



Croatia Country Report 2004 Global Wildland Fire Assessment 2004

1. Fire environment, fire regimes, ecological role of fire common to country

The typical occurrence of fire (fire regimes) in Croatia is determined by topography, altitude, climate and vegetation composition. Table 1 provides an overview of the natural fire hazard zones in the country.

Table 1. Categories of the natural conditions that determine fire hazard and risk in Croatia.

Natural Fire Hazard	Belts, sub-belts, bio-climates	Dominant forest vegetation
Very Low	Lowland (plains, valleys)	Semi-humid and humid forests and scrub-forest in various vegetation areas (forests of Pedunculate Oak (<i>Quercus robur</i>), willow, poplar, alder, etc.)
Low	Forests/steppe, hills (continental), low hills and low submontane, high hills and high submontane	Steppe-forest, various mesophyllous and mesothermic forests of sessile oak, Hungarian oak and bitter oak; beech and other broadleaf forests and shrubs
Moderate	High mountains and higher submontane	Different forests and shrubs of fir, spruce, pine (<i>Pinus sylvestris</i> , <i>Pinus leucodermis</i> , <i>Pinus peuce</i> , <i>Pinus mugo</i>), larch and other conifers
High	Hills (sub-Mediterranean)	Various thermophylforests, shrubs and scrubs of broadleaves (pubescent oak, Hungarian oak and other) and conifers (<i>Pinus</i> sp., <i>Cupressus</i> sp., <i>Juniperus</i> sp. and other)
Very High	Hills (Eumediterranean, thermo-Mediterranean, infra-Mediterranean)	Various xerophyllous and ultra-xerophyllous forests, maquis and garigues of evergreen broadleaves (oak, holly oak etc.) and conifers (<i>Pinus</i> sp., <i>Cupressus</i> sp., <i>Juniperus</i> sp. and other)

2. Narrative summary of major wildfire impacts on people, property, and natural resources during 1990s

Data on the impact of forest fires on people's health and their property during the 1990s are not available. Based on the Statute on Forest Management, the Statute on the Criteria for Forest Indemnity Price Lists, and the Programme for Managing a Forest Management Unit, the company managing state forests and other forest lands in Croatia (81% of total forest and forested land area) makes the calculation of all kinds of damage in the forests and forestland.

3. Fire database: Wildfire statistics of fire numbers, area burned and fire causes for the period of 1980-2002

The data on fire numbers and fire causes of 1980s are not available because the data of the Republic of Croatia were included in the summarized dataset of former Yugoslavia.

The fire numbers and causes of the period 1990-1999 have already been recorded in the fire database of the UNECE Timber Committee. The data presented in Table 2 are covering the period 2000-2004.

Table 2. Forest fire statistics of the Republic of Croatia covering the period 2000-2004.

Year	Total No. of fires on forest, other wooded land & other land	Total area burned on forest, other wooded land & other land	Area of forest burned	Area of other wooded land and other land burned	Human causes	Natural causes	Unknown causes
	no.	ha	ha	ha	no.	no.	no.
2000	7797	129883	27407	102476	6743	50	1004
2001	4024	27251	1818	25433	2924	32	1068
2002	4692	74945	5997	68948	3403	28	1261
2003	6924	77359	14155	63204	4803	65	2056
2004	2855	8988	1466	7522	1927	22	906
Average	5258	37734	10169	53517	3960	39	1259

4. Operational fire management system and organisations present in the country

The operational fire management system has been established by the Law on Fire Fighting and a number of legislation acts. Fire brigades are subordinated to local self-management, with financing also determined by the mentioned law. The law and the legislation acts determine the following:

- Assignment of individual fire brigades for particular fire-fighting tasks;
- Establishment of a National Committee for Fire Prevention and Control;
- Requirements to be met by firemen;
- Requirements to be met by fire brigade commanders;
- Relations during fire-fighting operations;
- Supervision of the fire-fighting systems;
- Education, training and improvement;
- Penal provisions.

Fire fighting is carried out by the following fire brigades:

- Public fire brigades of municipalities or cities (voluntary or professional);
- Voluntary fire brigades (societies);
- Professional national fire brigades;
- Voluntary national fire brigades;
- Intervention fire brigades of the Ministry of Home Affairs.

Preventive fire protection

The system of preventive fire protection has been determined by the Law on Fire Prevention and the supplementary acts. The Ministry of Home Affairs includes the Inspectorate of Interior Police – authorised for the tasks connected with fire prevention. In counties within individual police administrations there are also organisational units authorised for the tasks of fire prevention.

The Law on Fire Prevention prescribes the obligations of the local self-management units to enforce and take measures for improvements in fire prevention. The self-managing units are obliged to

prepare the Plan of Fire Protection based on the fire hazard assessments. The Plan is a document on the basis of which preventive and operational fire/prevention measures are organized and enforced on the territory of local self-management.

The preventive forest fire protection measures are prescribed by the Statute on Forest Fire Prevention, which obliges the particular members of the society to actively take part in fire prevention. This consists, among others, of a list of forests with cartographic description and an estimate on the degree of fire hazard, the establishment of a fire detection/reconnaissance system, preventive forest cultivation, and educational/information activities.

The fire-fighting system at government level

The Ministry of Home Affairs is a departmental body for the tasks of fire prevention and fire fighting in terms of enforcing the following:

- Supervision of the fire prevention and fire-fighting systems
- Control of the more complex events
- Inter-agency co-ordination of fire prevention and suppression
- Preparation and passing of legal regulations
- Strategic planning for the acquisition of mechanization and equipment
- Control of aerial and land fire-fighting forces
- Communication with other countries in the field of fire prevention

Within the Ministry of Home Affairs there is the Directorate for Prevention and Rescue, which includes the Fire-Fighting Department. This Department carries out the integration of the tasks connected with the tasks listed above, and is directed by the Fire Chief. In accordance with the Law on Fire Fighting, the Fire Chief is responsible for the organization, qualification and intervention capability of firefighting on the territory of the whole country. The Fire Chief is in charge of the intervention fire brigades, conducts fire-fighting interventions in two or more counties, and those that include aerial fire fighting force. The Fire Chief, or his/her deputy, may order every fire brigade to intervene on the territory of the Republic of Croatia with a particular number of firemen and technical equipment, and may request the assistance of the military forces.

The fire-fighting system at county level

The Republic of Croatia consists of twenty counties and the City of Zagreb, which also has county status. In each of the counties there are active public fire brigades organized in county fire societies. In accordance with the Law on Fire Fighting, county fire commanders are subordinates of the fire commander in charge of the county fire operations system. The county fire commander conducts more complex interventions, and those in which aerial fire-fighting forces take part on the territory of his/her county.

Management of complex fire events

If an event passes the capabilities of a city or a municipality, the county fire commander (at county level) takes over the command of the intervention.

The Fire Chief, or the person authorised by him/her, may take command of every fire intervention, i.e. this happens in case of more complex interventions during forest fire suppression operations, or in accidents caused by hazardous materials (HAZMAT). In more complex events, a Chief Headquarters is established.

The National Fire Operation Center of the Ministry of Home Affairs is active throughout the year. The Center is directly connected with fire operation centres of other counties, which enables a fast flow of information and commands, without which efficient large-scale interventions would not be possible.

The center is formed for the realisation of the following tasks:

- Integration of conducting and commanding tasks during the extinguishing of more complex fires
- Control and co-ordination of aerial fire-fighting forces
- Monitoring of the intervention procedure
- Activating backup forces
- Data processing
- Communication with all institutions and individuals of the fire system
- Informing the media

The Center encompasses all the subjects required for activating the material, technical and staff resources. During the summer fire season, the Center is dislocated to the coastal region of the country, from where it controls fire fighting.

Intervention fire brigades

In concordance with the Law on Fire Fighting, four firebases in coastal Croatia (Zadar, Šibenik, Split, Dubrovnik) are established, in each of which a center of Intervention Fire Brigades is included. The Intervention Fire Brigades are subordinated to the chief fire commander, i.e. the person authorized by him/her. A fire brigade has a regular staff of 16 people who are fire instructors, and fire squad leaders during the season. Immediately before the fire season, the Intervention Fire Brigades are reinforced with professional firemen from the public fire brigades of the continental Croatia. In case of massive forest fires, the intervention fire brigades are transported in vehicles and helicopters to the fire site. The intervention fire brigades also encompass aerial fire-fighting forces.

The training of the Intervention Fire Brigades encompasses the following:

- Operational activity – forest fire suppression
- Work with technical mechanization and equipment
- Coordination of land and air brigades
- Command of fire fighting
- Topography
- Physical preparation
- First aid
- Training for helicopter landing

The Intervention Fire Brigades are equipped with the following technical outfit:

- Fire engine vehicles
- Light portable forest fire extinguishers
- Pipes and hoses
- Rubber water containers
- Mowers, chain saws
- Protective equipment

Aerial fire-fighting forces

The Republic of Croatia has four Canadair CL-415 aircrafts and one Air Tractor for aerial forest fire suppression. Besides, helicopters MI-8 are used for both fire extinguishing and the transportation of firemen and equipment.

During fire season, aircraft are based in coastal airports. In accordance with danger estimates, aircrafts are positioned in particular bases, so that the flight to the fire site is the shortest possible.

Besides the use of the fixed-wing aircraft CL-415 for aerial fire suppression, the use of helicopters with suspended water containers (helibuckets) has been developed in Croatia during the recent years. Helicopters additionally serve for the transportation of water in rubber reservoirs to the elevations above fire sites, the transport of firefighters, equipment and special fire engines.

The regional center for disaster control

The Pact on Stability for South Europe brought the initiative for forming the Regional Disaster Management Center (RDMC) for the Split-Dalmatia County. The geographic position of the RDMC is such that its activity covers the whole region of Slovenia, Bosnia & Herzegovina, the Adriatic Sea, Italy, Greece, Albania, Serbia & Montenegro, and Macedonia. The aim of establishing the RDMC is to form a co-operation in the field of planning, preparation, prevention, fast reacting, reducing the disaster consequences, including forest fire extinguishing in the area of southeast Europe.

The regional center is now in the phase of organization.

Fire mechanization and equipment

The fire brigades of the Republic of Croatia have altogether 2,500 fire engines, of which about 1,200 fire-extinguishing vehicles, 45 air-rescuing vehicles, 65 vehicles for technical interventions, and 1,190 other fire vehicles.

The role of the voluntary fire brigades

The Croatian Law on fire fighting regulates the status of the voluntary fire fighting, which is based on a long tradition. The efficiency of Croatian fire-fighting would be impossible without the voluntary fire-fighting societies, especially in the parts where professional brigades are distant, and when a large number of firemen are essential for extinguishing extensive forest fires.

Based on the Law on Fire Fighting, voluntary fire-fighting societies are associated into Fire Associations of cities and municipalities, i.e. County Fire Associations. The supreme association of voluntary fire-fighting in the Republic of Croatia is the Croatian Fire-Fighting Association, whose task is the promotion of the interests of voluntary firemen societies on the territory of the Republic of Croatia, and the representation of Croatian fire-fighting abroad.

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Republika Hrvatska

Tel: +385-1-3699033
Fax: +385-1-3025026
e-mail: zajednica@zg.hinet.hr
Internet address: www.hvz.hr

5. Use of prescribed fire in the region to achieve management objectives

Within the fighting tactics in the open space in the Republic of Croatia, particularly along the coast, the tactics of setting suppression fires (backfires) is rarely applied. The use of prescribed fire on agricultural lands, e.g. for soil preparation, is also not practiced. The reasons for this are the following:

- Rugged and uneven geomorphology
- According to this, varying distribution of forest associations depending on geographic width and the level above sea;
- The interweaving of forest and agricultural land with urban areas;
- Changeable climatic circumstances in the micro relief;
- Little experience in the mechanization and technology of this procedure;
- Insufficient number of educated specialist staff for the preparation, setting and control of prescribed fire;
- "Let burn" – in terms of deliberate burning of certain areas to favour others – is not compliant with the constitution of the Republic of Croatia and the protection of man's property.

The proportion fire outbreaks caused by natural phenomena in open space (lightning) is only 1% in all country, although there are some locations on the Adriatic where this occurs more frequently than elsewhere.

The proportion of fire outbreaks caused by human factor in the Republic of Croatia is convincingly the highest (>95%). It is the biggest problem in fire prevention, especially when comes to illegal burning of weeds and other agricultural residues on tilled land and the uncultivated (abandoned, neglected) areas that are undergoing succession to brushland and forests.

6. Sustainable land-use practices employed in the country to reduce wildfire hazards and wildfire risks

According to the Law on Agricultural Land, such areas must be maintained for production. This is supported by the enforcement of a number of measures for reducing the development of weeds / succession on abandoned lands. Unfortunately, this is where it comes to the first and major fire prevention issue – the unsettled proprietary relations in private forest and agricultural areas, especially along the coast. This issue includes the inhomogeneous character of such land in terms of property, so that private land is frequently interwoven with the state-owned areas, making difficult the establishment of particular technical or preventive cultivation measures. The areas that are sufficiently wide (plains) to prevent the spreading of fire along the coast – which the most threatened region – are in the hinterland in only a few locations. Even such areas (frequently burnt, too) are under forests or low vegetation, and also with the above-mentioned problems, so that they cannot be converted into fire-safe (low fire hazard) areas.

7. Public policies concerning fire

The government of the Republic of Croatia makes yearly announcements of a Programme of Activities for the enforcement of special fire prevention measures that are of national interest. The Programme is the basis for the preparation of preventive and operational activities aimed at the protection of both coastal and continental vegetation.

The Programme prescribes the tasks with the terms of their completion for all ministries and other governmental bodies and local authorities. These tasks refer to the preventive activities for reducing the possibility of occurrence and the spreading of fires. One part of the programme has operational character, prescribing the tasks for those that actively take part in fire suppression. The carrier of the activity in this part is the Ministry of Home Affairs and the Croatian Fire Association.

Another important fact is that, apart from the Programme of Activities, there is the Plan of Interventions in case of large fires in the open space. This Plan determines detailed strategies of employing the forces for a more complex event.

Forests are managed in accordance with the Law on Forests, which provides the basic technical and cultivation prevention measures for forest fire prevention. In addition, there are acts of law for forest management, with the stipulations on management methods, the maintenance of the “forest order”, and the calculation of the damage caused by fire or other causes.

Agricultural land is managed in concordance with the Law on Agricultural Land, which stipulates the manners of treating land for the purpose of protecting the production capability of agricultural land. This, without doubt, includes fire prevention.

Some areas are protected by the constitutional and special legal regulations, and are managed on the basis of the Law on Environmental Protection.

ANNEX
National Database on Fire Suppression Responsibilities and Resources

1. Name of Country

The Republic of Croatia

2. Agencies responsible for Wildland Fire Prevention

According to the Croatian National Fire Prevention Program, there are many subjects that are integrally, each for its own department, responsible for the enforcement of fire prevention measures.

The supreme organization for fire prevention supervision of these subjects is

Ministry of Home Affairs
Department of Inspection and Administration
Home Affairs Inspectorate
Ilica 335
10000 Zagreb
Republic of Croatia

Tel: +385-1-2391-570
Fax: +385-1-2391-493
e-mail: ssegdin@mup.hr

3. Agencies responsible for Wildland Fire Control

3.1. Central / National

National Protection and Rescue Directorate
Fire Service
Nehajska 5
10000 Zagreb
Republic of Croatia
Tel: +385-1-2391-550
Fax: +385-1-2391-492
e-mail: mjurin@mup.hr

Emergency contact:
Ministry of Home Affairs
Operation Communication Center (round-the-clock duty)
Utica Grada Vukovara 33
10000 Zagreb
Republic of Croatia
Tel: +385-1-6122305
+385-1-6122226
Fax: +385-1-6122644

Emergency contact:
National Protection and Rescue Directorate
Fire Service
National Fire Operation Center (round-the-clock duty)
Tkalčićeva 67
10000 Zagreb
Republic of Croatia
Tel: +385-1-6122221
+385-1-6122975
Fax: +385-1-6122804
e-mail: mjurin@mup.hr

3.2. Provincial/State

The only *focal point* is at national level. Emergency calls are made to the fire department by dialling 93. Preparations are being made for the introduction of the European emergency number 112.

4. Agencies responsible for Disaster Management

4.1. Central / National

National Protection and Rescue Directorate
Civil Defence Section
Nehajska 5
10000 Zagreb
Republic of Croatia
Tel: +385-1-2391-530
Fax: +385-1-2391-491
e-mail: akoncar@mup.hr

Emergency contact:

Ministry of Home Affairs
Operation Communication Center (round-the-clock duty)
Ulica Grada Vukovara 33
10000 Zagreb
Republic of Croatia
Tel: +385-1-6122305
+385-1-6122226
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Emergency contact:

National Information Centre (round-the-clock duty)
Tel: +385-1-4818911
+385-1-3784820
Fax: +385-1-4551511
+385-1-3784840

5. Focal point for Natural and technological Disasters to the United Nations

5.1 Central/National

National Protection and Rescue Directorate
Civil Protection Service
Nehajska 5
10000 Zagreb
Republic of Croatia
Tel. +385-1-2391-530
+385-1-2391-491
e-mail: akoncar@mup.hr

Emergency contact:

Ministry of Home Affairs
Operation Communication Center (round-the clock duty)
Ulica Grada Vukovara 33
10000 Zagreb
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Tel: +385-1-6122305
+385-1-6122226

Fax: +385-1-6122644

Emergency contact:

National Information Center (round-the-clock duty)

Tel: +385-1-4818911

+385-1-3784820

Fax: +385-1-4551511

+385-1-3784840

6. Bilateral and multilateral emergency assistance agreements

Agreements on multilateral assistance have been signed with the following countries:

- Republic of Slovenia
- Republic of Hungary
- Bosnia & Herzegovina
- Republic of Slovakia

Agreements ready for signing:

- Republic of Poland
- Republic of Austria

Agreement in negotiation stage:

- Russian Federation
- Ukraine
- Republic of Italy
- Republic of France

6. National Fire Information System

a. *Provider of real-time or near-real time fire situation reports*

The monitoring-information service, which is obligatory for legal bodies as given under item 7.b., submits fire situation reports to the competent Fire Unit.

b. *Fire detection/reconnaissance system*

The Statute on Fire Prevention stipulates that the following bodies must establish a fire detection/reconnaissance service: legal bodies, that according to special regulations manage forests and forestlands; authorized persons of other real rights to forests and forest lands; counties, cities and municipalities with forests and forest lands owned by physical bodies. Based on the order of the authorized inspection bodies of the Ministry of Home Affairs, the fire detection service includes the legal bodies responsible for managing and maintenance of public roads, railway, and power-supply, and the legal bodies responsible for providing postal and telecommunication services. This service is established during summer fire season between 1 June and 15 September. At times of high and very high fire hazards classified as degree I, this service works round-the-clock. In cases of a very high fire danger index, the Ministry issues instructions on air investigation of the specially endangered parts of the Adriatic.

c. *Fire weather or fire-danger forecasts*

Together with the analysis of the forest fire prevention season, the National Hydrometeorological Institute prepares prediction maps of monthly and seasonal fire severity rating for the months of May, June, July, August, September (MSR and SSR), and cumulatively for the period June-September. These are supplied with daily graphs of the ISI index (Initial Spread Index) and the FWI (Fire Weather Index). Due to the long dry period in 2003, the analysis was exceptionally prolonged to May.

The National Hydro Meteorological Institute daily calculates the fire danger index in the open space, based on three meteorological stations.

The real prognostic index of the following day is calculated once a day – after 14 hours, for 19 locations on the Adriatic Sea and the coastland.

Weekly and semi-weekly weather forecasts for the Adriatic region and coastland are made twice a week (Mondays and Thursdays). Weekly forecasts are made separately for north Adriatic and Dalmatia, while the semi-weekly forecasts for north, central and south Adriatic are made with special comments on thunder possibilities.

d. *Decision-support system*

During large wildfire situations, upon request, the National Hydro Meteorological Institute gives special support to the Fire Operations Center of the Ministry of Home Affairs. This support includes

- Local weather forecasts for the burnt areas;
- Immediate communication of the forecaster on duty with the firemen on site;
- Provision of weather situation analyses for the Adriatic region and the medium-term weather forecast estimates.

e. *Relevant environmental and socio-economic conditions*

The applied FWI method accepts the meteorological circumstances and the moisture state of the dead forest inflammable material (dead fuel moisture).

In according to the Statute on Forest Fire Prevention, the legal bodies cited under item (b) are obliged to prepare a list of forests classified by fire danger degree, in concordance with the Standards for Forest Fire Estimates.

8. Wildland Fire Management Infrastructures and Equipment

Section 4 of the country report describes fire-fighting bases with equipment.

Since the integration into the European Union is of national interest to Croatia, the acceptance of the European norms in the field of fire fighting and prevention is in progress. This particularly applies to the fire-fighting mechanization (vehicles, extinguishers) and other devices and equipment (protection outfits, hoses and tools, etc.) The system of radio-communication in fire fighting works on two-meter frequency range (simplex and r-channels). The radio-communication system is under the authority of the Ministry of Marine Traffic and Communications. On more complex occasions, the radio-communication support is provided by the specialist services of the Ministry of Home Affairs.

7. Human Resources (for national use)

In the Republic of Croatia there are currently 1,908 active fire brigades with 65,217 active members. The major proportion of these consists of voluntary fire brigades (1,790). There are 55 professional fire brigades, mainly in cities and bigger municipalities, with 2,157 firemen.

In the industrial sector (enterprises, companies) there are 45 professional fire brigades with about 1000 professional firemen.

An important fact is that the firemen working in professional fire brigades and the members of the voluntary fire brigades respond to all kinds of fire and all kinds of technical interventions (forest fires, fires on buildings, accidents with hazardous materials). There are no fire brigades that would respond only to forest fires.

List of fire fighting personnel by counties

County	Number of professional firemen	Number of voluntary firemen
Zagreb	111	10.300
Krapina-Zagorje	37	5,600
Sisak-Moslavina	102	3,600
Karlovac	75	3,700
Varaždin	48	3,700
Koprivnica-Križevci	90	4,312
Bjelovar-Bilogora	70	6,400
Littoral-Goranian	233	4,312
Lika-Senj	32	260
Virovitica-Podravina	51	1,100
Požega-Slavonia	7	2,032
Slavonski Brod-Posavina	54	3,600
Zadar	164	400
Osijek-Baranja	123	4,100
Šibenik-Knin	78	390
Vukovar-Srijem	90	1,200
Split-Dalmatia	120	1,837
Istria	231	520
Dubrovnik-Neretva	92	675
Međimurje	48	6,541
City of Zagreb	311	1,593
Total	2,157	63,060

8. Equipment available for International Emergency Assistance

According to the Law on Fire-Fighting, intervention fire brigades have been formed, and are also supposed to help other countries, as defined by international agreements (see section "Intervention fire brigades" in the main report).

The intervention fire brigades also include fire air forces (see section "Aerial Fire-Fighting Forces" in the main report).

The forces can respond within eight hours from receiving the call for help. As a rule, help is offered to the countries that have signed the Agreement (see section 6) with the Republic of Croatia.

Sections 4 and 5 contain telephone numbers and contact addresses. An important point is that the aid requirement should go through the Croatian Ministry of Foreign Affairs, i.e. via Croatian embassies in the countries in question, unless the international agreement stipulates another manner of mutual communication.

Contact:

Ministry of Foreign Affairs
 Trg Nikole Šubića Zrinskog 7.8
 10000 Zagreb
 Republic of Croatia
 Tel: +385-1-4569964
 Fax: +385-1-4920149
 e-mail: mvp@mvp.hr
 Internet address: www.mvp.hr

9. Human Resources (for international use)

According to the Law on Fire-Fighting, intervention fire brigades have been formed, and are also supposed to help other countries, as contained by the international agreement (see section "Intervention fire brigades" in the main report). Fifty firemen have been foreseen for the purpose of giving help to other countries. The intervention fire brigades also include aerial fire fighting forces (see section "Aerial Fire-Fighting Forces" in the main report).

12. Wildland Fire Management Training Facilities

In the School for Fire Fighting and Civil Defence there are programs of education, training and advanced training for firemen and other protection/rescue forces. The school holds examinations and issues certifications for fire engines and other mechanization and equipment.

National programs

- Qualification programs for firemen and fire technicians;
- Programs for training and advanced training of regular soldiers, non-commissioned and commissioned officers in the Croatian Army;
- Programs for training the members of the intervention civil defence fire brigades with the Ministry of Home Affairs.

National and international programs

- Programs for training the members of the intervention fire brigades.

13. Wildland Fire Research Institutions

Extensive research on the Mediterranean forest fires has been carried out for ten years at the Faculty of Forestry in Zagreb. A large number of collected data have been described and partly published. The data are currently being supplied with additional information and are being statistically processed.

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