International Forest Fire News (IFFN) No. 33 (July – December 2005, 44-50) ISSN 1029-0864

Fire Situation in Hungary

Forest Area and Ownership in Hungary

The total forest area in Hungary is 2 million hectares (ha), the forest cover index is 20.5 % of the total country area. The highest forest density is found in low mountain ranges, whereas in the lowlands it is typical to find mosaic land use structure (Figure 1). Approximately 600.000 ha of the Hungarian forests were planted between 1950 and 1980. Before the recent political changes 99% of the forests were in state ownership.

During the complicated process of change in the political system, a basic change in forest ownership relations took place, and as a result of this change approx. 730,000 ha of forests became privately owned. The state owned forestry had to adapt to the new economic situation. The new ownership structure henceforward has an important role in forestry and in wildfire management, too. In the new owner structure the communal-forests are nearly missing, and the ratio of small private forest-ownerships is very high. More than 1/3 of the forest estate are smaller than 1 ha, and ¾ are smaller than 5 ha. 40 percent of the private forest owners live in town, and have just indirect contact with their forests. Two percent do not know the size of their forests! More than 14 percent of the Hungarian forests are of inordinate ownership, meaning that these areas have owners but the owners do not report themselves at the forest-office.

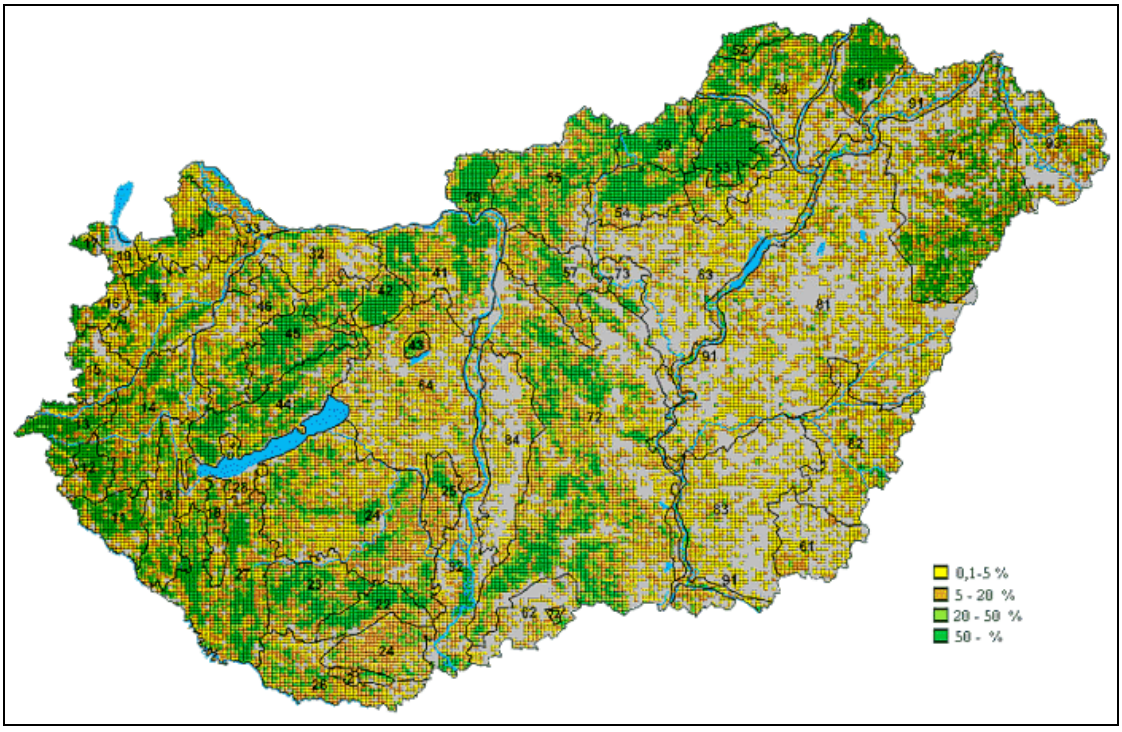

Figure 1. Forest cover index of Hungary. Source: National Forest Service of Hungary

One of the characteristic features of Hungarian forest stand composition is the absolute dominance of broadleaved forests. They make up a total of 85% of the total forest area; coniferous forests contribute to 15%. Significant broadleaf species are oak (*Quercus petrea, Q. robur*) and Turkey oak (*Quercus cerris*), black locust (*Robinia pseudoacacia*) and poplar species (*Populus* sp.). The most important conifer species are Scots pine (*Pinus sylvestris*) and Austrian pine (*Pinus nigra*) (Figure 2). The pine stands are occupying the area of the poorest sand-soils in the Hungarian lowlands and the dolomitic bleaks in the Hungarian lower mountain ranges. Nearly 65% of all fires are started in broadleaved stands. 50% of all fires in broadleaved stands are in oak and Turkey oak forests.

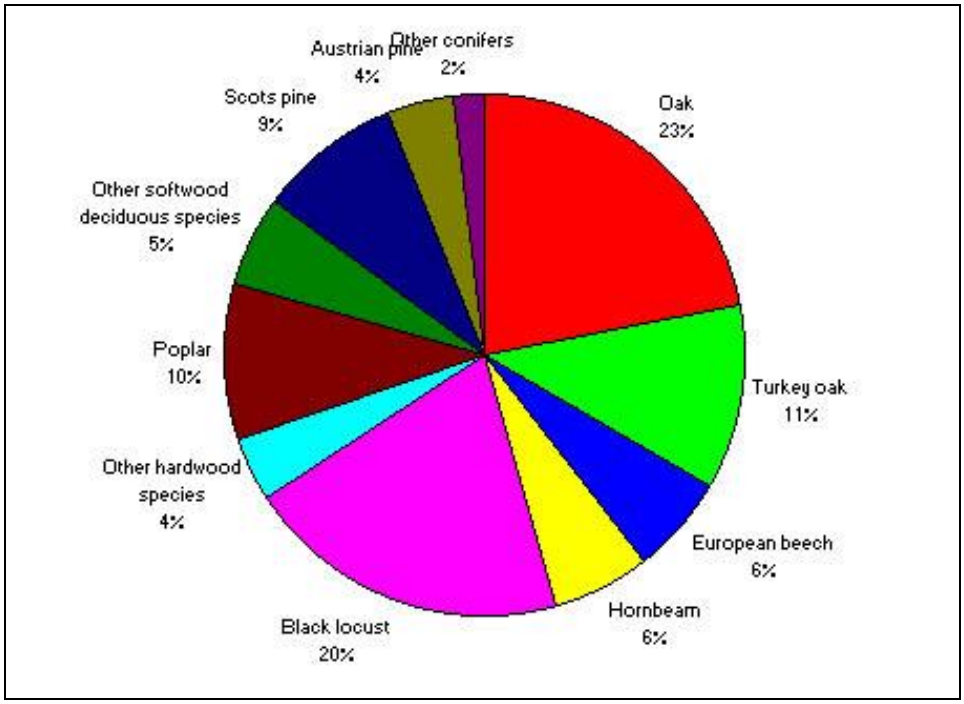

Figure 2. Distribution of forest area in Hungary by species group

More than 59 % of the Hungarian forests are younger than 40 years. This is mainly due to the forest plantation programme of the last 40 years, as well as due to the fast-growing tree species like black locust, willow and poplar, which account for a high proportion of this age group. Forest stands between 40-60 years make up 16.6%, 60-80 years 10.9 %, and stands older than 80 years 10.9% of the total forest area. Approximately 60% of all forest fires are observed in stands not older than 20 years, and 90% in stand not older than 60 years.

Fire Statistics

Fire data gathering has been imprecise in Hungary. The causes were the many institutional alterations, and the rapid change in forest ownership structure. For the period 1990-2001 statistical fire data include only the number of forest fires as well as some data on area burned in state-owned forests (Table 1). Data on fires occurring outside of forests were not gathered.

In 2005 the concept for a new data gathering system was agreed by the Hungarian Forest Service (HFS) and the Hungarian Disaster Recovery Service (HDRS). However, the implementation of the new system needs a common information platform and appropriate legal changes (Figure 3).

In the new system the HDRS delivers the location of fires to the HFS, who completes the data with burned area and forest stand information. In the future it must become an integrated fire data gathering system, in which the different agencies can add diverse data segments on forest fires. Despite this new system, information on the burned area outside of forests (such as grass and bush land, mainly in private ownership) is not gathered. Just the number of non-forest fires is available.

Fire causes

In Hungary 99% of the wildfires are caused by humans. Most fires are started by negligence. Only a small part of fires are caused by arson. Typical forest fire causes are the incompletely extinguished fires of hikers, and the illicit agricultural fires.

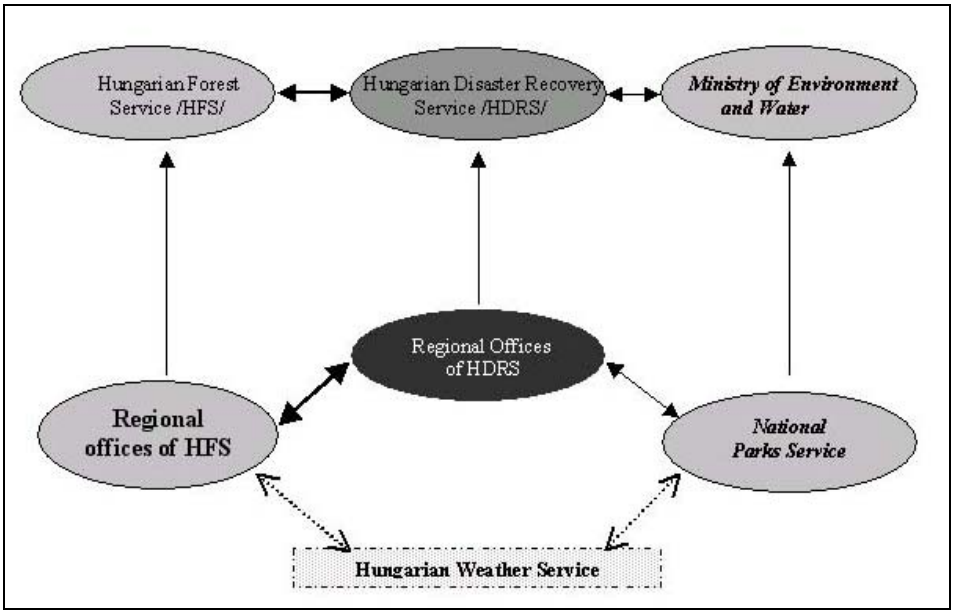

Figure 3. Conception of the new wildland fire data gathering system for Hungary

Table 1. Wildland fire statistical data for Hungary 1991-2002

Year	Number of Forest Fires	Number fires on other lands	Total burned forest area (ha)	Burned area in state-owned forests (ha)
1991	646			
1992	2452	3264		1480
1993	1188	4818		947
1994	555			592
1995	542			399
1996	514			407
1997	770			403
1998	854	3750		726
1999	229	1021	1309	289
2000	811		2599	799
2001	419			419
2002	382		1226	

Fire characteristics

In Hungary wildland fires can be classified in five representative groups of characteristic fire regimes. Each group has distinct fuel types, fire size and fire characteristics:

Spring fires in broadleaved stands (oak, turkey oak, black locust and poplar regeneration and plantations). The fires are not region specific, but depend on the fuel type. The fire size is seldom larger than 5 ha, but usually destroys the young stands. The cause of the relatively small average burned area is partly the Hungarian Forestry Act, which defines 5 ha as the maximal size of clear-cutting area. The resulting mosaic age structure is advantageous: Once the fire reaches the older stands in the neighbourhood, the prevailing fuel type with higher fuel moisture will decrease the fire spread and intensity. Thus fire suppression will be easier. However, in several territories where the size of coherent young stand areas comes up to 100 ha, fires cause more control problems.

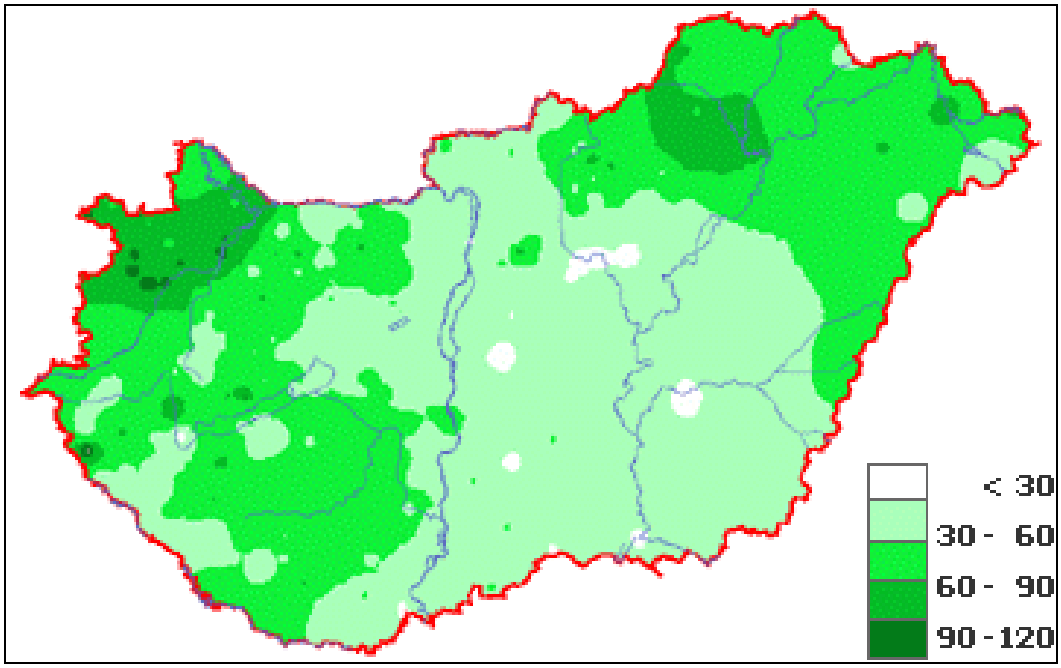

Figure 4. Average precipitation (mm) in the first 3 months of the year in Hungary. The distribution pattern of rainfall below 60 mm reveals the risk of early spring fires. Source: Hungarian Weather Service.

Summer fires in broadleaved stands occur during the hot and dry continental summer in broadleaved and coniferous stands. The fires in the broadleaved stands (mostly oak stands) are surface fires with low intensity but with high fire spread. The broadleaved stands are characterized by a thin duff and timber litter layer with a low total surface fuel load. Due to this characteristic the fires do not develop into crown fires in these stands.

There are more problems with the coniferous stands (Scots and Austrian pines) in the Hungarian lowlands. Surface fires in those stands mostly develop into crown fires, a phenomenon attributed to:

- Needles of the pines decompose very slowly
- High fuel loads
- Fuels dry very fast due to the specific site conditions
- Duff layers, often reaching a depth of 50 cm, burn with high intensity and result in crown fires
- The average lower crown height in stands on sandy and dolomitic-bleak dominated sites are 10-15m

These crown fires can only stop outside of pine stands, with the help of natural barriers or broadleaf stands. Fires in these stands not only cause high economic damages, e.g. reforestation costs. On these extremely poor forest sites stand-replacement fires contribute significantly to site degradation because only after 1 to 2 generations of undisturbed pine stands a reforestation with other species is possible.

Summer fires in juniper-poplar stands. These associations are under natural protection, and are not managed. In these stands the dominant fuel is juniper (*Juniperus communis*). Wildfires in junipers can be characterized as bush fires with medium intensity and high fire spread. After the fire the species ratio in the area changes due to fire intolerance of junipers.

Grassland fires in summer and autumn. The occurrence of these fires is high and mainly in the lowland plains, but unfortunately the state statistics do not provide statistical information. The average fire size is 20-50 ha, with a trend of increased over the last decade. Some large fires between 1500-8000 ha occurred. These fires have high spread rate with a wide fire front and low intensity. In the mosaic landscape of the lowland plains the grass fires ignite small bush, reed and forest areas and cause high spot fire potential. Large grassland fires generate smoke pollution problems at the rural-urban interface.

Peatland fires in very dry summers. Fires burning in desiccated organic terrain usually start as surface fires, e.g. grass fires that are penetrating into the dry organic layers. As in other parts pf the world, these fires difficult to control. Effective suppression tactics include trench construction and flooding of the area.

Responsibilities Around Wildland Fire

The Hungarian forest-act classifies the stands in three categories. The first category (high danger) comprises

- Dry oak stands (*Orno Querco pubescenti cerris*) in the mountains
- Young and middle age conifer stands in the lowlands
- Park forests in the lowlands
- Broadleaf regeneration and plantation stands in the lowlands
- Stands with recreational-oriented use in the lowlands
- Stands in neighbourhood of railways and main roads in the lowlands

In the second category (medium danger) are

- Conifer stands
- Other park forests
- Regeneration and plantation stands
- Stands in neighbourhood of railways and main roads

The third category (low danger) refers to all other stands.

Fire prevention in Hungary is the duty of the forest owners. According to the Forest Act „the forest owner must provide for conditions of wildland fire prevention". According to the Decree of the Ministry of Interior on Fire Protection „the forest owners must organize early warning systems and initial attack crews in the high fire risk periods." This law environment was sufficient when the state forest ownership was close to 99 %. Under the actual ownership structure, however, it is not adequate anymore.

Fire fighting in practice is the responsibility of the professional and volunteer fire-fighter brigades. Together with the Civil Protection Service they are integrated under the Disaster Recovery Service. In the country there are 110 professional and app. 40 volunteer structural firehouses. This firehouse-density and the fire fighting resources is enough to fight structural fires, but if more small wildfires burn in the operation area of a firehouse the resources become limited and the response times will be longer.

Early warning and observation

Formerly in Hungary no special fire weather index and fire weather forecast was in operational use. This was a disadvantage both for the fire professionals and for the PR activities. With the help of fire weather forecasts the personnel of the fire and forest service would be in the position to be prepared and to allocate resources for fire suppression. Without a fire weather index it is difficult to communicate the fire risk period to the general public. Furthermore the current legal regulations can impose only general fire bans, which do not consider the variability of fire weather.

Currently the weather panel of the Canadian spatial fire management system is tested under Hungarian conditions. With additional innovations the fire weather raster maps will be used together with fuel and fire behaviour models and the digital forest GIS database of the Forest Service for modelling large fire incidents (Figure 5).

The system of forest area observation is aimed at possibly early detection of fires:

- The main observation method is the lookout patrol (ground fire detection). After the forestry act the forest owners must organize the patrolling. This works well in state forest areas. However, the small private owners do not have time or money to organize the patrolling. Fortunately most high-risk stands remain in state ownership, which are not localized separately but are intermixed with private forest lands. Thus, patrols by the state authorities are also observing the fires in private areas.

- Aerial patrol (aerial fire detection) is used only in high-risk periods in the lowlands, to control the nature conservation areas.
- Tower-based observation will be expanded in the near future. Instead of building new lookout towers, the available towers of the mobile phone communication system will be used. This will also ensure an easy data transfer.

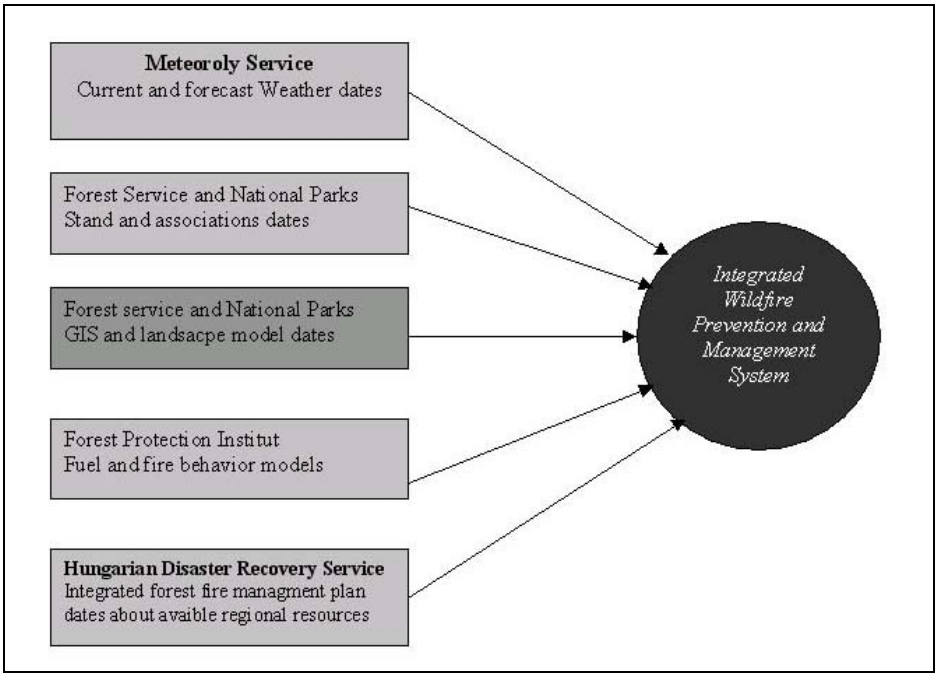

Figure 5. Concept of the Integrated Wildfire Information and Decision Support System

Equipment

Fire fighting is mainly the responsibility of the Fire Service. Fire Service staff is well trained and equipped for fighting structural fires and other disaster situations, including fires in hazardous materials. They are however not adequately trained and equipped for wildland fire suppression. This is not a question of will but of costs. The engines are for structural use and are difficult to operate in the field. They are not equipped for wildland fire operations. Even though the forest offices and the national park services have light vehicles (which could better be used in off-road conditions), they have no fire fighting equipment, and the staff is not trained. Furthermore light personal protection equipment for wildland fire fighting is missing. Heavy equipment such as tractors, dozers and ploughs usually belong to the Forest Service and to its contractors.

As mentioned before, the heavy fire engines are not able to approach the fires on difficult terrain or access routes of lower quality and size, and they are not equipped to build a longer mobile waterline in the field. Because of missing training and special firing equipment, burnout and backfire techniques are not used in fire suppression.

The cheapest solution to upgrade wildland fire equipment would be to supply the 4WD vehicles of forest offices and national parks with slip-on units and other special light equipment. In addition a new training standard should be developed, which would make the work between the different agencies more efficient.

Aerial fire fighting capacity is available in a limited way. Some contractors have small agriculture airplanes. However, they are used only for larger fires and not for initial attack. Besides those airplanes helicopters of the army with *Bambi* buckets are used to fight bigger fires. Small airplanes and helicopters are used in some cases. Since they do not belong to the Forest Service or to the Fire Service hence the requisition needs a longer time. However in my esteem it is unlikely that Hungary should large water bombers, therefore cooperation with neighbouring countries would play an important role in case of extreme fire situations.

Prescribed burning

At the moment prescribed burning is not practiced in Hungary. The Nature Protection act does not permit the use of fire. However starting next year the first experiments to test the effects of prescribed fires in Hungarian vegetation types will be carried out. The prescribed fires will be used in partly managed non-forested areas, such as grass and bush lands, where other management methods were abandoned due to high costs. In these areas that are often under the rules of nature conservation the fuel loads have increased continuously in the last decades. Well-planned and performed prescribed burning operations could be an adequate and cost-effective management method for these areas. Requirements are that the regional land and forest management offices are well equipped for fire fighting and prescribed burning activities. The biggest difficulty will be to manage the prescribed burning together with fire prevention public relation programs. A close cooperation with the European Fire in Nature Conservation Network (EFNCN) is envisaged.

Conclusions

The major, most difficult task in connection with wildland fires probably is not the fire suppression and the fire fighting in the field, but creating cooperation between all agencies and landowners concerned with wildland fire. It is not sufficient to set up this cooperation at the administrative level only, but it must be effective on the operational level, too. The new fire data-gathering directive of the European Union, and the progressive approach of the new forest fire protection decree was a good indicator for starting this cooperation in Hungary.

With complementary help of the European Union structural financial support hopefully projects can be started in the next years addressing the following subjects:

- Improvement of fire fighting equipment
- Modernization of forest roads and water supply systems
- Subsidies for forest management in stands of low economic value
- Integration of the private forest owners in wildfire prevention
- Research in fire management

Besides the projects on the national level collaboration in research and in operation on regional and international level would be very important. With help of the UNISDR Regional Southeast Europe Wildland Fire Network not only a fast information exchange can be ensured, but financial support can be saved, too.

IFFN Contribution by

Daniel Nagy
Global Fire Monitoring Center (GFMC)
Georges-Koehler-Allee 75
D - 79110 Freiburg
Germany

Tel: +49-761-808011
Fax: +49-761-808012
e-mail: daniel.nagy@gfmc.org