 20,122,415.0 | 6.0 | 121.5 | 508,845.0 | 6.2 | 3.1 | 2.6 |
| 5 | Spruce forests | 86,400.0 | 4.1 | 66,535,201 | 3.3 | 770 | 18,926,036.0 | 5.7 | 219.1 | 607,062.0 | 7.4 | 7.0 | 3.2 |
| 6 | Pine forests | 119,200.0 | 5.7 | 116,694,242 | 5.8 | 979 | 15,570,918.0 | 4.7 | 130.6 | 844,612.0 | 10.3 | 7.1 | 5.4 |
| 7 | Hornbeam forests | 117,600.0 | 5.6 | 173,232,391 | 8.7 | 1,473 | 13,033,810.0 | 3.9 | 110.8 | 292,237.0 | 3.6 | 2.5 | 2.3 |
| 8 | Forests of birch, aspen and black locust | 198,000.0 | 9.4 | 217,249,003 | 10.8 | 1,097 | 11,758,347.0 | 3.5 | 59.4 | 535,456.0 | 6.5 | 2.7 | 4.5 |
| 9 | Fir forests | 25,600.0 | 1.2 | 17,989,412 | 0.9 | 703 | 9,838,863.0 | 3.0 | 384.3 | 225,515.0 | 2.7 | 8.8 | 2.3 |
| 10 | Forests of oriental hornbeam, hop hornbeam and flowering ash | 87,200.0 | 4.2 | 129,961,443 | 6.5 | 1,490 | 4,794,933.0 | 1.4 | 55.0 | 133,127.0 | 1.6 | 1.5 | 2.7 |
| 11 | Lime forests | 18,800.0 | 0.9 | 22,960,860 | 1.1 | 1,221 | 3,341,865.0 | 1.0 | 177.8 | 71,335.0 | 0.9 | 3.8 | 2.1 |
| 12 | Narrow-leaved ash forests | 14,800.0 | 0.7 | 15,960,094 | 0.8 | 1,078 | 2,962,850.0 | 0.9 | 200.2 | 86,142.0 | 1.0 | 5.8 | 2.9 |
| 13 | Forests of other broadleaves | 44,800.0 | 2.1 | 46,329,466 | 2.3 | 1,034 | 2,668,161.0 | 0.8 | 59.6 | 78,352.0 | 1.0 | 1.7 | 2.9 |
| 14 | Poplar forests | 12,000.0 | 0.6 | 5,476,014 | 0.3 | 456 | 1,638,481.0 | 0.5 | 136.5 | 73,255.0 | 0.9 | 6.1 | 4.5 |
| 15 | Forests of ash and maple | 12,400.0 | 0.6 | 14,706,881 | 0.7 | 1,186 | 1,556,763.0 | 0.5 | 125.5 | 42,777.0 | 0.5 | 3.4 | 2.7 |
| 16 | Common oak forests | 6,000.0 | 0.3 | 2,349,816 | 0.1 | 392 | 1,278,900.0 | 0.4 | 213.2 | 23,354.0 | 0.3 | 3.9 | 1.8 |
| 17 | Willow forests | 10,800.0 | 0.5 | 4,858,136 | 0.2 | 450 | 1,059,944.0 | 0.3 | 98.1 | 24,287.0 | 0.3 | 2.2 | 2.2 |
| 18 | Forests of other conifers | 5,200.0 | 0.2 | 5,974,626 | 0.3 | 1,149 | 1,054,331.0 | 0.3 | 202.8 | 42,235.0 | 0.5 | 8.1 | 4.0 |
| 19 | Pubescent oak forests | 10,000.0 | 0.5 | 11,742,372 | 0.6 | 1,174 | 796,164.0 | 0.2 | 79.6 | 25,160.0 | 0.3 | 2.5 | 3.1 |
| 20 | Alder forests | 6,400.0 | 0.3 | 4,828,446 | 0.2 | 754 | 672,989.0 | 0.2 | 105.2 | 19,487.0 | 0.2 | 3.0 | 2.9 |
| **TOTAL** | | **2,098,400.0** | **100.0** | **2,012,696,354** | **100.0** | **959** | **333,404,424.0** | **100.0** | **158.9** | **8,222,129.0** | **100.0** | **3.9** | **2.5** |

**Table 9.** Forests by structural form

| Structural form | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Even-aged stands | 1,909,200.0 | 91.0 | 1,917,971,741 | 95.3 | 1,005 | 271,764,560.9 | 81.5 | 142.3 | 6,983,817.0 | 84.9 | 3.7 | 2.6 |
| Uneven-aged stands | 169,200.0 | 8.0 | 81,435,613 | 4.1 | 481 | 52,873,251.3 | 15.9 | 312.5 | 1,048,795.0 | 12.8 | 6.2 | 2.0 |
| Selection stands | 18,800.0 | 0.9 | 12,983,423 | 0.6 | 691 | 8,099,889.7 | 2.4 | 430.8 | 180,014.5 | 2.2 | 9.6 | 2.2 |
| Virgin forests | 1,200.0 | 0.1 | 305,577 | 0.0 | 255 | 666,721.7 | 0.2 | 555.6 | 9,502.5 | 0.1 | 7.9 | 1.4 |
| **Total** | **2,098,400.0** | **100.0** | **2,012,696,354** | **100.0** | **959** | **333,404,423.5** | **100.0** | **158.9** | **8,222,129.0** | **100.0** | **3.9** | **2.5** |

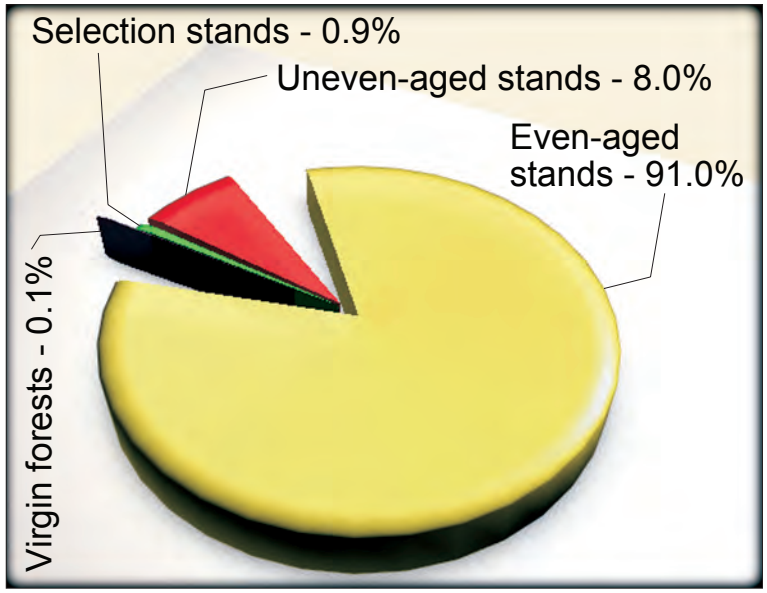



**Diagram 9.** Forests by structural form (area)

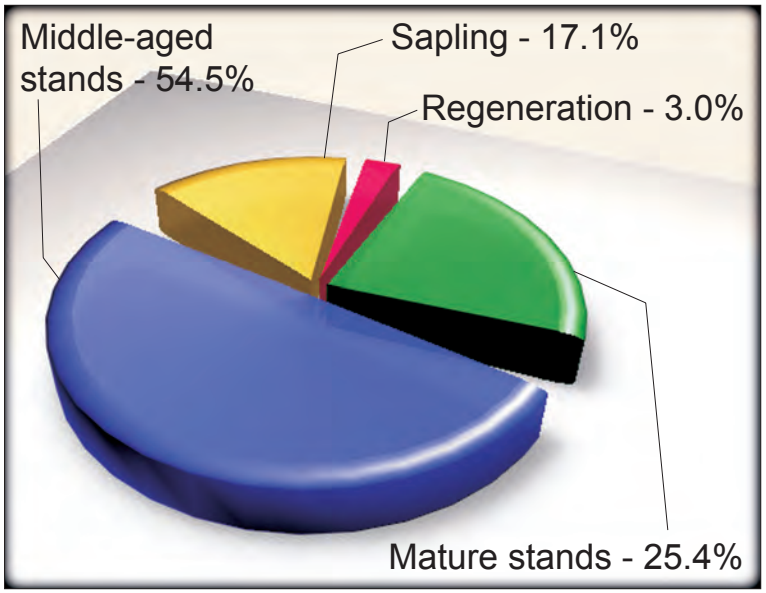



**Diagram 10.** High even-aged forests by development stages (area)

**Table 10.** High even-aged forests by development stages

| Stand development stage | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Regeneration | 15,600.0 | 3.0 | | | | | | | | | | |
| Sapling | 90,000.0 | 17.1 | 105.838.499 | 26.9 | 1,176 | 7,055,896.3 | 7.1 | 78.4 | 481,300.6 | 17.2 | 5.3 | 6.8 |
| Middle-aged stands | 286,400.0 | 54.5 | 247.209.817 | 62.7 | 863 | 57,280,933.0 | 57.0 | 200.0 | 1,724,611.0 | 61.6 | 6.0 | 3.0 |
| Mature stands | 133,200.0 | 25.4 | 40.970.762 | 10.4 | 308 | 36,104,374.0 | 35.9 | 271.1 | 593,053.8 | 21.2 | 4.5 | 1.6 |
| **Total** | **525,200.0** | **100.0** | **394.019.078** | **100.0** | **750** | **100,441,203.3** | **100.0** | **191.2** | **2,798,965.4** | **100.0** | **5.3** | **2.8** |

**Table 11.** Forests by age classes

| Age class | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| I | 57,600.0 | 3.0 | 1,337,568 | 0.1 | 23 | 59,623.4 | 0.0 | 1.0 | 6,426.8 | 0.1 | 0.1 | 10.8 |
| II | 143,200.0 | 7.5 | 148,636,334 | 7.7 | 1,038 | 6,793,227.3 | 2.5 | 47.4 | 395,558.9 | 5.7 | 2.8 | 5.8 |
| III | 442,000.0 | 23.2 | 588,826,754 | 30.7 | 1,332 | 43,422,579.9 | 16.0 | 98.2 | 1,570,887.0 | 22.5 | 3.6 | 3.6 |
| IV | 415,200.0 | 21.7 | 488,593,003 | 25.5 | 1,177 | 55,054,225.5 | 20.2 | 132.6 | 1,578,139.0 | 22.6 | 3.8 | 2.9 |
| V | 323,600.0 | 16.9 | 340,254,015 | 17.7 | 1,052 | 52,446,289.4 | 19.3 | 162.1 | 1,314,213.0 | 18.8 | 4.1 | 2.5 |
| VI | 283,600.0 | 14.9 | 209,603,298 | 10.9 | 739 | 58,574,941.0 | 21.6 | 206.5 | 1,161,504.0 | 16.6 | 4.1 | 2.0 |
| VII | 119,600.0 | 6.3 | 85,593,747 | 4.5 | 716 | 25,889,729.0 | 9.5 | 216.5 | 498,431.4 | 7.1 | 4.2 | 1.9 |
| VIII | 124,400.0 | 6.5 | 55,127,023 | 2.9 | 443 | 29,523,945.4 | 10.9 | 237.3 | 458,656.4 | 6.6 | 3.7 | 1.6 |
| **Total** | **1,909,200.0** | **100.0** | **1,917,971,741** | **100.0** | **1,005** | **271,764,560.9** | **100.0** | **142.3** | **6,983,816.5** | **100.0** | **3.7** | **2.6** |

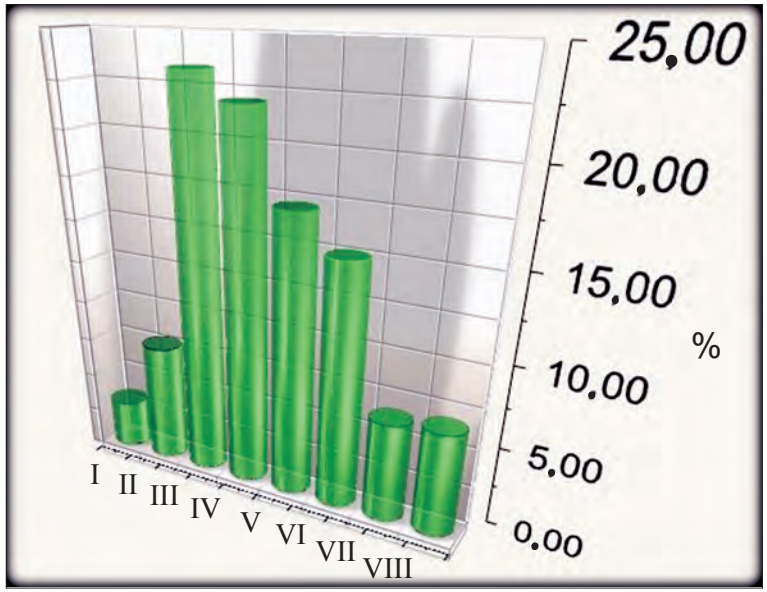



**Diagram 11.** Forests by age classes (area)

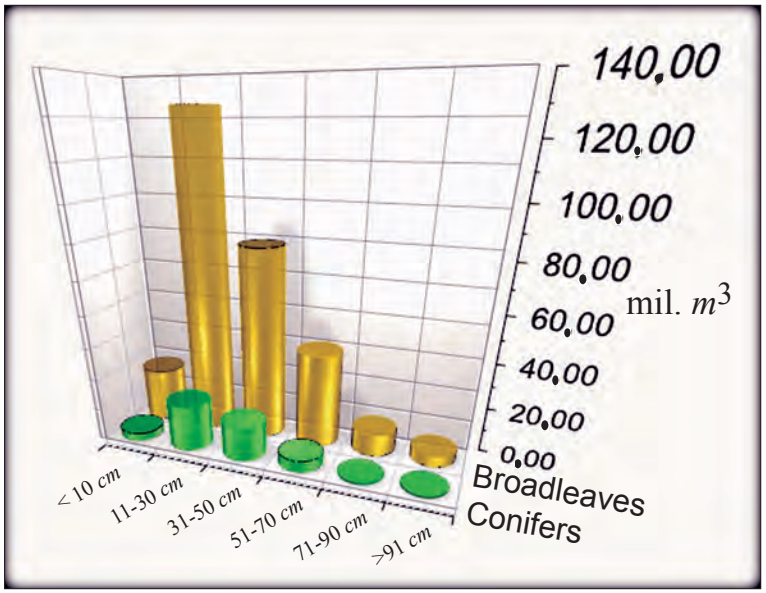



**Diagram 12.** Forest volume structure by diameter classes

**Table 12.** Forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | > 91 *cm* |
| Beech | 146,333,927 | 3,923,941 | 45,564,171 | 51,231,084 | 32,611,352 | 8,746,826 | 4,256,553 |
| Turkey oak | 45,581,356 | 3,914,217 | 28,611,740 | 10,682,812 | 2,033,714 | 198,381 | 140,492 |
| Hungarian oak | 20,986,465 | 2,639,607 | 14,474,559 | 3,358,941 | 461,503 | 51,855 | |
| Sessile oak | 20,117,359 | 1,266,605 | 10,238,052 | 5,633,261 | 2,432,048 | 358,513 | 188,880 |
| Hornbeam | 14,409,637 | 3,293,075 | 8,150,142 | 1,958,873 | 800,605 | 146,871 | 60,071 |
| Black locust | 9,820,713 | 2,555,787 | 6,060,213 | 1,103,544 | 101,168 | | |
| Flowering ash | 3,406,454 | 1,497,317 | 1,716,916 | 166,128 | 26,093 | | |
| Large-leaved lime | 3,048,590 | 203,488 | 1,266,916 | 1,076,121 | 431,859 | 24,596 | 45,610 |
| Field maple | 2,908,995 | 637,666 | 1,794,556 | 407,932 | 68,842 | | |
| Other broadleaves | 2,551,932 | 531,602 | 1,513,659 | 403,286 | 79,234 | 24,150 | |
| Narrow-leaved ash | 2,539,128 | 183,205 | 1,196,254 | 906,239 | 222,148 | 31,282 | |
| Aspen | 2,251,596 | 227,600 | 1,496,773 | 501,311 | 25,912 | | |
| Oriental hornbeam | 1,717,529 | 1,197,720 | 485,505 | 14,618 | 19,686 | | |
| Hop hornbeam | 1,480,694 | 276,067 | 1,086,634 | 99,885 | 18,109 | | |
| Maple | 1,426,624 | 166,313 | 629,107 | 445,661 | 137,731 | | 47,812 |
| Common oak | 1,347,521 | 20,103 | 310,730 | 543,951 | 472,737 | | |
| Cherry | 1,224,911 | 142,788 | 691,632 | 337,148 | 53,343 | | |
| Willow | 909,214 | 19,523 | 269,815 | 373,157 | 199,960 | 46,759 | |
| Birch | 858,099 | 125,004 | 556,892 | 160,956 | 15,247 | | |
| Pubescent oak | 857,250 | 157,089 | 499,917 | 134,190 | 16,515 | | 49,539 |
| Smooth-leaved elm | 815,715 | 318,239 | 368,227 | 112,674 | 16,574 | | |
| Alder | 762,290 | 50,313 | 411,498 | 244,994 | 55,486 | | |
| White ash | 734,326 | 76,479 | 358,316 | 190,468 | 109,062 | | |
| Euramer. poplar | 626,571 | 10,469 | 100,059 | 385,909 | 85,069 | 45,065 | |
| Black poplar | 559,031 | | 29,285 | 228,673 | 215,892 | 23,454 | 61,727 |
| Small-leaved lime | 460,811 | 80,893 | 117,772 | 185,201 | 76,945 | | |
| White poplar | 385,323 | 11,459 | 66,992 | 145,121 | 161,751 | | |
| Norway maple | 369,749 | 7,710 | 186,475 | 129,981 | 45,583 | | |
| Silver lime | 293,866 | 21,008 | 49,391 | 171,567 | 51,899 | | |
| Common walnut | 290,550 | 33,274 | 149,929 | 75,314 | 32,032 | | |
| Turkish hazel | 207,391 | 39,598 | 106,032 | 54,277 | 7,484 | | |
| Wych elm | 186,394 | 7,710 | 95,434 | 83,251 | | | |
| Balkan maple | 95,318 | 17,458 | 54,610 | 13,036 | 10,214 | | |
| Wild service tree | 93,126 | 25,139 | 46,096 | 21,890 | | | |
| Europ. white elm | 32,297 | 18,822 | 13,475 | | | | |
| Ash-leaved maple | 9,693 | 8,050 | 1,644 | | | | |
| Mountain ash | 3,377 | | | 3,377 | | | |
| White ash | 1,469 | | 1,469 | | | | |
| **Total broadleaves** | **289,705,291** | **23,705,338** | **128,770,887** | **81,584,831** | **41,095,797** | **9,697,752** | **4,850,684** |
| Spruce | 18,810,547 | 1,694,644 | 6,669,041 | 7,257,982 | 2,886,162 | 183,776 | 118,941 |
| Austrian pine | 11,950,227 | 956,492 | 7,408,002 | 3,240,767 | 315,298 | 29,669 | |
| Fir | 8,304,924 | 134,375 | 2,836,021 | 3,510,612 | 1,779,367 | 44,549 | |
| Scots pine | 3,626,197 | 279,712 | 2,457,507 | 859,680 | 29,299 | | |
| Douglas-fir | 511,151 | 13,085 | 368,015 | 130,052 | | | |
| Weymouth pine | 355,416 | 13,864 | 267,564 | 73,988 | | | |
| Larch | 107,760 | 24,616 | 74,511 | 8,633 | | | |
| Yew | 2,395 | | 2,395 | | | | |
| Other conifers | 30,516 | 2,829 | 27,686 | | | | |
| **Total conifers** | **43,699,133** | **3,119,617** | **20,110,742** | **15,081,714** | **5,010,126** | **257,994** | **118,941** |
| **TOTAL** | **333,404,424** | **26,824,956** | **148,881,628** | **96,666,544** | **46,105,924** | **9,955,748** | **4,969,624** |

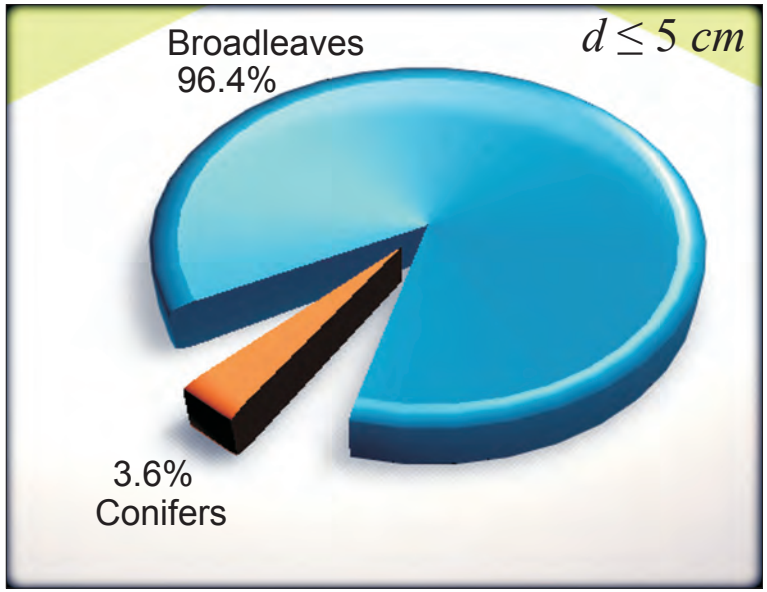



**Diagram 13.** Forests by number of trees *d≤5 cm*

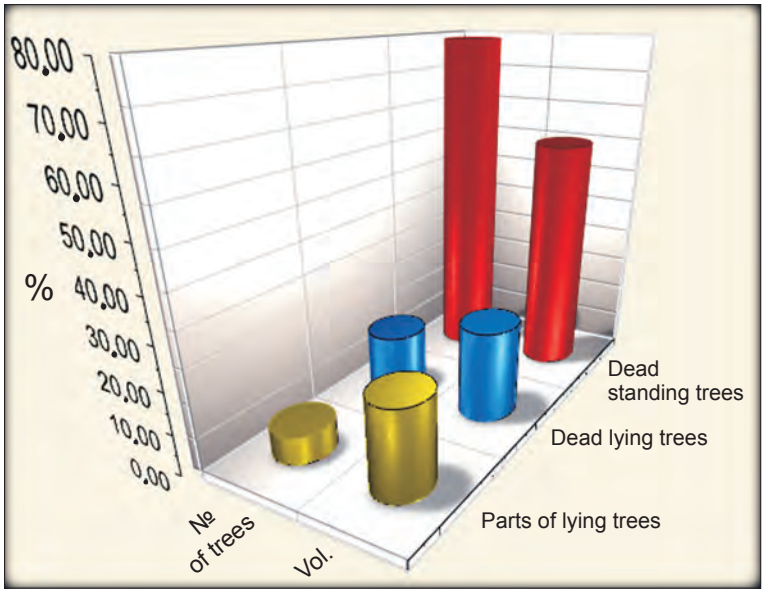



**Diagram 14.** Dead wood

**Table 13.** Thin tree *d≤5 cm*

| Tree species | Number of trees | |
|---|---|---|
| | *trees* | % |
| Broadleaves | 13,815,600 | 96.4 |
| Conifers | 510,000 | 3.6 |
| **TOTAL** | **14,325,600** | **100.0** |

**Table 14.** Dead wood

| Tree health | Number of trees | | Volume | |
|---|---|---|---|---|
| | *trees* | % | $m^3$ | % |
| Dead standing trees | 75,205,403 | 78.8 | 8,474,388.8 | 56.2 |
| Dead lying trees | 13,586,556 | 14.3 | 3,220,057.8 | 21.4 |
| Parts of lying trees | 6,541,726 | 6.9 | 3,372,148.0 | 22.4 |
| **TOTAL** | **95,333,685** | **100.0** | **15,066,594.6** | **100.0** |

# APPENDIX 4 - The growing stock of the Autonomous Province of Vojvodina

**Table 1.** Area structure by land use

| Land use | Area | |
|---|---|---|
| | *ha* | % |
| Forest | 154,000.0 | 7.1 |
| Other wooded land | 44,400.0 | 2.1 |
| Unfertile land | 3,600.0 | 0.2 |
| Agricultural land | 1,860,000.0 | 86.2 |
| Meadows and pastures | 29,200.0 | 1.4 |
| Built-up land | 37,600.0 | 1.7 |
| Inland water | 27,600.0 | 1.3 |
| **TOTAL** | **2,156,400.0** | **100.0** |

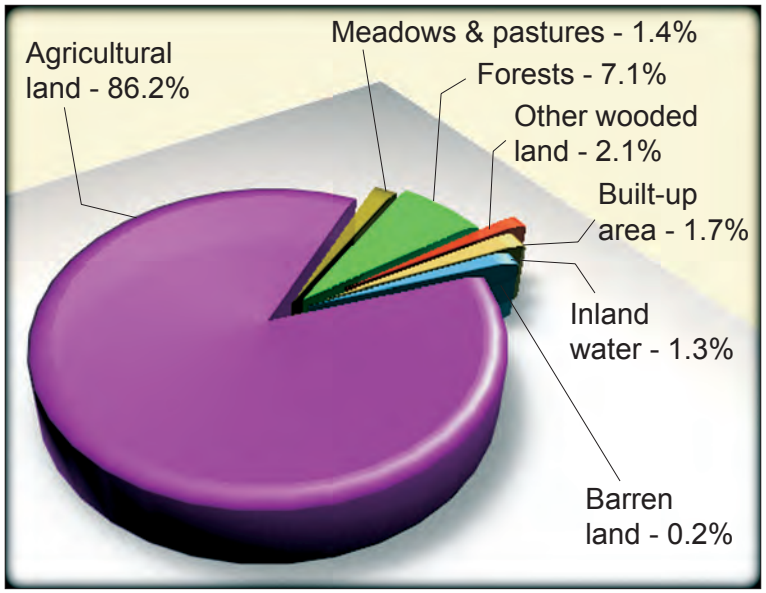



**Diagram 1.** Area structure by land use

**Table 2.** Forests by ownership

| Ownership | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| State | 124,800.0 | 81.0 | 78,589,210 | 77.1 | 630 | 23,975,720.7 | 82.4 | 192.1 | 739,591.2 | 86.2 | 5.9 | 3.1 |
| Private | 29,200.0 | 19.0 | 23,350,289 | 22.9 | 800 | 5,107,273.3 | 17.6 | 174.9 | 118,052.6 | 13.8 | 4.0 | 2.3 |
| **TOTAL** | **154,000.0** | **100.0** | **101,939,499** | **100.0** | **662** | **29,082,994.0** | **100.0** | **188.9** | **857,643.8** | **100.0** | **5.6** | **2.9** |

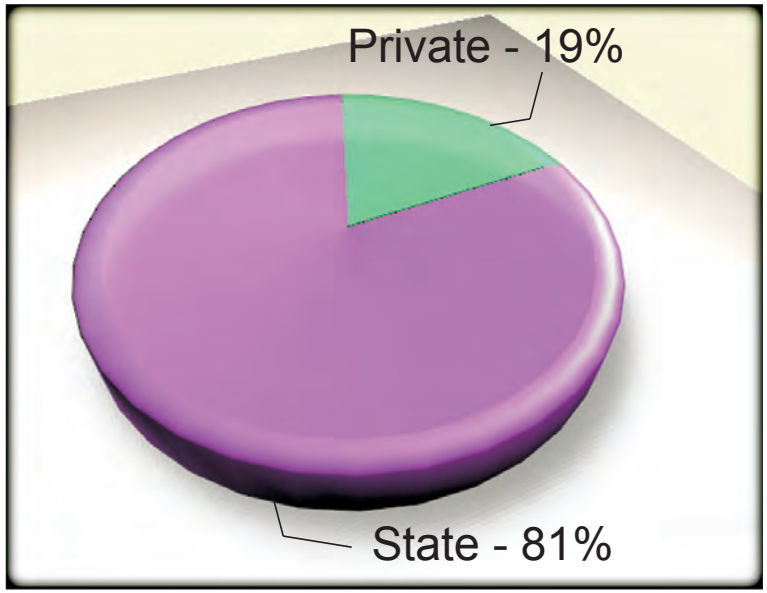



**Diagram 2.** Forests by ownership (area)

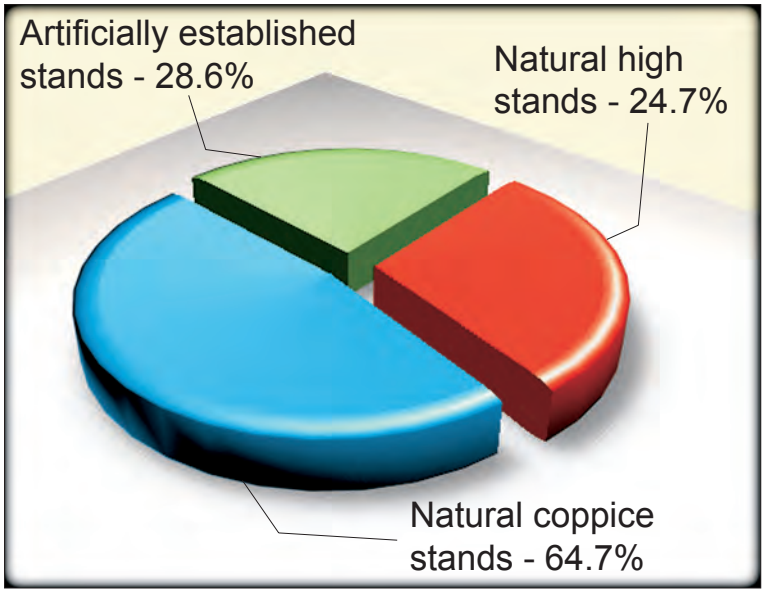



**Diagram 3.** Forests by origin (area)

**Table 3.** Forests by origin

| Stand origin | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Natural high stands | 38,000.0 | 24.7 | 21,039,331 | 20.7 | 554 | 11,970,197.0 | 41.2 | 315.0 | 219,274.0 | 25.6 | 5.8 | 1.8 |
| Natural coppice stands | 72,000.0 | 46.7 | 61,600,917 | 60.4 | 856 | 9,837,054.0 | 33.8 | 136.6 | 272,230.0 | 31.7 | 3.8 | 2.8 |
| Artificially established stands | 44,000.0 | 28.6 | 19,299,251 | 18.9 | 439 | 7,275,743.0 | 25.0 | 165.4 | 366,140.0 | 42.7 | 8.3 | 5.0 |
| **TOTAL** | **154,000.0** | **100.0** | **101,939,499** | **100.0** | **662** | **29,082,994.0** | **100.0** | **188.9** | **857,644.0** | **100.0** | **5.6** | **2.9** |

**Table 4.** Forests by naturalness

| Naturalness | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Semi-natural forests | 110,000.0 | 71.4 | 82,640,248 | 81.1 | 751 | 21,807,251.0 | 75.0 | 198.2 | 491,503.8 | 57.3 | 4.5 | 2.3 |
| Plantations | 44,000.0 | 28.6 | 19,299,251 | 18.9 | 439 | 7,275,743.1 | 25.0 | 165.4 | 366,140.0 | 42.7 | 8.3 | 5.0 |
| **TOTAL** | **154,000.0** | **100.0** | **101,939,499** | **100.0** | **662** | **29,082,994.0** | **100.0** | **188.9** | **857,643.8** | **100.0** | **5.6** | **2.9** |

**Table 5.** Forests by preservation status

| Stand preservation | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Well-preserved stands | 101,200.0 | 65.7 | 89,473,272 | 87.8 | 884 | 16,168,910.4 | 55.6 | 159.8 | 580,594.3 | 67.7 | 5.7 | 3.6 |
| Insufficiently stocked stands | 44,800.0 | 29.1 | 11,831,695 | 11.6 | 264 | 12,218,629.6 | 42.0 | 272.7 | 253,361.1 | 29.5 | 5.7 | 2.1 |
| Devastated stand | 8,000.0 | 5.2 | 634,532 | 0.6 | 79 | 695,454.0 | 2.4 | 86.9 | 23,688.5 | 2.8 | 3.0 | 3.4 |
| **TOTAL** | **154,000.0** | **100.0** | **101,939,499** | **100.0** | **662** | **29,082,994.0** | **100.0** | **188.9** | **857,643.9** | **100.0** | **5.6** | **2.9** |

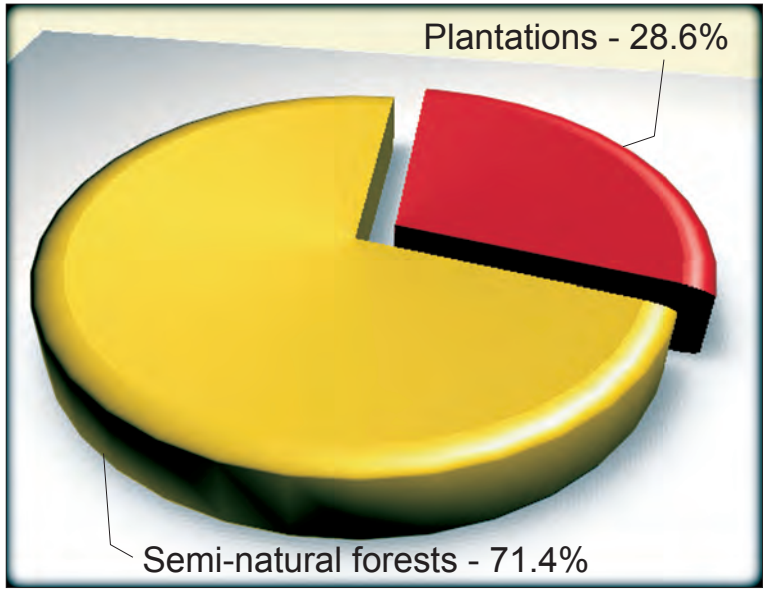



**Diagram 4.** Forests by naturalness (area)

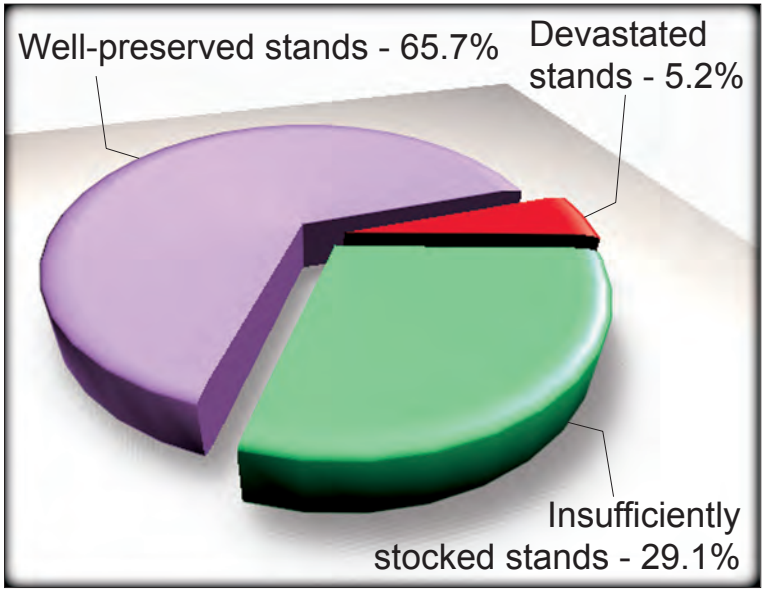



**Diagram 5.** Forests by preservation status (area)

**Table 6.** Forests by mixture

| Stand mixture | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees*·*ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| Pure broadleaf stands | 107,200.0 | 69.6 | 63,565,726 | 62.4 | 593 | 19,778,517.7 | 68.0 | 184.5 | 632,320.6 | 73.7 | 5.9 | 3.2 |
| Mixed broadleaf stands | 39,200.0 | 25.5 | 31,944,652 | 31.3 | 815 | 8,246.816.5 | 28.4 | 210.4 | 177,348.8 | 20.7 | 4.5 | 2.2 |
| Mixed broadleaf and coniferous stands | 2,000.0 | 1.3 | 2,150,360 | 2.1 | 1,075 | 351,082.2 | 1.2 | 175.5 | 10,731.9 | 1.3 | 5.4 | 3.1 |
| Pure coniferous stands | 5,600.0 | 3.6 | 4,278,761 | 4.2 | 764 | 706,577.6 | 2.4 | 126.2 | 37,242.6 | 4.3 | 6.7 | 5.3 |
| **TOTAL** | **154,000.0** | **100.0** | **101,939,499** | **100.0** | **662** | **29,082,994.0** | **100.0** | **188.9** | **857,643.9** | **100.0** | **5.6** | **2.9** |

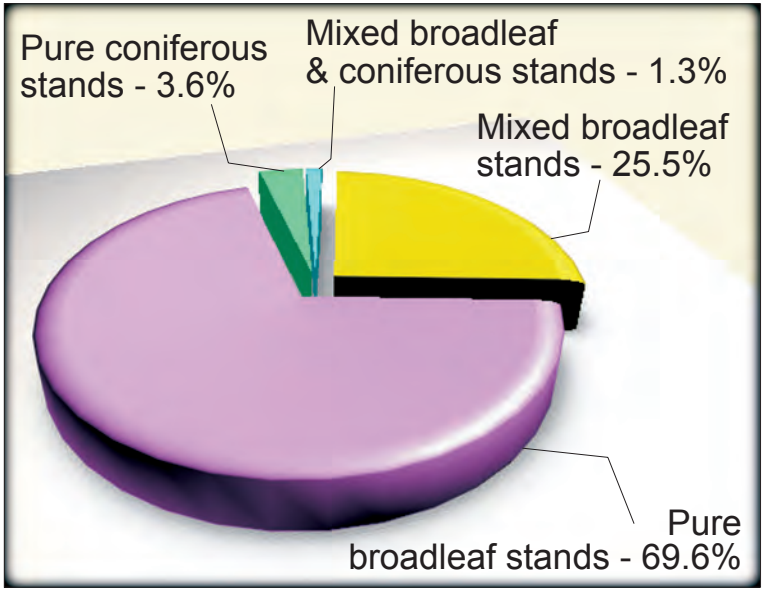



**Diagram 6.** Forests by mixture (area)

**Table 7.** Forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| Common oak | 9,112,213 | 8.9 | 7,894,852.0 | 27.1 | 134,608.0 | 15.7 | 1.7 |
| Euramerican poplar | 5,571,975 | 5.5 | 5,511,291.0 | 19.0 | 298,960.0 | 34.9 | 5.4 |
| Narrow-leaved ash | 6,257,053 | 6.1 | 3,253,183.0 | 11.2 | 80,746.0 | 9.4 | 2.5 |
| Silver lime | 4,483,486 | 4.4 | 1,485,230.0 | 5.1 | 26,805.0 | 3.1 | 1.8 |
| Sessile oak | 3,441,613 | 3.4 | 1,425,531.0 | 4.9 | 31,540.0 | 3.7 | 2.2 |
| Black locust | 26,147,720 | 25.7 | 1,423,231.0 | 4.9 | 67,221.0 | 7.8 | 4.7 |
| Turkey oak | 1,641,510 | 1.6 | 1,399,090.0 | 4.8 | 19,540.0 | 2.3 | 1.4 |
| Willow | 4,021,190 | 3.9 | 1,002,873.0 | 3.4 | 24,831.0 | 2.9 | 2.5 |
| Hornbeam | 5,419,571 | 5.3 | 747,603.0 | 2.6 | 12,630.0 | 1.5 | 1.7 |
| Beech | 630,606 | 0.6 | 516,901.0 | 1.8 | 7,835.0 | 0.9 | 1.5 |
| Large-leaved lime | 1,357,487 | 1.3 | 487,271.0 | 1.7 | 8,450.0 | 1.0 | 1.7 |
| Small-leaved lime | 3,268,698 | 3.2 | 484,063.0 | 1.7 | 10,621.0 | 1.2 | 2.2 |
| Black poplar | 1,092,157 | 1.1 | 458,333.0 | 1.6 | 28,775.0 | 3.4 | 6.3 |
| Other broadleaves | 5,554,373 | 5.4 | 390,068.0 | 1.3 | 13,042.0 | 1.5 | 3.3 |
| Smooth-leaved elm | 3,252,046 | 3.2 | 282,228.0 | 1.0 | 10,200.0 | 1.2 | 3.6 |
| Field maple | 3,222,799 | 3.2 | 272,308.0 | 0.9 | 5,188.0 | 0.6 | 1.9 |
| White poplar | 779,506 | 0.8 | 221,828.0 | 0.8 | 7,590.0 | 0.9 | 3.4 |
| White ash | 6,469,472 | 6.3 | 156,107.0 | 0.5 | 4,427.0 | 0.5 | 2.8 |
| Black walnut | 336,701 | 0.3 | 154,850.0 | 0.5 | 4,169.0 | 0.5 | 2.7 |
| Aspen | 149,959 | 0.1 | 106,709.0 | 0.4 | 2,760.0 | 0.3 | 2.6 |
| Flowering ash | 1,345,583 | 1.3 | 99,303.0 | 0.3 | 2,041.0 | 0.2 | 2.1 |
| Pubescent oak | 130,153 | 0.1 | 98,917.0 | 0.3 | 1,895.0 | 0.2 | 1.9 |
| Ash-leaved maple | 936,106 | 0.9 | 82,583.0 | 0.3 | 2,269.0 | 0.3 | 2.7 |
| Cherry | 575,019 | 0.6 | 67,358.0 | 0.2 | 1,438.0 | 0.2 | 2.1 |
| European hackberry | 940,783 | 0.9 | 55,588.0 | 0.2 | 1,694.0 | 0.2 | 3.0 |
| Norway maple | 305,577 | 0.3 | 48,211.0 | 0.2 | 1,331.0 | 0.2 | 2.8 |

**Table 7.** Forests by tree species

| Tree species | Number of trees | | Volume | | Volume increment | | |
|---|---|---|---|---|---|---|---|
| | *trees* | % | $m^3$ | % | $m^3$ | % | $p_{iv}$ |
| White ash | 29,709 | 0.0 | 32,948.0 | 0.1 | 597.0 | 0.1 | 1.8 |
| Common walnut | 506,466 | 0.5 | 23,890.0 | 0.1 | 1,544.0 | 0.2 | 6.5 |
| Wild service tree | 82,053 | 0.1 | 17,139.0 | 0.1 | 324.0 | 0.0 | 1.9 |
| Birch | 319,725 | 0.3 | 16,674.0 | 0.1 | 1,780.0 | 0.2 | 10.7 |
| Maple | 5,659 | 0.0 | 6,732.0 | 0.0 | 111.0 | 0.0 | 1.6 |
| Alder | 12,732 | 0.0 | 1,388.0 | 0.0 | 42.0 | 0.0 | 3.0 |
| Wych elm | 12,732 | 0.0 | 685.0 | 0.0 | 22.0 | 0.0 | 3.2 |
| **Total broadleaves** | **97,412,433** | **95.6** | **28,224,966.0** | **97.0** | **815,026.0** | **95.0** | **2.9** |
| Austrian pine | 4,103,073 | 4.0 | 708,799.0 | 2.4 | 37,519.0 | 4.4 | 5.3 |
| Scots pine | 423,993 | 0.4 | 149,233.0 | 0.5 | 5,142.0 | 0.6 | 3.4 |
| **Total conifers** | **4,527,066** | **4.4** | **858,032.0** | **3.0** | **42,661.0** | **5.0** | **5.0** |
| **TOTAL** | **101,939,499** | **100.0** | **29,082,994.0** | **100.0** | **857,644.0** | **100.0** | **2.9** |

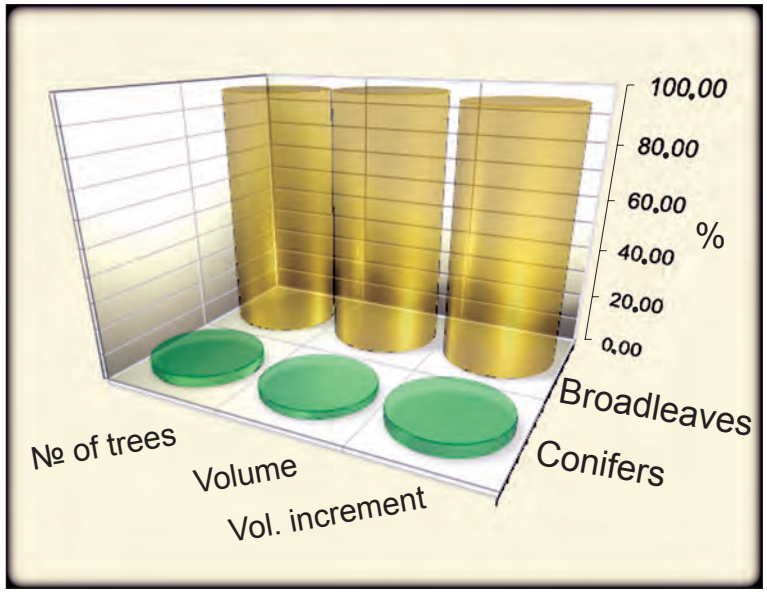



**Diagram 7.** Forests by tree species

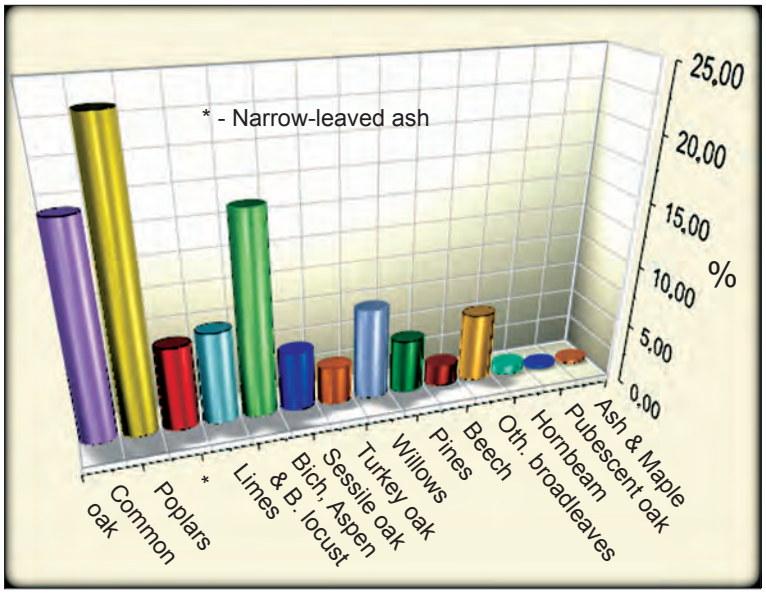



**Diagram 8.** Forests by stand categories (area)

**Table 8.** Forests by stand categories

| № | Stand categories | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $m^3$ | % | $m^3 \cdot ha^{-1}$ | $p_{iv}$ |
| 1 | Common oak forests | 26,400.0 | 17.1 | 14,010,124 | 13.7 | 531 | 8,839,864.0 | 30.4 | 334.8 | 154,500.0 | 18.0 | 5.9 | 1.8 |
| 2 | Poplar forests | 36,000.0 | 23.4 | 11,172,651 | 11.0 | 310 | 6,177,995.0 | 21.2 | 171.6 | 325,014.0 | 37.9 | 9.0 | 5.2 |
| 3 | Forest of narrow-leaved ash | 10,400.0 | 6.8 | 7,567,596 | 7.4 | 728 | 3,015,964.0 | 10.4 | 290.0 | 76,376.0 | 8.9 | 7.3 | 2.5 |
| 4 | Lime forests | 11,600.0 | 7.5 | 7,595,141 | 7.5 | 655 | 2,791,699.0 | 9.6 | 240.7 | 49,362.0 | 5.8 | 4.3 | 1.8 |
| 5 | Forest birch, aspen and black locust | 25,200.0 | 16.4 | 27,365,966 | 26.8 | 1,086 | 1,643,781.0 | 5.7 | 65.2 | 81,731.0 | 9.5 | 3.2 | 4.9 |
| 6 | Sessile oak forests | 7,600.0 | 4.9 | 5,919,911 | 5.8 | 779 | 1,473,641.0 | 5.1 | 193.9 | 32,977.0 | 3.8 | 4.3 | 2.2 |
| 7 | Turkey oak forests | 4,800.0 | 3.1 | 2,472,188 | 2.4 | 515 | 1,437,099.0 | 4.9 | 299.4 | 22,824.0 | 2.7 | 4.8 | 1.6 |
| 8 | Willow forests | 11,600.0 | 7.5 | 4,856,850 | 4.8 | 419 | 1,114,848.0 | 3.8 | 96.1 | 28,082.0 | 3.3 | 2.4 | 2.5 |
| 9 | Pine forests | 6,800.0 | 4.4 | 5,977,828 | 5.9 | 879 | 879,883.0 | 3.0 | 129.4 | 43,029.0 | 5.0 | 6.3 | 4.9 |
| 10 | Beech forests | 2,800.0 | 1.8 | 1,017,177 | 1.0 | 363 | 722,499.0 | 2.5 | 258.0 | 11,831.0 | 1.4 | 4.2 | 1.6 |
| 11 | Forests of other broadleaves | 8,800.0 | 5.7 | 10,925,463 | 10.7 | 1,242 | 615,392.0 | 2.1 | 69.9 | 23,701.0 | 2.8 | 2.7 | 3.9 |
| 12 | Hornbeam forests | 1,200.0 | 0.8 | 2,216,852 | 2.2 | 1,847 | 232,767.0 | 0.8 | 194.0 | 5,511.0 | 0.6 | 4.6 | 2.4 |
| 13 | Pubescent oak forests | 400.0 | 0.3 | 812,044 | 0.8 | 2,030 | 111,048.0 | 0.4 | 277.6 | 2,371.0 | 0.3 | 5.9 | 2.1 |
| 14 | Forests of ash and maple | 400.0 | 0.3 | 29,709 | 0.0 | 74 | 26,513.0 | 0.1 | 66.3 | 334.0 | 0.0 | 0.8 | 1.2 |
| **Total** | | **154,000.0** | **100.0** | **101,939,499** | **100.0** | **662** | **29,082,994.0** | **100.0** | **188.9** | **857,644.0** | **100.0** | **5.6** | **2.9** |

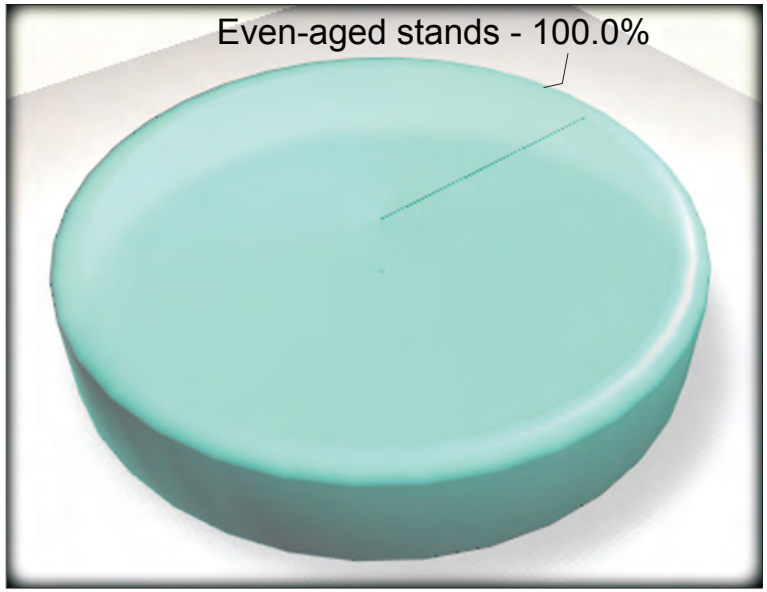



**Diagram 9.** Forests by structural form (area)

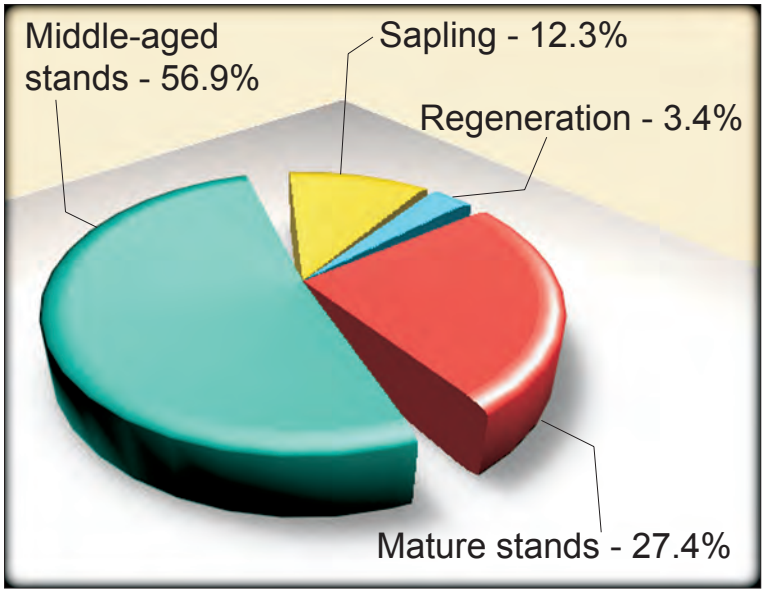



**Diagram 10.** High even-aged forests by development stages (area)

**Table 9.** Forests by structural form

| Stand structural form | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Even-aged stands | 154,000.0 | 100.0 | 101,939,499 | 100.0 | 662 | 29,082,994.0 | 100.0 | 188.9 | 857,643.8 | 100.0 | 5.6 | 2.9 |
| **TOTAL** | **154,000.0** | **100.0** | **101,939,499** | **100.0** | **662** | **29,082,994.0** | **100.0** | **188.9** | **857,643.8** | **100.0** | **5.6** | **2.9** |

**Table 10.** High even-aged forests by development stages

| Stand development stage | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| Regeneration | 2,800.0 | 3.4 | | | | | | | | | | |
| Sapling | 10,000.0 | 12.3 | 9,305,532 | 22.9 | 931 | 665,333.3 | 3.5 | 66.5 | 35,598.3 | 6.1 | 3.6 | 5.4 |
| Middle-aged stands | 46,400.0 | 56.9 | 23,790,326 | 58.6 | 513 | 12,102,729.4 | 63.2 | 260.8 | 313,242.3 | 54.0 | 6.8 | 2.6 |
| Mature stands | 22,400.0 | 27.4 | 7,510,831 | 18.5 | 335 | 6,368,180.0 | 33.3 | 284.3 | 231,668.3 | 39.9 | 10.3 | 3.6 |
| **TOTAL** | **81,600.0** | **100.0** | **40,606,689** | **100.0** | **498** | **19,136,242.6** | **100.0** | **234.5** | **580,508.9** | **100.0** | **7.1** | **3.0** |

**Table 11.** Forests by age classes

| Age class | Area | | Number of trees | | | Volume | | | Volume increment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ha* | % | *trees* | % | *trees·ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | *m*$^3$ | % | *m*$^3$·*ha*$^{-1}$ | $p_{iv}$ |
| I | 12,800.0 | 8.3 | 1,090,604 | 1.1 | 85 | 41,524.2 | 0.1 | 3.2 | 2,277.5 | 0.3 | 0.2 | 5.5 |
| II | 23,200.0 | 15.1 | 26,619,229 | 26.0 | 1,147 | 1,815,101.2 | 6.2 | 78.2 | 89,338.7 | 10.4 | 3.9 | 4.9 |
| III | 23,200.0 | 15.1 | 23,561,532 | 23.1 | 1,016 | 2,465,304.4 | 8.5 | 106.3 | 145,740.2 | 17.0 | 6.3 | 5.9 |
| IV | 15,600.0 | 10.1 | 12,217,801 | 12.0 | 783 | 2,916,036.7 | 10.1 | 186.9 | 115,135.1 | 13.4 | 7.4 | 3.9 |
| V | 32,000.0 | 20.8 | 17,606,504 | 17.3 | 550 | 8,271,286.9 | 28.4 | 258.5 | 235,304.7 | 27.4 | 7.4 | 2.8 |
| VI | 20,000.0 | 13.0 | 11,823,503 | 11.6 | 591 | 6,110,809.4 | 21.0 | 305.5 | 126,287.9 | 14.7 | 6.3 | 2.1 |
| VII | 13,600.0 | 8.8 | 5,276,974 | 5.2 | 388 | 4,006,506.4 | 13.8 | 294.6 | 81,081.4 | 9.5 | 6.0 | 2.0 |
| VIII | 13,600.0 | 8.8 | 3,743,350 | 3.7 | 275 | 3,456,424.9 | 11.9 | 254.1 | 62,478.4 | 7.3 | 4.6 | 1.8 |
| **Total** | **154,000.0** | **100.0** | **101,939,499** | **100.0** | **662** | **29,082,994.0** | **100.0** | **188.9** | **857,643.8** | **100.0** | **5.6** | **2.9** |

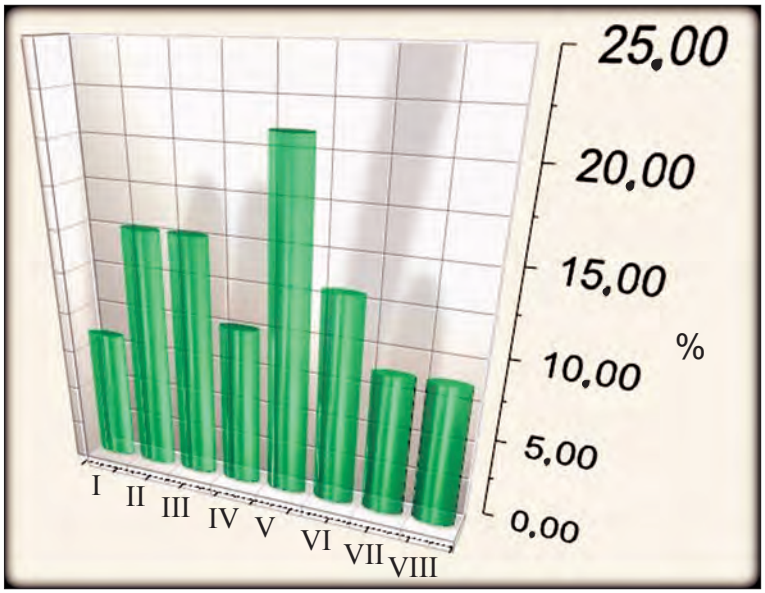



**Diagram 11.** Forests by age classes (area)

**Table 12.** Forests by diameter classes

| Tree species | Volume by diameter classes [$m^3$] | | | | | | |
|---|---|---|---|---|---|---|---|
| | ∑ | < 10 *cm* | 11-30 *cm* | 31-50 *cm* | 51-70 *cm* | 71-90 *cm* | >91 *cm* |
| Common oak | 7,894,852 | 156,807 | 989,259 | 4,088,319 | 2,211,596 | 316,578 | 132,293 |
| Euramerican poplar | 5,511,291 | 11,601 | 788,146 | 2,541,505 | 1,752,344 | 417,695 | |
| Narrow-leaved ash | 3,253,183 | 79,595 | 1,426,966 | 1,169,793 | 507,002 | 69,827 | |
| Silver lime | 1,485,230 | 43,955 | 413,327 | 787,035 | 240,913 | | |
| Sessile oak | 1,425,531 | 22,338 | 555,674 | 798,278 | 49,241 | | |
| Black locust | 1,423,231 | 314,064 | 1,038,618 | 70,549 | | | |
| Turkey oak | 1,399,090 | | 435,569 | 650,659 | 312,862 | | |
| Willow | 1,002,871 | 21,409 | 556,891 | 222,477 | 91,501 | 57,299 | 53,294 |
| Hornbeam | 747,603 | 71,471 | 481,771 | 164,366 | 29,995 | | |
| Beech | 516,901 | | 59,945 | 274,145 | 182,811 | | |
| Large-leaved lime | 487,271 | 9,365 | 119,299 | 252,936 | 105,671 | | |
| Small-leaved lime | 484,064 | 50,930 | 168,336 | 210,149 | 54,649 | | |
| Black poplar | 458,333 | 6,989 | 66,193 | 155,954 | 204,104 | 25,093 | |
| Other broadleaves | 390,068 | 84,685 | 229,658 | 64,198 | 11,527 | | |
| Smooth-leaved elm | 282,228 | 76,522 | 143,084 | 62,622 | | | |
| Field maple | 272,309 | 28,139 | 207,011 | 37,159 | | | |
| White poplar | 221,827 | 5,192 | 118,542 | 31,156 | 66,937 | | |
| White ash | 156,107 | 97,898 | 47,572 | 10,637 | | | |
| Black walnut | 154,850 | | 86,635 | 68,215 | | | |
| Aspen | 106,708 | | 21,618 | 60,064 | 25,026 | | |
| Flowering ash | 99,303 | 8,785 | 90,518 | | | | |
| Pubescent oak | 98,916 | | 8,683 | 77,280 | 12,953 | | |
| Ash-leaved maple | 82,582 | 31,364 | 51,218 | | | | |
| Cherry | 67,358 | 8,545 | 16,020 | 19,197 | 23,596 | | |
| Europ. hackberry | 55,587 | 17,443 | 19,349 | 18,795 | | | |
| Norway maple | 48,212 | 5,107 | 22,515 | 4,532 | 16,058 | | |
| White ash | 32,948 | | 1,407 | 15,152 | 16,389 | | |
| Common walnut | 23,890 | 12,449 | 8,275 | 3,166 | | | |
| Wild service tree | 17,138 | | 13,463 | 3,675 | | | |
| Birch | 16,674 | 5,093 | 11,581 | | | | |
| Maple | 6,732 | | | 6,732 | | | |
| Alder | 1,388 | | 1,388 | | | | |
| Wych elm | 685 | | 685 | | | | |
| **Total broadleaves** | **28,224,961** | **1,169,746** | **8,199,216** | **11,868,745** | **5,915,175** | **886,492** | **185,587** |
| Austrian pine | 708,800 | 35,651 | 479,398 | 160,016 | 33,735 | | |
| Scots pine | 149,233 | | 86,574 | 62,659 | | | |
| **Total conifers** | **858,033** | **35,651** | **565,972** | **222,675** | **33,735** | | |
| **TOTAL** | **29,082,994** | **1,205,397** | **8,765,188** | **12,091,420** | **5,948,910** | **886,492** | **185,587** |

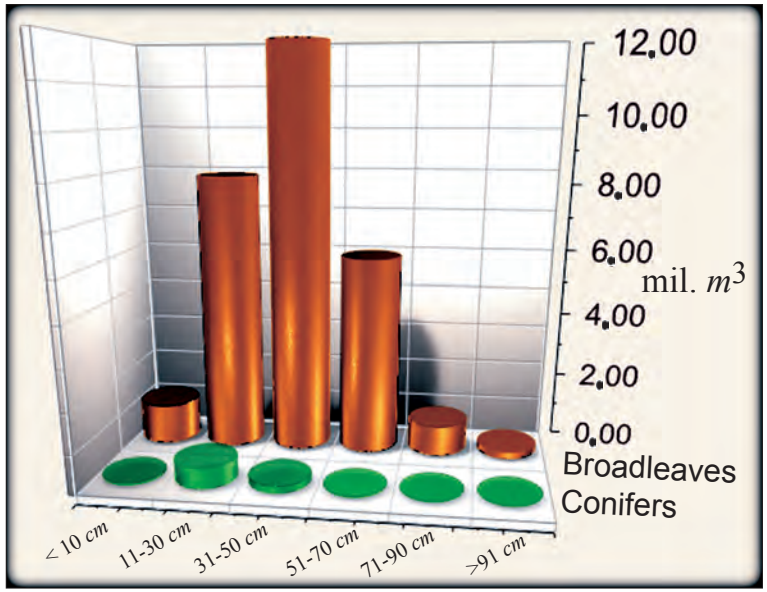



**Diagram 12.** Forest volume structure by diameter classes

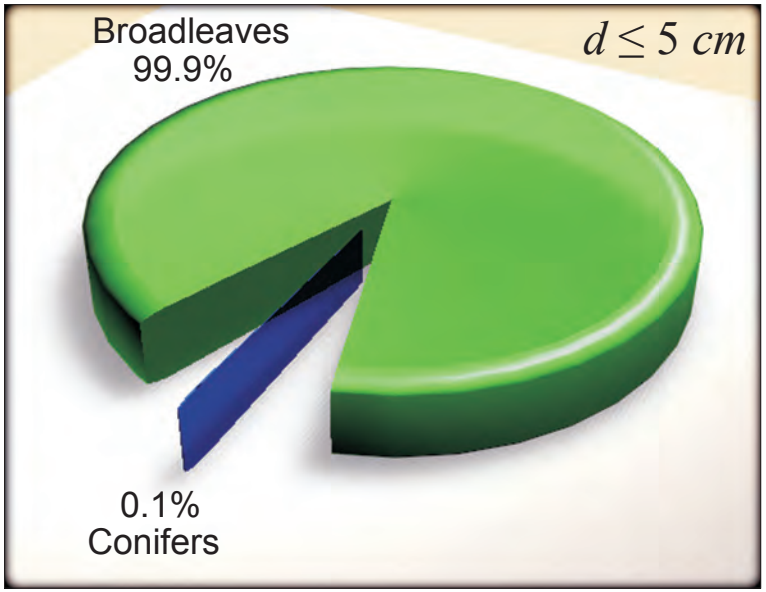



**Diagram 13.** Forests by number of trees $d \leq 5$ *cm*

**Table 13.** Thin trees $d \leq 5$ *cm*

| Tree species | Number of trees | |
|---|---|---|
| | *trees* | % |
| Broadleaves | 748,400 | 99.9 |
| Conifers | 800 | 0.1 |
| **TOTAL** | **749,200** | **100.0** |

**Table 14.** Dead wood

| Tree health | Number of trees | | Volume | |
|---|---|---|---|---|
| | *trees* | % | $m^3$ | % |
| Dead standing trees | 4,078,238 | 72.2 | 638,721.0 | 53.5 |
| Dead lying trees | 1,325,400 | 23.4 | 397,022.9 | 33.3 |
| Parts of lying trees | 250,039 | 4.4 | 158,075.7 | 13.2 |
| **TOTAL** | **5,653,677** | **100.0** | **1,193,819.6** | **100.0** |

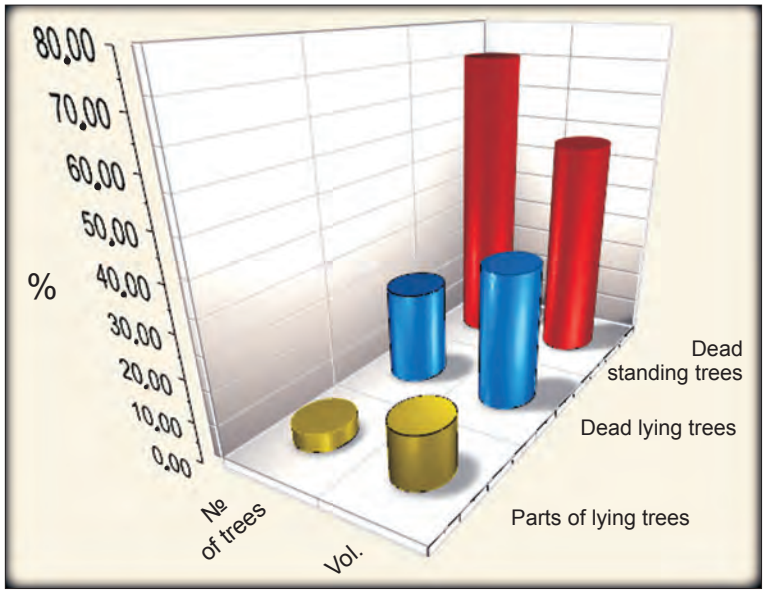
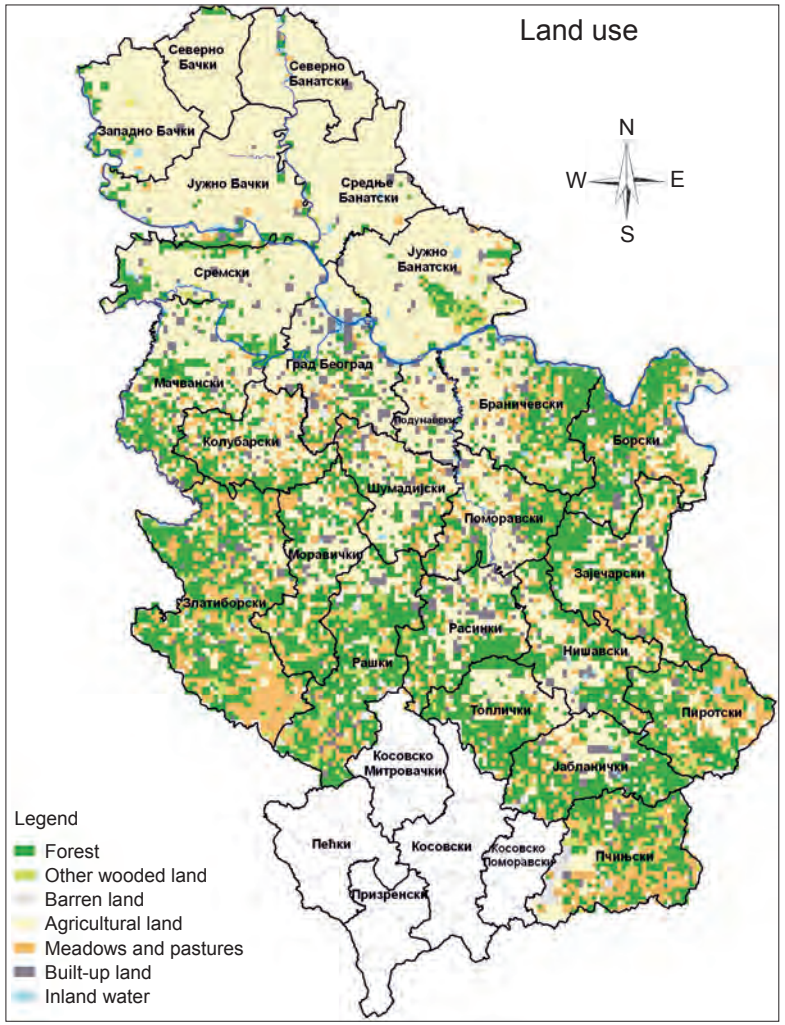
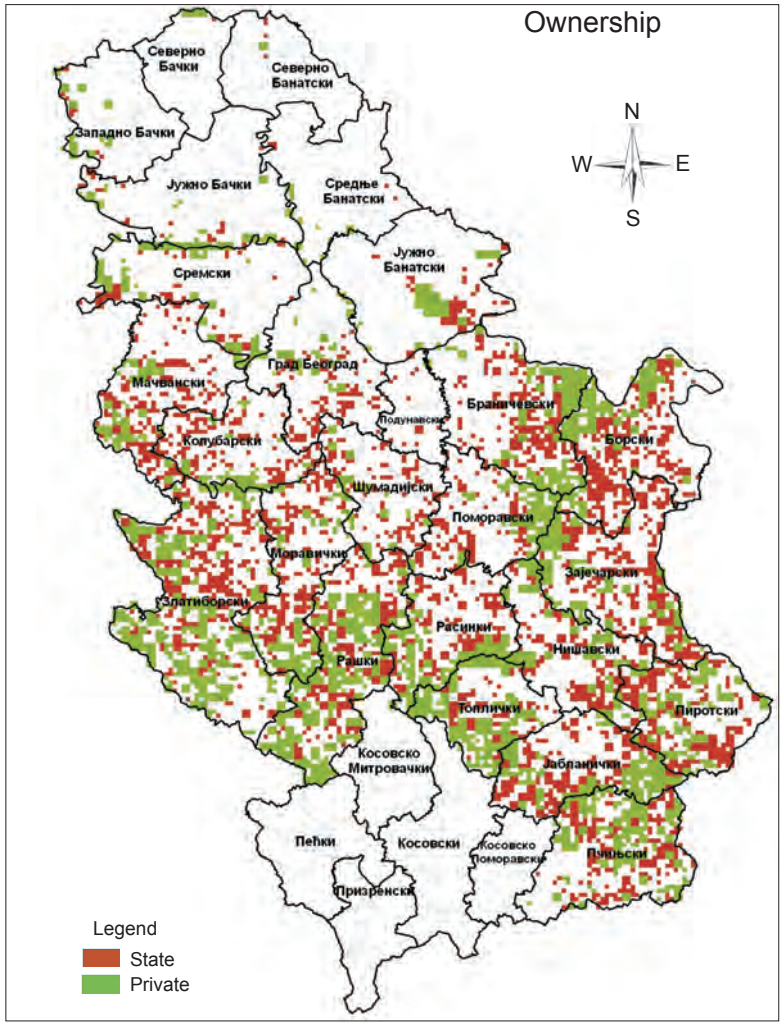



**Diagram 14.** Dead wood

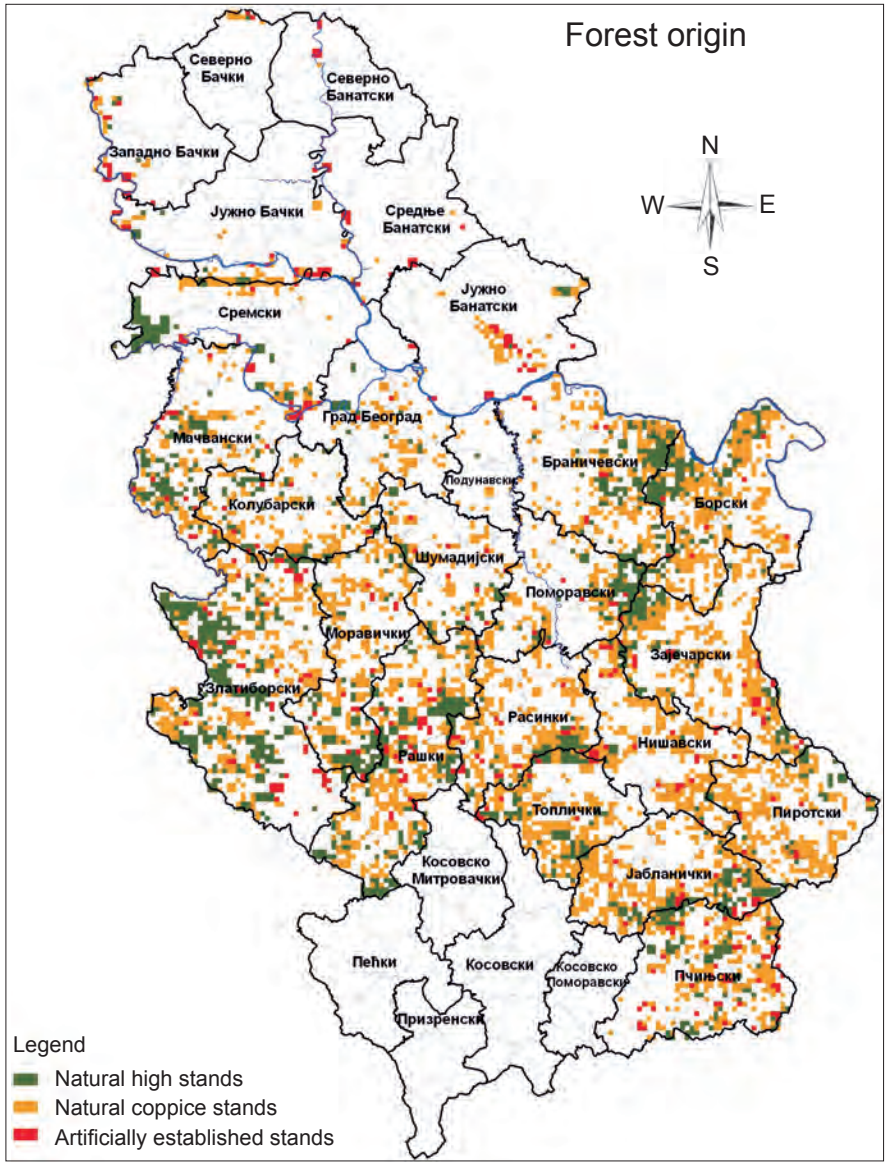
# APPENDIX 5 - Thematic maps



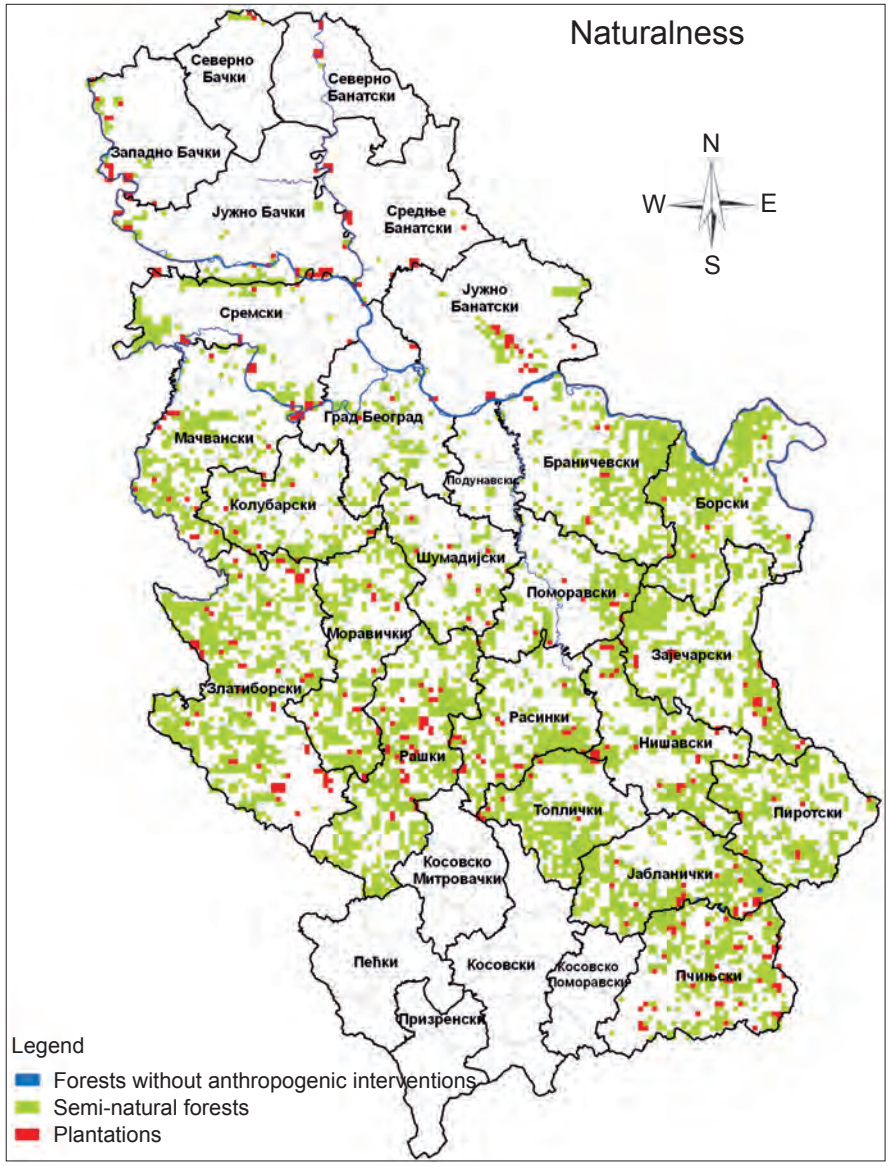

**Map 1**




**Map 2**

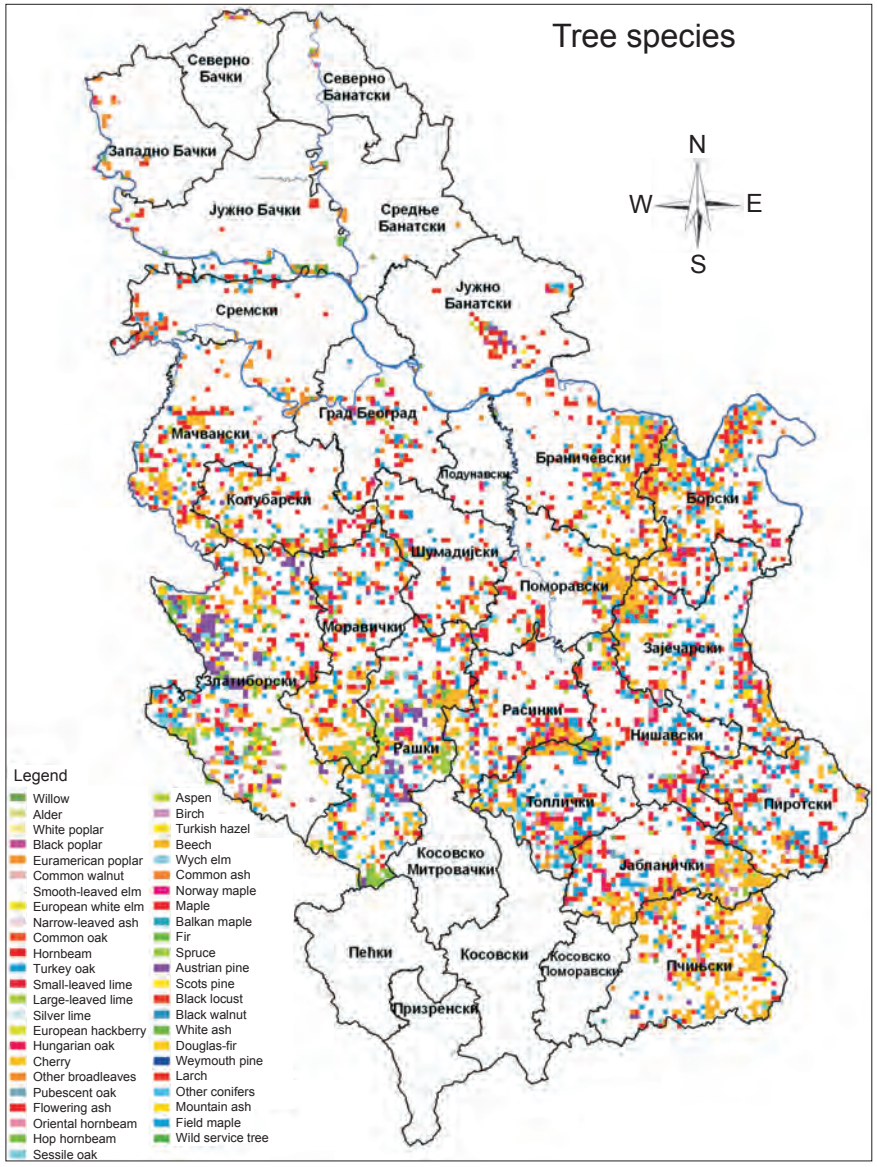

Forest origin
N
W
E
S
Северно Бачки
Северно Банатски
Западно Бачки
Јужно Бачки
Средње Банатски
Јужно Банатски
Сремски
Град Београд
Мачвански
Подунавски
Браничевски
Колубарски
Борски
Шумадијски
Поморавски
Моравички
Зајечарски
Златиборски
Расински
Нишавски
Рашки
Топлички
Пиротски
Косовско Митровачки
Јабланички
Пећки
Косовски
Косовско Поморавски
Пчињски
Призренски
Legend
Natural high stands
Natural coppice stands
Artificially established stands

**Map 3**

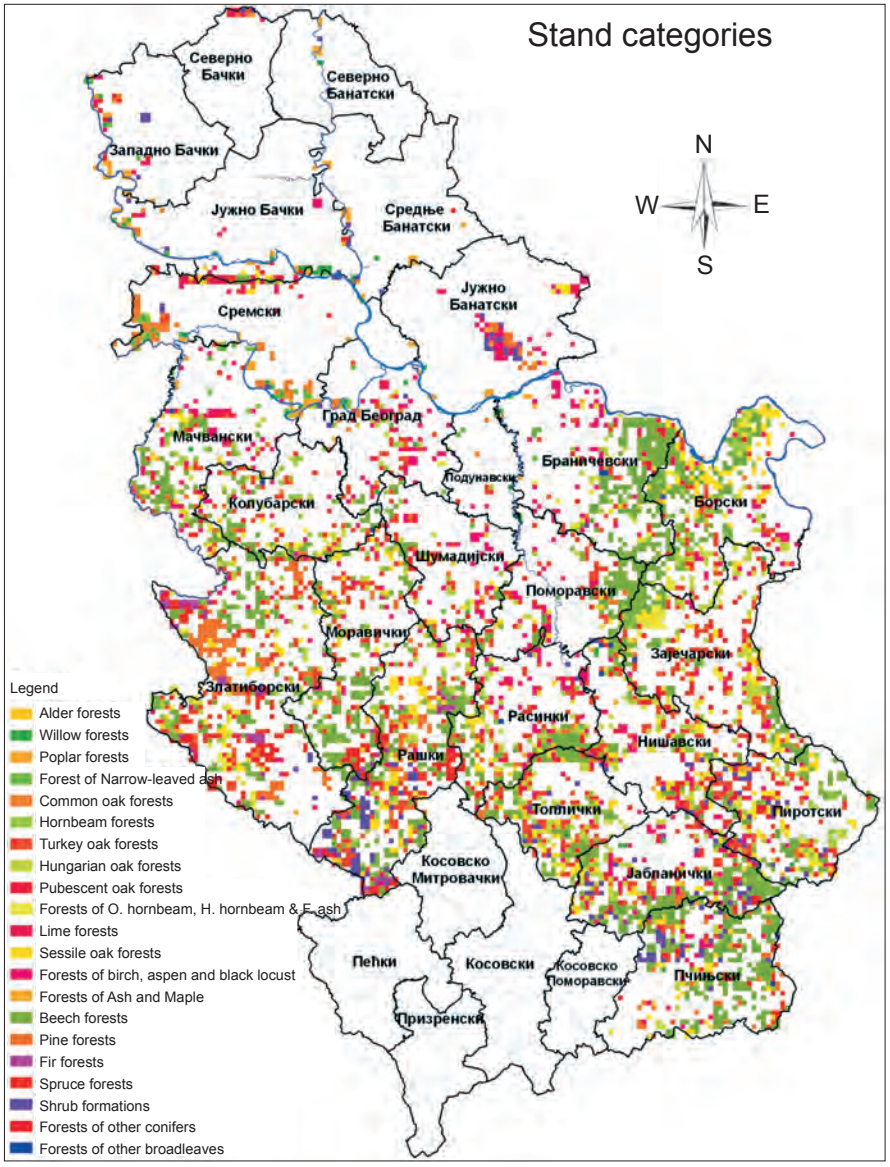

Naturalness
N
W
E
S
Северно Бачки
Северно Банатски
Западно Бачки
Јужно Бачки
Средње Банатски
Јужно Банатски
Сремски
Град Београд
Мачвански
Подунавски
Браничевски
Колубарски
Борски
Шумадијски
Поморавски
Моравички
Зајечарски
Златиборски
Расински
Нишавски
Рашки
Топлички
Пиротски
Косовско Митровачки
Јабланички
Пећки
Косовски
Косовско Поморавски
Пчињски
Призренски
Legend
Forests without anthropogenic interventions
Semi-natural forests
Plantations

**Map 4**

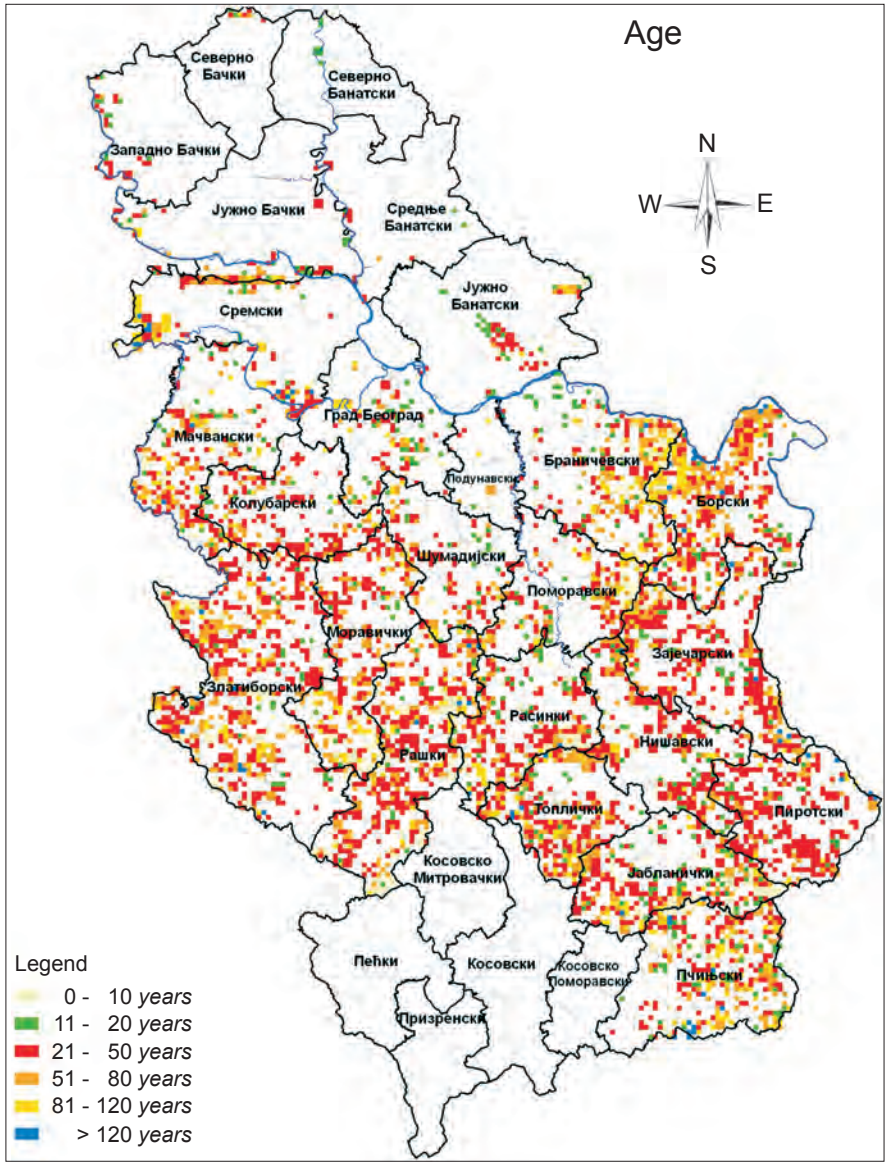
**Map 5**


Tree species
Северно Бачки
Северно Банатски
Западно Бачки
Јужно Бачки
Средње Банатски
Јужно Банатски
Сремски
Град Београд
Мачвански
Подунавски
Браничевски
Колубарски
Борски
Шумадијски
Поморавски
Моравички
Зајечарски
Златиборски
Расински
Нишавски
Рашки
Топлички
Пиротски
Косовско Митровачки
Јабланички
Пчињски
Пећки
Косовски
Косовско Поморавски
Призренски
N
W
E
S
Legend
Willow
Alder
White poplar
Black poplar
Euramerican poplar
Common walnut
Smooth-leaved elm
European white elm
Narrow-leaved ash
Common oak
Hornbeam
Turkey oak
Small-leaved lime
Large-leaved lime
Silver lime
European hackberry
Hungarian oak
Cherry
Other broadleaves
Pubescent oak
Flowering ash
Oriental hornbeam
Hop hornbeam
Sessile oak
Aspen
Birch
Turkish hazel
Beech
Wych elm
Common ash
Norway maple
Maple
Balkan maple
Fir
Spruce
Austrian pine
Scots pine
Black locust
Black walnut
White ash
Douglas-fir
Weymouth pine
Larch
Other conifers
Mountain ash
Field maple
Wild service tree

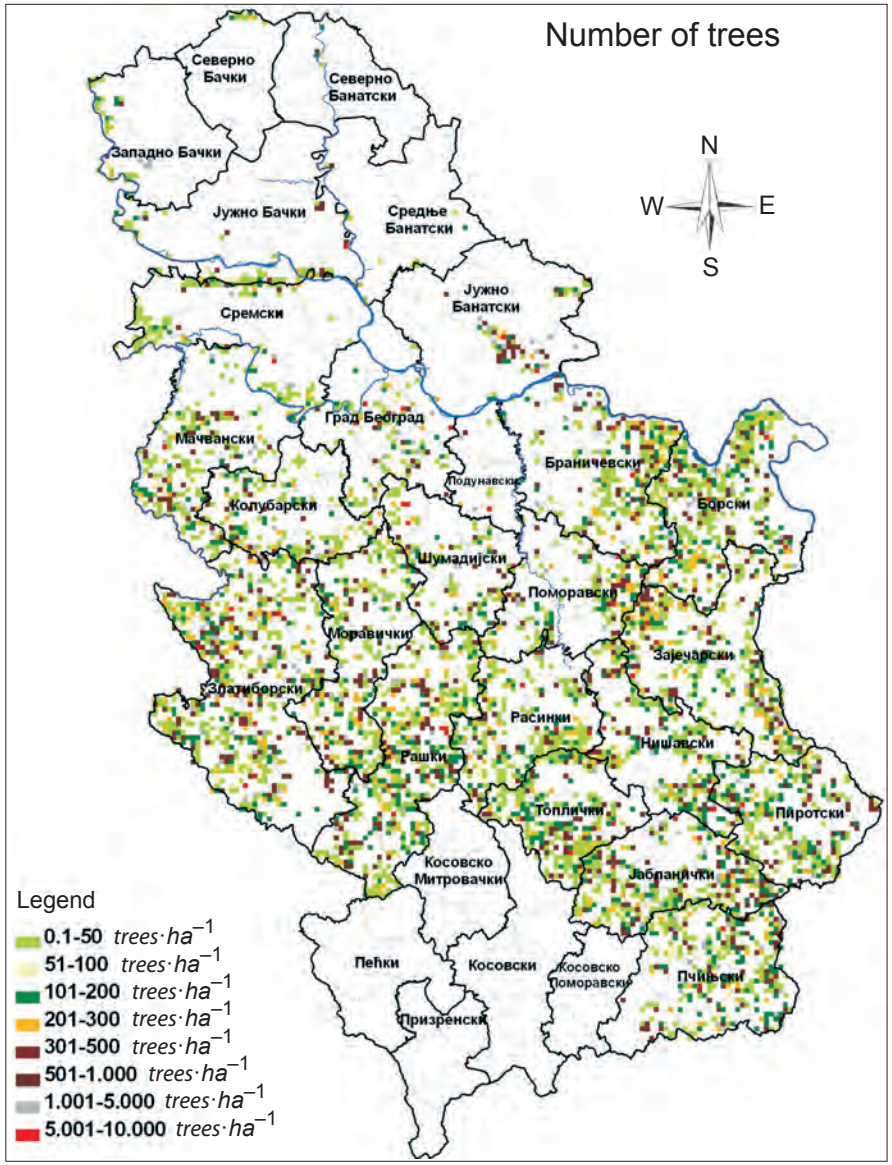
**Map 6**


Stand categories
Северно Бачки
Северно Банатски
Западно Бачки
Јужно Бачки
Средње Банатски
Јужно Банатски
Сремски
Град Београд
Мачвански
Подунавски
Браничевски
Колубарски
Борски
Шумадијски
Поморавски
Моравички
Зајечарски
Златиборски
Расински
Нишавски
Рашки
Топлички
Пиротски
Косовско Митровачки
Јабланички
Пчињски
Пећки
Косовски
Косовско Поморавски
Призренски
N
W
E
S
Legend
Alder forests
Willow forests
Poplar forests
Forest of Narrow-leaved ash
Common oak forests
Hornbeam forests
Turkey oak forests
Hungarian oak forests
Pubescent oak forests
Forests of O. hornbeam, H. hornbeam & F. ash
Lime forests
Sessile oak forests
Forests of birch, aspen and black locust
Forests of Ash and Maple
Beech forests
Pine forests
Fir forests
Spruce forests
Shrub formations
Forests of other conifers
Forests of other broadleaves

**Map 7**


Age
N
W
E
S
Северно Бачки
Северно Банатски
Западно Бачки
Јужно Бачки
Средње Банатски
Јужно Банатски
Сремски
Град Београд
Мачвански
Подунавски
Браничевски
Колубарски
Борски
Шумадијски
Поморавски
Моравички
Зајечарски
Златиборски
Расински
Нишавски
Рашки
Топлички
Пиротски
Косовско Митровачки
Јабланички
Пчињски
Косовско Поморавски
Косовски
Пећки
Призренски
Legend
0 - 10 years
11 - 20 years
21 - 50 years
51 - 80 years
81 - 120 years
> 120 years

**Map 8**


Number of trees
N
W
E
S
Северно Бачки
Северно Банатски
Западно Бачки
Јужно Бачки
Средње Банатски
Јужно Банатски
Сремски
Град Београд
Мачвански
Подунавски
Браничевски
Колубарски
Борски
Шумадијски
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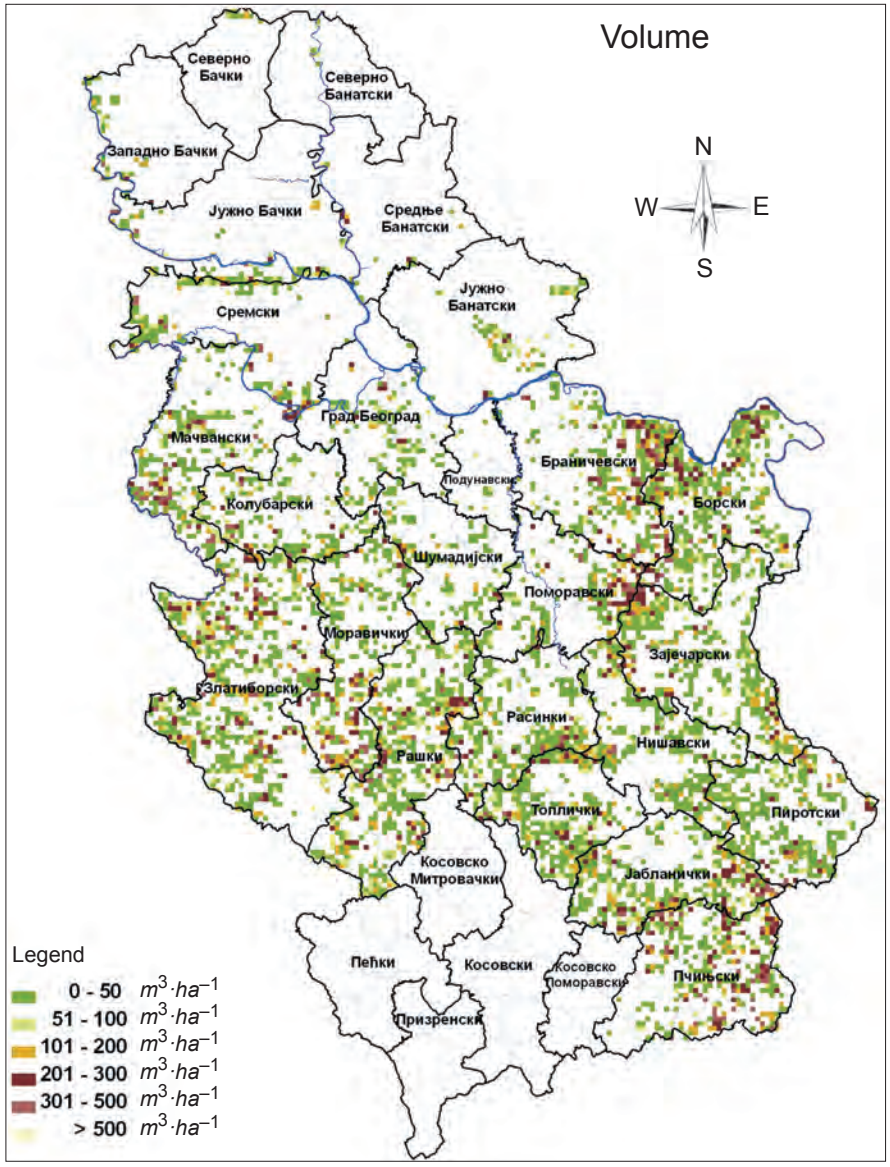
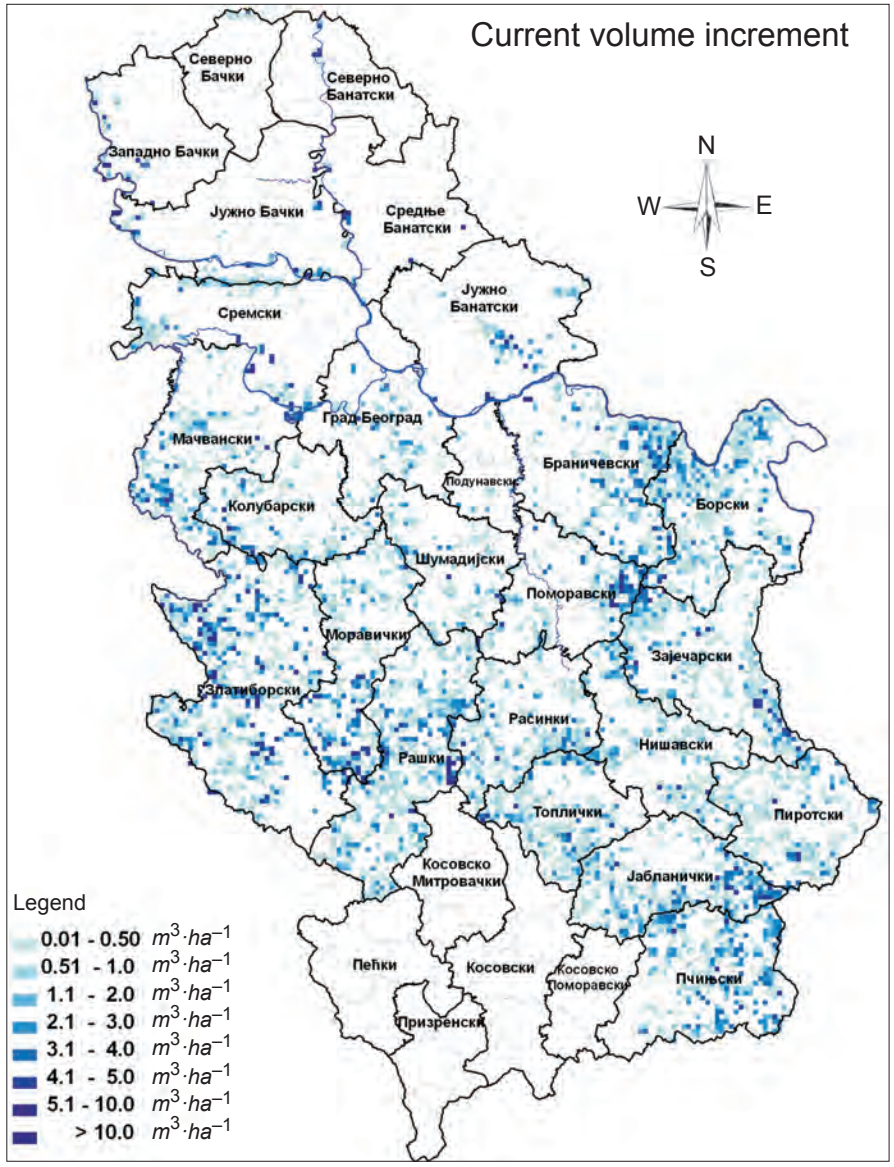
Моравички
Зајечарски
Златиборски
Расински
Нишавски
Рашки
Топлички
Пиротски
Косовско Митровачки
Јабланички
Пчињски
Косовско Поморавски
Косовски
Пећки
Призренски
Legend
0.1-50 trees·ha−1
51-100 trees·ha−1
101-200 trees·ha−1
201-300 trees·ha−1
301-500 trees·ha−1
501-1.000 trees·ha−1
1.001-5.000 trees·ha−1
5.001-10.000 trees·ha−1

**Map 9**


Volume
Северно Бачки
Северно Банатски
Западно Бачки
Јужно Бачки
Средње Банатски
Јужно Банатски
Сремски
Град Београд
Мачвански
Подунавски
Браничевски
Колубарски
Борски
Шумадијски
Поморавски
Моравички
Зајечарски
Златиборски
Расински
Нишавски
Рашки
Топлички
Пиротски
Косовско Митровачки
Јабланички
Пећки
Косовски
Косовско Поморавски
Пчињски
Призренски
N
W
E
S
Legend
0 - 50 m3·ha–1
51 - 100 m3·ha–1
101 - 200 m3·ha–1
201 - 300 m3·ha–1
301 - 500 m3·ha–1
> 500 m3·ha–1

**Map 10**


Current volume increment
Северно Бачки
Северно Банатски
Западно Бачки
Јужно Бачки
Средње Банатски
Јужно Банатски
Сремски
Град Београд
Мачвански
Подунавски
Браничевски
Колубарски
Борски
Шумадијски
Поморавски
Моравички
Зајечарски
Златиборски
Расински
Нишавски
Рашки
Топлички
Пиротски
Косовско Митровачки
Јабланички
Пећки
Косовски
Косовско Поморавски
Пчињски
Призренски
N
W
E
S
Legend
0.01 - 0.50 m3·ha–1
0.51 - 1.0 m3·ha–1
1.1 - 2.0 m3·ha–1
2.1 - 3.0 m3·ha–1
3.1 - 4.0 m3·ha–1
4.1 - 5.0 m3·ha–1
5.1 - 10.0 m3·ha–1
> 10.0 m3·ha–1