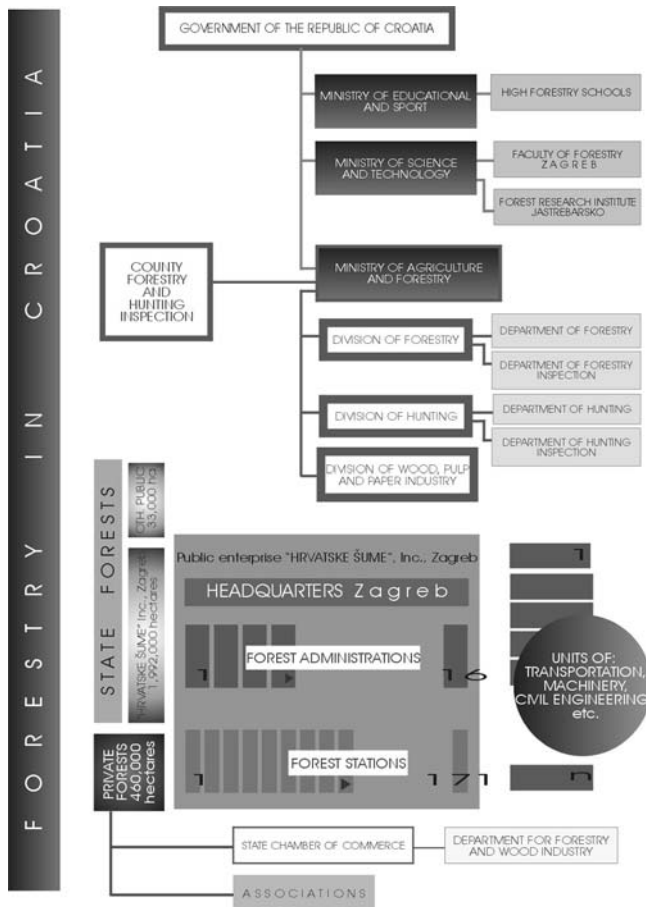


CROATIA - NATIONAL STATEMENT

SUBJECT 1

Basic data

Forest land in Croatia covers 43.5 % of state territory (56,538 km²). 80 % of the forest land is covered with forest vegetation while the rest is comprised of different classes of non-covered land (unstocked-productive 16.2 %, unstocked-unproductive 0.7 % and unfertile 3.1 %). In terms of timber production, it should be emphasized that a large part of the forest area belongs to the karst region (42 %). Having 0.51 hectare of forests per capita Croatia may be considered as a European country with significant forest area.



Organisation Chart of Forestry in Croatia

Forests in Croatia are mostly owned by the state. The state owns 82 % of forest land and private owners 18 %. State owned forests and forest land in Croatia are managed by the state company "Hrvatske šume" on the basis of General and Unit management Plan. "Hrvatske šume" was established in 1991 in accordance with the Forest Act. For the first time in Croatia's history a state company is responsible for managing all the state and public forest land under control of the Ministry of Agriculture and Forestry.

Forests are categorized by their primary function into commercial (exploitable) 94.3 %, protective (4.5 %), special purpose (1.2 %) and nurseries (424 ha).

Management of commercial forests is based on successive regeneration felling for even-aged forests and selective felling for uneven-aged forests. Management practices in unexploitable and protective forests are either limited or forbidden.

Forests in Croatia are characterized by good preservation of their natural characteristics, and various ecological conditions on a relatively small area, which resulted in establishing many forest associations. Forests

of the Croatian inland area represent the most valuable part of the forest ecosystems in the country. They cover approximately 54% of the total forest land. Forests in the inland area are located at an altitude ranging between 100 and 1,600 m above sea level. Forest belts in these communities are essentially different: belt of oak deciduous forests, belt of beech and fir, belt of subalpine beech and belt of Mugho pine. Forests of the Mediterranean area can be divided into two zones: the littoral (eumediterranean) which is characterized by Holm oak forests and Aleppo pine and submediterranean characterized by Pubescent oak forests and Austrian black pine.

Forest structure from the silvicultural aspect are: high forests (63.9 %), coppices (15.8 %), brushwood, maquis, garigues (19.3 %) and plantations (1 %).

Forests in Croatia are broadleaved (84 %) and coniferous (16 %). Broadleaved forests consist of the following species of trees (expressed in percentage): beech 36.5 %, pedunculate oak 13.9 %, sessile oak 10 %, hornbeam 8.2 %, ash 3.3 %, other hard broadleaved 9.9 %, soft broadleaves 3.8 %, fir 9.3 % and other conifers 5.1 %.

Hrvatske šume d.o.o. Zagreb

Main business objectives of «Hrvatske šume» are:

- ⇒ unified forest management in the whole Republic of Croatia,
- ⇒ permanent investments in forest regeneration and improving of forest ecological value,
- ⇒ maintaining of stability and integrated forest protection,
- ⇒ economically viable production under market conditions,
- ⇒ high quality of products and better utilization of forest biomass,
- ⇒ optimal forest roads density,
- ⇒ promotion of the value and role of forest and forestry.

The number of employees has been reduced from more than 14,000 in 1990 to approximately 9,500 of employees of all educational and training categories.

Forest harvesting and timber sales

On the area of 1,991,537 ha the growing stock is 278,323 621 m³ (140 m³/ha), the annual increment is 8,123,496 m³ (4.1 m³/ha) and the allowable cut is 4,934,199 m³ (2.5 m³/ha). About 3.59 mil. m³ of timber is cut annually and wood structure of timber sales by assortments is as follows: logs 51.3 %, thin roundwood 0.9 %, pulpwood 17.1 % and fuelwood 30.7 %. A large majority of wood products is sold under pre-set contract/retail arrangements – 90.5 %, by public biddings for domestic market - 4.9 % and by international public biddings (export) - 4.6 % of wood products.

It should be noted that the government of the Republic of Croatia confirms the price-list of forest products and also has a considerable impact on their distribution (the lobby of wood industry is very powerful).

The state has recognized the ever increasing significance of non-market forest functions and hence 0.07 % of each paid bill of legal entities in the Republic of Croatia is set aside for this purpose. These targeted funds are at the disposal of «Hrvatske šume» d.o.o. Zagreb and they are used for financing afforestation and natural regeneration of non-commercial ecosystems (especially on karst) as well as for scientific-research work.

Information technology and communication system

Information technology is a dispersed activity in the Croatian forests. There is a tendency to bring closer the place of data access to the place of their origin and to transfer the obtained business information as quickly and as efficiently as possible to the place of its use. A series of software applications are used, they are continually up-graded and new software packages are created.

Investments into IT equipment should be intensified and new, up-to-date and more efficient computer programs should be developed and the current ones should be integrated. The necessity of introducing GIS system into forest management procedure should be emphasized. The system of computer communication and other ways of communication (phone, fax) should also be up-dated.

Recent changing processes

- ⇒ the development of the project task Restructuring of «Hrvatske šume» d.o.o. Zagreb by the Irish company Coillte is nearly completed,
- ⇒ the new National Forest Policy and Strategy is being prepared as well as the guidelines of Croatian forestry development,
- ⇒ the new Forest Act is to be passed,
- ⇒ Forest certification - FSC (Forest Stewardship Council) system,
- ⇒ Standardization of forest products in accordance with the EN standards.

Basic issues

- ⇒ preservation of natural forests by sustainable management and biodiversity of species,
- ⇒ preventive measures for fire fighting on islands and in the coastal area of the Republic of Croatia and afforestation, regeneration and protection of karst forest ecosystems,
- ⇒ increase of share of profit from secondary forest products in total income realized from forest products sales,

- ⇒ finding markets for cordwood (pulpwood), especially for Aleppo pine from coastal forests, which is not currently used,
- ⇒ impossibility of management of mine contaminated forest areas (mine clearance),
- ⇒ IT development and its more intensive application in all segments of forestry,
- ⇒ increasing tendency of outsourcing forests and forest land from regular management and their protection,
- ⇒ the need of more active participation of foresters and forestry profession in developing global plans and guidelines for spatial management and forestry related laws and development strategies,
- ⇒ introduction of environmentally friendly technologies for timber production.

SUBJECT 2

Technology of Forest harvesting

In the Croatian forestry, felling and processing is carried out by motor-manual operations. Chain saws are used for felling and delimiting trees, and assortments crosscutting. Machines for mechanized felling and processing are not applied, and their use in our conditions is restricted by: forests of predominantly natural origin, species of trees and their size, micro and macro relief, silvicultural methods and methods of forest management and others.

In silvicultural operations, mulchers are used for stand preparations, stand tending is carried out by billhook and motor cleaners, and in young stands in the area of lowland forests 2.5 m openings are cut every 30 m (ghost trails).

The method of timber processing and machines used for timber extraction are closely related to the terrain topography and to the type of forest and type of felling, respectively:

- ⇒ area of mountainous uneven-aged (selective) forests of fir and beech – features: managed by selection felling with the felling cycle of 10 years, tree-length method of timber processing, timber extraction is carried out on the ground by use of cable skidders. The skidder can only enter a forest if a network of secondary forest roads (strip roads) is provided, as mountainous areas have very prominent macro as well as micro relief with numerous karst phenomena disabling the tractors' forest off-road mobility. Due to difficult terrain, a strip road must usually be built, most often by excavator equipped with a pick-up hammer.
- ⇒ area of hilly even-aged forests of sessile-oak and beech – features: managed by shelterwood system with rotation from 80 (100 years), tree-length method of timber processing, in thinnings and regeneration fellings timber extraction is carried out by use of cable skidders and adapted farm tractors.
- ⇒ area of lowland even-aged forests of pedunculate oak – features: managed by shelterwood system with rotation from 120 (140 years), cut-to-length method of timber processing, in thinning operations timber extraction is carried out by use of tractor equipages (farm tractor and a four-wheel semi-trailer with boggy suspension and hydraulic crane equipped with stabilizers and independent winch), while forwarders are commonly used for extraction from regeneration fellings.

Timber extraction with mobile yarders is only used from time to time. The reason for the present sporadic use of mobile yarders in Croatia lies primarily in their high purchase price and higher operating costs compared to skidders as well as in their requirement for highly organized and trained team of operators.

Forest roads

Forest roads on the area of the Republic of Croatia can be broken down into:

- ⇒ primary forest roads (forest industrial roads and forest fire-protection roads),
- ⇒ secondary forest roads (skid trails and strip roads).

For primary forest roads, project documentation is prepared (main and construction project) by use of CESTA software application, while the secondary forest roads are marked on site by establishing the zero line. Projecting is carried out by the so called indirect method in which several variants of zero

lines are determined on forest-industrial maps, the best one is selected and then transferred to the terrain where forest road axial range is adapted to it. Furthermore, the usual procedure of geodetic measurement is carried out as well as the collection of terrain data, which are then processed by the above software package.

The land-registry is being prepared of primary forest roads on the area of the whole country. The inventory identification is carried out by use of GPS Trimble Geoexplorer 3, their categorization is determined simultaneously and then they are mapped in 1:25000 maps in digital form. There is no land-registry of secondary forest roads. If it existed it would be much easier to draw up a survey of the workplace and to make preparations and plans of work in forestry.

Construction of primary forest roads is performed by dozers in lowland and foothill regions, i.e. on easier categories of building material and on steep hilly and mountainous terrain with stony surfaces of different hardness, excavators are used equipped with hydraulic hammer. As a result, explosive is not used in building anymore and direct and indirect damages to forest ecosystem have been considerably reduced. This technology can, therefore, be considered ecologically and environmentally friendly. On lowland terrain of bad or poor soil strength, different environmentally friendly methods for soil stabilization are applied (RRP, WEGS, PERMAZYME, geosynthetics, etc.).

Current and planned openness by 2010 subject to relief regions is as follows:

- ⇒ Lowland region – 7 m/ha,
- ⇒ Foothill-hilly region – 12 m/ha,
- ⇒ Mountainous region – 15 m/ha.

Problems

- ⇒ non-existence of land-registry of primary forest roads (it is being prepared),
- ⇒ non-existence of land-registry of secondary forest roads,
- ⇒ lack of GIS bases at the level of the whole country to be used for conducting the analyses, making decisions and developing studies for forest areas opening,
- ⇒ introduction of mechanized felling and processing of wood,
- ⇒ development of technologies of forest biomass production, as well as its market and use. There are no legal regulations related to forest biomass, nor Croatian standards that cover this forest product. Likewise, the government is not interested in giving any incentives to possible producers of forest biomass, nor any privileges to energy producers who use it as fuel.

Subject 3

Continuous training and education is being conducted of employees of “Hrvatske šume” d.o.o Zagreb as well as of other employees in forestry, at all levels, within the company and in cooperation with scientific and research institutions.

For the employees within «Hrvatske šume» d.o.o. Zagreb the following courses are organized with the pertaining check of knowledge:

- ⇒ for cutters (regulations of motor-saw operation),
- ⇒ for machine operations in timber processing,
- ⇒ for operations with new machines and modern work technologies.

Managers attend the following courses organized by their company:

- ⇒ for snage marking,
- ⇒ on log marking.

District forest officers and forest supervisors at any level can attend the following courses:

- ⇒ for work preparation,
- ⇒ for introduction of European standards for roundwood,
- ⇒ on restructuring of «Hrvatske šume»
- ⇒ IT courses
- ⇒ courses for managers.

As forestry machine production is not developed in the Republic of Croatia, before purchasing new machines they should be put on trial, i.e. the ergonomic characteristics should be tested (primarily noise and vibrations). At the Faculty of Forestry in Zagreb there is a certified Laboratory for Testing Noise and Vibrations and a Laboratory for Testing Technical Features of Forest Machines.

The Faculty of Forestry of Zagreb University organizes specialized post-graduate studies and scientific post-graduate courses. Specialized post-graduate studies take two-semester (one year) and they are organized by the following areas:

- ⇒ silviculture of natural stands,
- ⇒ nursery production and forestry plantations,
- ⇒ protection of forests,
- ⇒ hunting management,
- ⇒ forest improvement of karst regions with karst flood control,
- ⇒ phytosociology and pedology,
- ⇒ forest harvesting,
- ⇒ organization and economics of forestry.
- ⇒ ecological landscape arrangement and protection of nature and horticulture

Scientific post-graduate studies are organized in accordance with the following topics:

- ⇒ forest tree improvement,
- ⇒ silviculture,
- ⇒ forest harvesting,
- ⇒ protection of forests,
- ⇒ hunting management,
- ⇒ forest management,
- ⇒ arrangement of park and natural recreational areas,
- ⇒ organization and economics of forestry.

Along with post-graduate studies, the Faculty of Forestry carries out, together with the Forestry Institute in Jastrebarsko, scientific research for the needs of «Hrvatske šume» d.o.o. Zagreb pursuant to the five-year scientific-research plan. Scientific-research work is governed by the Commission for scientific-research work made of representatives of «Hrvatske šume», Faculty of Forestry and Forestry Institute in Jastrebarsko. Scientific-research work is conducted subject to the needs and requirements of «Hrvatske šume» and the annual results are issued in the form of annual reports. When a five-year research cycle is completed, a scientific symposium is organized where the achieved results are presented, unsolved issues are discussed and guidelines for further action are suggested. The employees of «Hrvatske šume» take active part in scientific-research work and research is mostly carried out on their area.

In compliance with the actual matters of dispute, Workshops are organized by a specific Department within the Faculty of Forestry, or by several Departments depending on the matter at issue.