

REPORT ON FIRE THREAT TO FORESTS IN POLAND

Ryszard Kapuściński
General Directorate of State Forests in Warsaw

Forests in Poland cover 8,8 million ha, which corresponds to 28,2% of country area. The structure of ownership of forests in Poland (expressed in percent of forested area) looks as follows: State Forests – 78,5%, forests of physical persons – 16%, national parks – 2%, other public forests – 1,5%, other private forests – 1,1% and communal forests – 0,9%. Main area of forests, i.e. 6,8 million ha is the property of the State Treasury, managed by the State Forest Farm of State Forests. Forest inspectorates functioning in the structure of the State Forests administer 28 thousand of forest complexes, among of them over 6 thousand with the area less than 5 ha. The average forest area of private property is about 1,3 ha. The report on fire threat to forests in Poland refers to the State Forests.

Forests in Poland remained basically at the areas with the poorest soils and in the difficult access places which is reflected in the system of forest habitat types. In the habitat structure of forests, the big wood sites prevail occurring at 62,1% of the total forest area; richer forest sites occupy 37,9% and including 3,0% for alder forests and marshy forests.

In the species composition of the forests the coniferous species prevail – 77,1%, and especially pine tree (together with larch – 68,9% of area), which found in Poland the most favourable climatic and habitat conditions in its Euro-Asian range. Also the big participation of coniferous species in the composition of our forests has been caused by their preference by the wood processing industry, starting from the XIX th century.

In the age structure of a forest, the II and III age class of forest stands dominate (i.e. from 21 up to 60 years), covering respectively 24,3% and 22,1% of the area. The average wood capacity of the forest stands is 203 m³/ha.

The condition of our forests and their protection problems have direct influence on the threat to the forest environment in Poland, which is among the highest in Europe. It results from continuous, simultaneous action of many factors causing unfavourable phenomena and changes to the health condition of forests. The forest condition is influenced by detrimental factors, both with abiotic and biotic character as well as with anthropogenic one.

Abiotic threats result most of all from geographic position of Poland at the area of clashes between influences of marine and continental climate. The frequent weather anomalies connected with them are expressed by occurrence of extreme temperatures, precipitation and winds. Also unfavourable condition of forests in Poland is influenced permanently by the factors, forming a water balance of forest habitats. One can take into account here – in the long perspective – deficit of precipitation, repeatable dry periods during vegetation season and lowering of ground water level. The effect of this is occurrence of shortage of moisture on vast areas of Poland accessible for plants, resulting among the others in acquiring the steppe characteristics.

Clear predominance of west direction winds causes the increased flow of air contamination from the heavily industrialised countries in West and Central Europe.

The Polish forests in major part are located on poor sandy soils, which characterise with high permeability of precipitation waters. The extremely unfavourable conditions of grow for trees exist at the afforestation areas on the post-agriculture lands, at the total area of almost 1,5 million ha.

As far as the threats from the biotic factors are concerned, Poland belongs to the countries in which unfavourable phenomena in forests are connected with mass occurrence of insect pests and fungous infection diseases. The biggest threat dynamics to the Polish forests is expressed by leaf eating pests of coniferous forest stands, and locally also by the secondary pests in pine and spruce forest stands.

Among the threats from the anthropogenic factors, the main problem is the environment contamination caused by industry, communal economy, transport and by fires.

Emission of air contamination in the last years has been lowered, remaining however the crucial factor influencing the health condition of forests. From the end of the eighties, the continuous decrease in air contamination in Poland has been noted, which is directly referred to the lowered emission of SO₂ and NO₂. Decreasing tendency of the NO₂ emission was however stopped in 1992 and one should expect its reversal as a consequence of intense development of the motor transport.

The function of influence of the above mentioned factors (abiotic, biotic, and anthropogenic) is the health condition of forests, which is usually determined on the basis of reduction ratio of assimilating apparatus (defoliation). The average defoliation ratio of the forest stands in Poland has shown lately a small improvement in health of forest stands. Comparing a level of damage to forest stands with other countries in Europe, it must be stated that in spite of noticed improvement in this field, Poland still belongs to the countries with high degree of forest damage on the European continent.

Forests in Poland characterise with various rate of fire threat depending on the region. One of the basic criterion of the fire threat evaluation to forests, are the fire threat categories to forests. We distinguish three categories of fire threat to a forest:

- I category – high threat;
- II category – medium threat;
- III category – low threat.

While assigning the above categories one takes into account the natural and forest conditions (among the others the habitual type of forest, age of forest stand) and average conditions of fire occurrence in forests – their number, climatic conditions determined by hydrothermal coefficient, as well as ratios for air contamination with industrial emissions. Spatial distribution of particular categories of fire threats to forests in Poland is illustrated in picture no 1.

The fire threat condition to forests in Poland is expressed emphatically by fire statistics from the 1991 – 1999 period. Data on that subject has been compiled in table no 1. The biggest number of fires in 1999 occurred in the spring (April, May) – 1446 fires and in the summer (July, August and September) – 2458. The distribution of forest fires in particular regions of Poland in 1999 is illustrated in picture no 2. To the regions with the biggest number of fires one can include the regional directorates of State Forests in Zielona Góra (782 fires), Katowice (622), Szczecin (429), Warsaw (339) and Wrocław (327).

Among the main causes of fire occurrence in forests one can mention arsons, imprudence of the juvenile, imprudence of the grown-up, statics, faults of technical devices, road transport, railway transport, transfers of fire from unforested lands and other not specified reasons.

The percentage distribution of forest fires according to causes of their occurrence on the basis of data from the 1991-1999 period has been compiled in table no 2. Among the main causes of forest fires one can mention arsons and imprudence of the grown-up, and since 1991 also transfers of fire from unforested lands.

Many factors decide upon the high fire threat to forests in Poland, among of them the crucial importance have the following ones:

- big participation of the poorest habitats, covered mainly by pine forest stands;
- considerable participation of younger forest stands, i.e. up to 40 years old;
- big participation of lands excluded from agriculture production (barren lands), on which many often burning dry grass takes place especially in the spring or in the late summer;
- growing penetration of forests by people, among the others in relation to the development of transport system;
- locally bad condition of forest health, caused by the environment contamination and unfavourable sequence of climatic phenomena;
- bad sanitary condition of forests, caused by not performing curing actions (it regards particularly the private forests).

The most vulnerable to fire occurrence are coniferous forest stands, especially pine ones growing in dry wood habitats, fresh wood habitats and mixed fresh wood habitats which cover about 55% of the forest area. The factor encouraging the fire threat increase is the low age of forest stands. The most vulnerable to fires are young forest stands of up to 40 years old. They cover about 45,5% of the area. Their participation will be increasing, following the implementation of the program for increasing Poland's forestage. This program is based on afforestation of lands excluded from agriculture production.

The problem of the last years is burning of dry grass on unused lands, excluded from agriculture production. Direct neighbourhood of barren lands with forest areas is a factor encouraging transfer of fire from burning grass to forests. Burning of dry plant wastes, especially grass, takes place usually in the spring and concerns also balks and road shoulders.

Dynamic development of tourism and recreation which takes place in the world as well as in our country, is accompanied by the intense penetration of the forest areas. It is favoured by the expanding individual motor transport, making accessible the places which have not been visited so far. Situation in this field will be still radically changed in the course of realisation of motorway and road network program in our country.

The factor encouraging the penetration of forests and in consequence the fire occurrence, is a vast fragmentation of forest complexes, which are usually parted by inhabited areas with less or more scattered build-up.

The characteristic feature of the Polish forests, influenced by many damage creative factors (among the others by the industry), is reduction of assimilation apparatus (defoliation) and thinning out of forest stands. Increased access of light to the bottom of a forest caused by these changes, favours excessive expansion of undergrowth plants, especially grass, which after drying out is very flammable material. Such a situation happens most often in the spring, before development of the new plants and in the summer in the period of hot days without raining.

Increase of fires observed since the eighties has direct connection with the sequence of atmospheric conditions, especially with the deficit of precipitation, increase of temperature above the average values and prolongation of drought periods. Forecast global changes of climate show, that we will still have to do with weather anomalies, favouring occurrence of fires and other natural calamities.

The scale of the fire problem in the Polish forests may be reflected by the fact, that in some years its area was comparable with the area of fires, registered in the Mediterranean countries. Such a situation forces the State Forests to carry out

continuous, intense activities aiming at prevention and effective forest fire fighting. It is supported by the fire fighting protection system of the forests, which consists of:

1. Observation and alarming system
2. Set of technical means
3. Document entitled „Way of proceeding in case of forest fire occurrence” agreed between the forest inspector and the regional chief of the Fire Brigade

The observation and alarming system consists of: the network of permanent ground observation, fire fighting patrols, airborne monitoring, alarming and dispatching points, communication network.

The basic technical means of fire fighting protection comprise: access and fire roads, fire fighting strips, equipment bases (equipped among the others with patrol and extinguishing vehicles), water intake points, forest aviation bases.

The problem of the fire threat which is important for Poland requires constant development of all activities: organisational, technical, economical and information propaganda ones, which are the components of the fire fighting protection system. The basic task is still the problem of the social conscience and efficiency of the law, as well as improvement of co-operation and co-ordination of activities among all organisational units participating in the protection of forest against fire threats.

Warsaw, 11.04.2000

Picture no 1: Map of forest inspectorates with division into categories of fire threat to forest

- I category (high threat)
- II category (medium threat)
- III category (low threat)

Picture no 2: Fires in State Forests in 1999

Number of fires

Table no 1: Data on forest fires in the period 1991 – 1999

No	Data on forest fires	Data for the period		
		1991-1995	1996-1998	1999
1.	Average number of fires (pcs)	5206	3859	
2.	Average area of fires (ha)	8673,02	2978,73	
3.	Average area of one fire (ha)	1,67	0,77	0,40
4	Total number of fires in year (pcs)			4553
5.	Total area of fires in year (ha)			1799,77

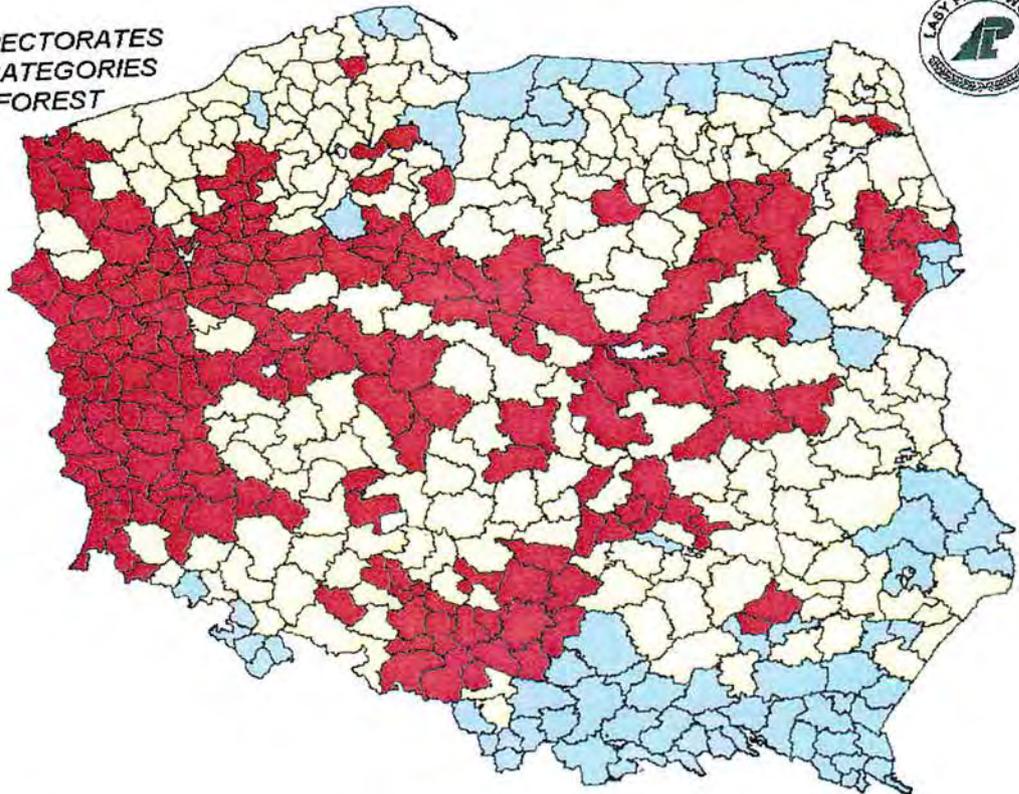
Table no 2: Percentage share of forest fires according to causes of their occurrence, based on data for the period of 1991 – 1999.

No	Causes of fire	Data for the period		
		1991 – 1995	1996 – 1998	1999
1.	Arsons	26,25	31,87	37,28
2.	Imprudence of the juvenile	1,73	1,70	1,74
3.	Imprudence of the grown-up	32,69	19,95	23,83
4.	Statics	1,20	0,79	0,55
5.	Breakdowns of power lines	0,86	0,85	0,82
6.	Road transport	0,48	0,42	0,53
7.	Railway transport	2,62	1,56	1,08
8.	Transfer of fire from unforested lands	5,17	18,93	8,89
9.	Others	1,40	1,22	1,59
10.	Not established	27,60	22,72	23,69

Picture no 1
MAP OF FOREST INSPECTORATES
WITH DIVISION INTO CATEGORIES
OF FIRE THREAT TO FOREST



- I category
/high threat/
- II category
/medium threat/
- III category
/low threat/



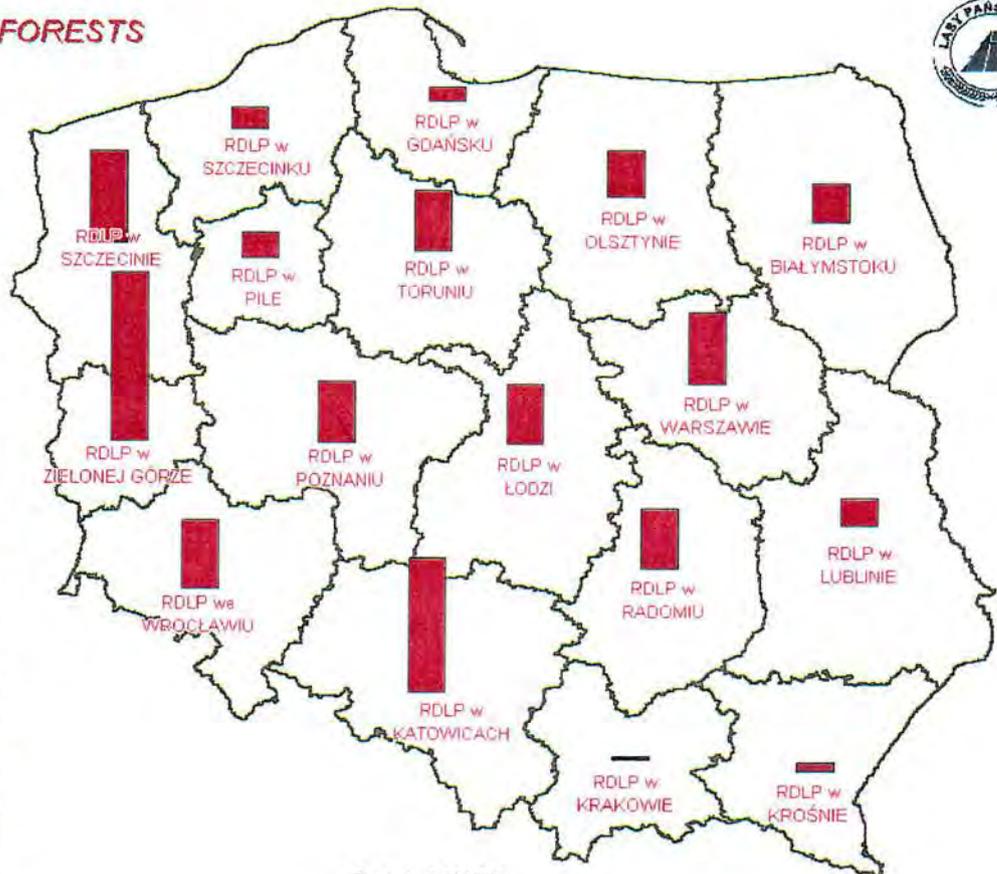
Scale 1 : 2 100 000

Opracowano i wykonało w Zespole Informacji i Planowania DGLP

Picture no 2
FIRES IN STATE FORESTS
IN 1999



Nazwa	Požary
BIALYSTOK	184
KATOWICE	622
KRAKÓW	20
KROSNO	43
LUBLIN	128
ŁÓDŹ	283
OLSZTYN	217
PIŁA	124
POZNAŃ	290
SZCZECIN	429
SZCZECINEK	107
TORUŃ	293
WROCŁAW	327
ZIELONA GÓRA	782
ODAŃSK	66
RADOM	279
WARSZAWA	339



Scale 1 : 2 200 000

Opracowano i wykonało w Zespole Informacji i Planowania DGLP