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Ukraine Forest Fire Report 2010

1. Assessment of the Fire Situation in Ukraine

1.1 Number, area and types of forests and other vegetation affected by fire

Number and area of wildfires, including forest fires in Ukraine is characterized by steady tendency to increase during last 30 years. In particular, during the period 1980-1989 the number of fires varied from 792 up to 2 377 cases per year, during 1990-1999 this parameter has increased more than twice from 1 818 up to 6 743, and remained at a level 3 205-6 383 fires per year (2000-2010) (Table 1).

Complete and reliable fire statistics are available only for that part of Ukrainian forests that managed by forest enterprises of the State Agency of Forest Resources of Ukraine (SAFRU) – about 68% of total forested area. SAFRU is a largest permanent user of forests in the country. The main indicators of fire history for this part of forests are shown on Figure 1. The annual number of fires during last 30 years has been steadily increasing 2.6 times, while the average annual burned area reached a maximum in the 1990s: (a) 1980s: 1673 fires / 1176 ha; (b) 1990s: 3 917 fires / 3 962 ha; (c) 2000-2010: 4 367 fires / 2006 ha.

Numbers of fires and area burned started slightly increase since 1987, but after 1991 raised 3 to 5 times. In 1994, 1996 and 2007 the burned area reached a maximum of 8 to 13 800 ha per year. The number of fires started with 1993 varies from 4 to 6 800 cases per year. With 2.7 ha the average annual size of fires reached a maximum in 1996 and 2007, and in other years mostly did not exceed 1 ha. The low average area of a fire may reflect a high efficiency of detection and response by fire fighting forces, rapid localization of fires at its initial stage, and fast dispatch and arrival of engines and forces for suppression. On the other hand, a low average area of fires can be the result of underestimating area burned. It is common, that if areas of burned forests in certain forest enterprise are higher than averages on the region, this is often perceived by control bodies as unsatisfactory organization of fire management. Thus, while the fire statistical data delivered may reflect correct number of fire occurrences but understate the real extent of fires.

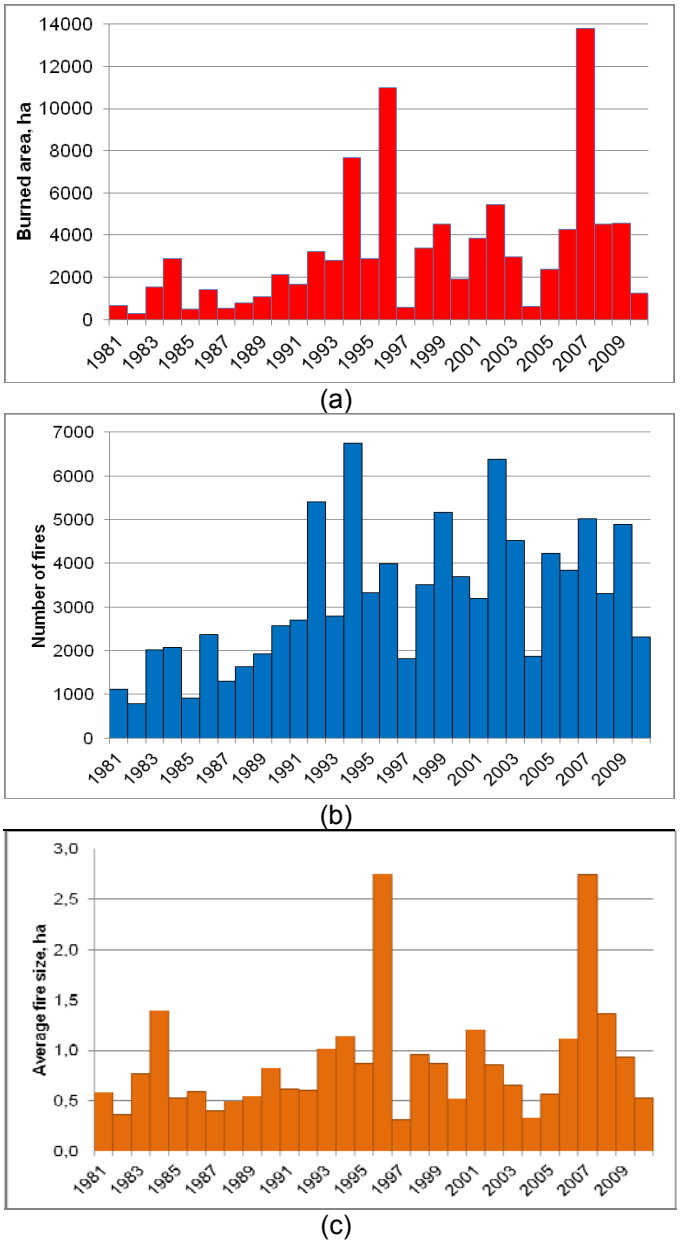

Figure 1. Total area burned (a), number of fires (b) and average fire size (c) in forests of State Agency of Forest Resources of Ukraine, which manages 68% of the forests of the country, during the period 1981 to 2010.

Such peculiarities of national statistical data reduce the efficiency of the analysis, especially concerning definition of the centers of burning, and also do not allow estimating precisely the real needs for technical and financial support of fire management in certain region. The frequency of fires in Ukraine for last 30 years reached 0.5 per 1 000 ha of forests. This is close to the same indicator for neighboring countries of the East Europe.

Table 1. Total area burned, number of forest fires and area of area of dead forests (due to forest fires) in Ukraine during the period 1981-2010. Source: State Agency of Statistics of Ukraine.

Indicators	1990	1995	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of fires	2 714	3 758	3 696	6 383	4 527	1 876	4 223	3 842	6 100	4 042	7 036	1 041
Burned area (ha)	2 400	3 500	1 600	5 000	2 800	600	2 300	4 300	13 800	5 500	6 315	10 600
Area of dead forests due to fires (ha)	1 157	2 031	696	2 913	2 087	1 051	1 437	1 864	10 955	3 819	2 727	4 500

Nationwide average indices of fires do not reflect the acuteness of the problem in regions of the country, which are very different by climate. Among the five natural-climatic zones allocated on the territory of Ukraine, two - are mountainous (the Ukrainian Carpathians and the Crimea), and three - are the flat terrain (the Ukrainian forest zone in the north of the country – Polissia), forest-steppe and steppe zones.

Within the last three zones east and west sub-zones are allocated, which differ essentially by climate features. The majority of fires occur in Scotch pine (*Pinus sylvestris* L.) forests, and to a lesser extent in spruce, fir or larch forests. Scotch pine forests are mainly semi-natural forests (planted) across all over the Ukraine: as a massive forests in the North of the country (the Ukrainian Polissia), and as a fragmented forests along the largest rivers stretching from the North to the South. Considerable parts of those Scotch pine forests grow outside of their natural habitats. More than half of the pine forests in Ukraine are artificially planted monocultures. They are currently in the young- to middle-aged stages and thus characterized by highest wildfire hazard.

Together with increase of number and area of fires during last decades, the share of crown fires areas also increased. In 1980s the share of crown fires area was less than 40% of all areas affected by fires. Since the 1990s this share has increased to 45-55 %, trend reflecting an increase of fire intensity and severity. Abovementioned razing of crown fires is particularly high in the South of Ukraine. In Kherson Oblast the share of crown fires during the last 26 years exceeded nationwide averages of Ukraine by 1.5-2 times (Figure 2). This could be explained by higher natural fire hazard of Scotch pine plantations and also by unfavorable fire weather in the South. In the long run, in conditions of expected of climate drying of the region due to global climate change, there is a high probability of increase of fires in the south of Ukraine. This requires prioritizing of activities for improvement of fire management capabilities in the region.

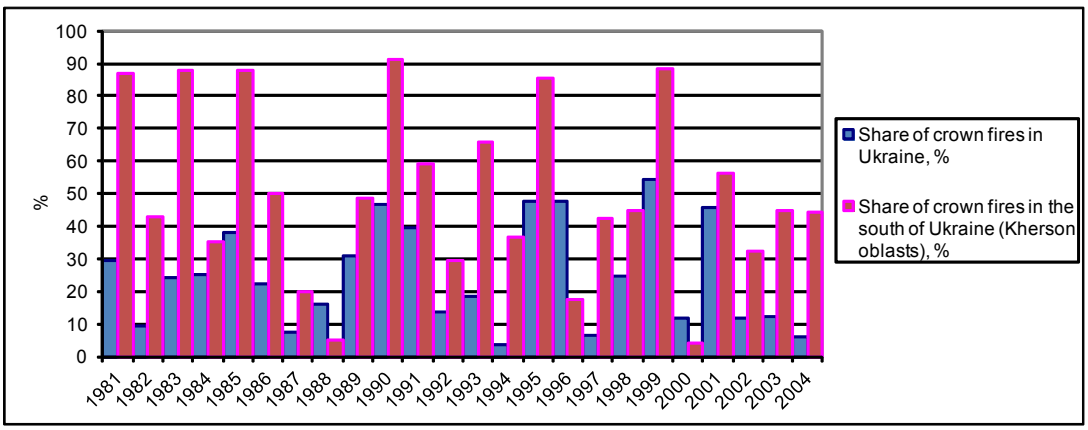

Figure 2. Share of crown fires in total amount of fires in Ukraine as a whole and in the south of the country (Kherson oblast) (%).

Quality of forest management, including fire management, essentially depends on ministerial subordination of forests. In Ukraine the majority of forests are in a state ownership (more 97%), and forests managed by more than 50 so-called “permanent users”: state committees, ministries and others, which are responsible for forest and fire management organization in their forests. The overall control of forest management (legislation development, implementation of rules etc.) of all permanent users is under the responsibility of the State Agency of Forest Resources of Ukraine, which is also largest permanent user and operates on 68% of Ukrainian forests. Forests belong to State Agency of Forest Resources of Ukraine are considered as the best with regards to quality and productivity, and fire management. Fire occurrence here is lower than in forests of other permanent users where there are fewer resources designated on fire management (Figure 3).

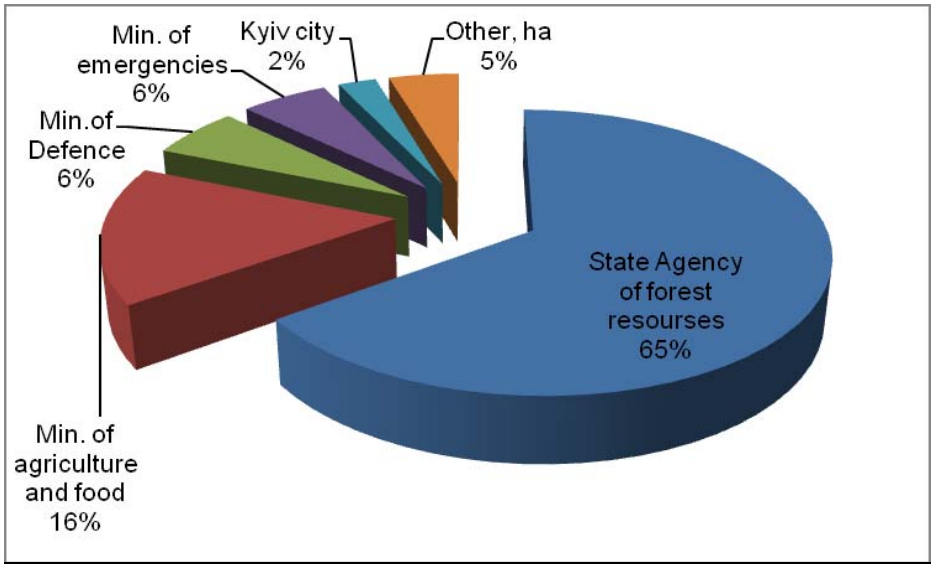

Figure 3. Distribution of burned area in forests by main permanent users in Ukraine (%)

In comparison with other users the forest enterprises of State Agency of Forest Resources of Ukraine have better fire management organization, better trained fire personal, more human resources and more developed capacity for fighting fires. However, in some years, catastrophic fires occurred, e.g., in 2007, when there were two large fires occurs in Kherson oblast and Crimea peninsula with a total area burned of about 9 000 ha – an area that three times larger than the long-term annual averages nationwide.

If the burned area depends mainly on detection and efficiency of fire forces response, number of fires reflects specificity level of anthropogenic impact on forest. Number of fires corresponds with total area of forests of certain permanent user except of Kiev city – the largest city of Ukraine, where presence of people in nearby forests and, accordingly, ignition sources are the highest.

In geographical aspect, the highest occurrence of wildfires is in the southern and southeastern parts of the country, which are characterized by a predominantly dry climate, periodic sand storms in spring and summer, when evaporation exceeds precipitation. Low productivity of Scotch pine forests in the south, the formation of gaps due to dying off of groups of trees, a high intensity of differentiation of trees inside of forest stands often create favorable fuel structures for development of crown fires. This is typical for the southern and southeastern regions, e.g. Lugansk, Kherson, and Kharkiv oblasts, and Crimea (Figure 4).

In 2007 69% of all crown fires in Ukraine occurred in the steppe zone. In Kherson significant afforestations of Scotch and Pallasiana pine (*Pinus pallasiana* D. Don) had been established on large sandy areas after the Second World War; 9% of fires occurred in Crimean peninsula and 3% - 6% in Lugansk, Donetsk and Dnipropetrovsk oblasts. All together in the steppe zone and in Crimea most part of the crown fires occurred in 2007 – 99%. Nevertheless, in other years, large crown fires happened also in the North, e.g. in Polissia about 3 000 ha in Volyn Oblast in 2006, or about 17 000 ha in the Chernobyl Exclusion Zone in 1992.

A better statistical picture of forest fires in 2007 can be developed by analyzing the data within the natural-climatic zones of Ukraine. In 2007 the highest number of all kind of fires happened also in the South and South-East of Ukraine: 56% of all fires in Ukraine burned in the steppe zone, 25% in the Central-Eastern Forest-and-Steppe (Table 2).

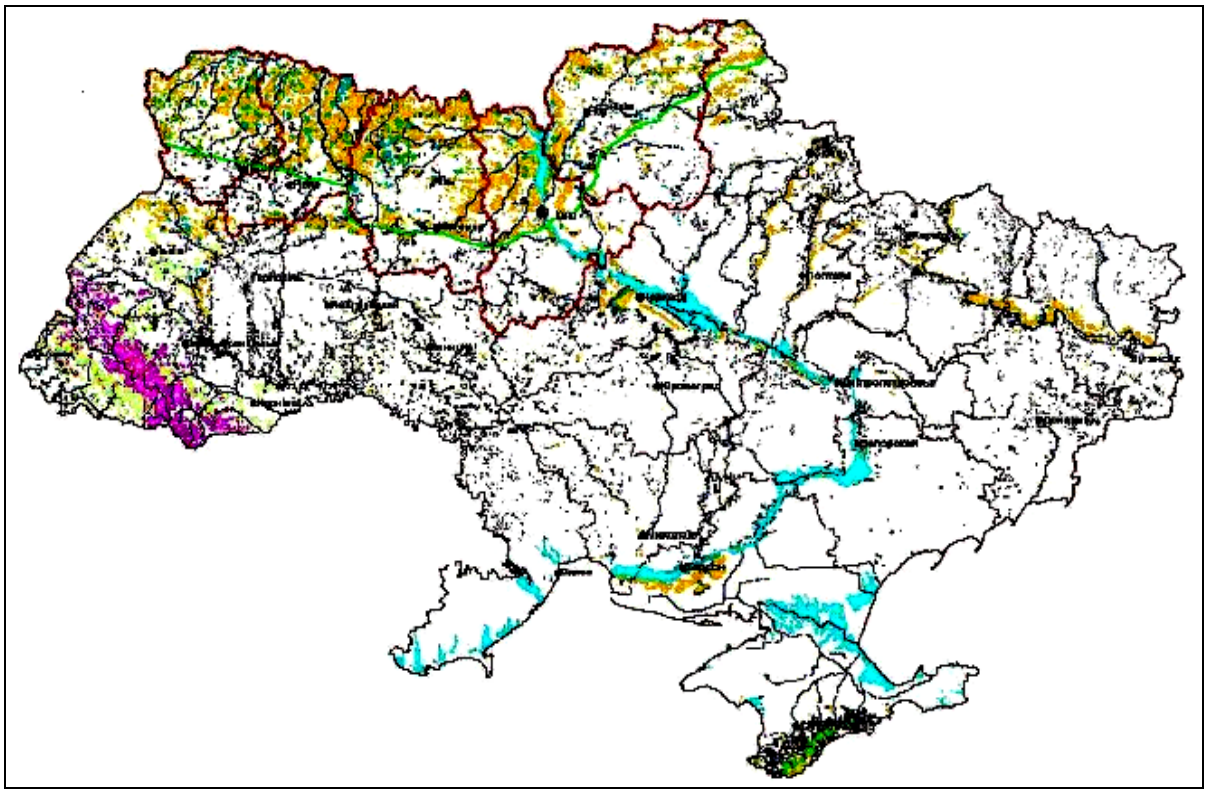

Figure 4. Most fire prone forests of Ukraine are Scotch pine forests (orange color) situated in the South along the large rivers, on Crimea peninsula and in the north of the country (Polissia).

Table 2. Number of fires and burned area in different natural climatic zones of Ukraine in 2007

Region	Number of fires	Burned area, (ha)	Area of crown fires, (ha)	Average area of fire (ha)
Steppe	3 434	11 494	7 183	3.3
Crimea	353	1 553	303	4.4
Central-Eastern forest-steppe zone	1 514	540	105	0.4
Forest zone (Polissia)	720	199	2	0.3
Carpathians	16	8	1	0.5
Western forest-steppe	63	7	0	0.1

Long-term less fires occurred in the North – in the Polissia zone (12%) and in Crimea (6%). In the Western regions, such as Carpathians and the western forest-steppe zone, the number of fires did not exceed 1% of the total. In these regions the occurrence of fires is dependent on population density rather than on climatic conditions. Figure 5 shows the distribution of fire occurrence in 2007 by natural zones.

Due to two large fires in Crimea and Kherson in 2007, the total area of fires in these two regions reached 95% of the total area burned in Ukraine, and the average area of fire here is also highest – 4.9 and 3.7 ha accordingly, in comparison with the average of other regions (0.1-0.6 ha).

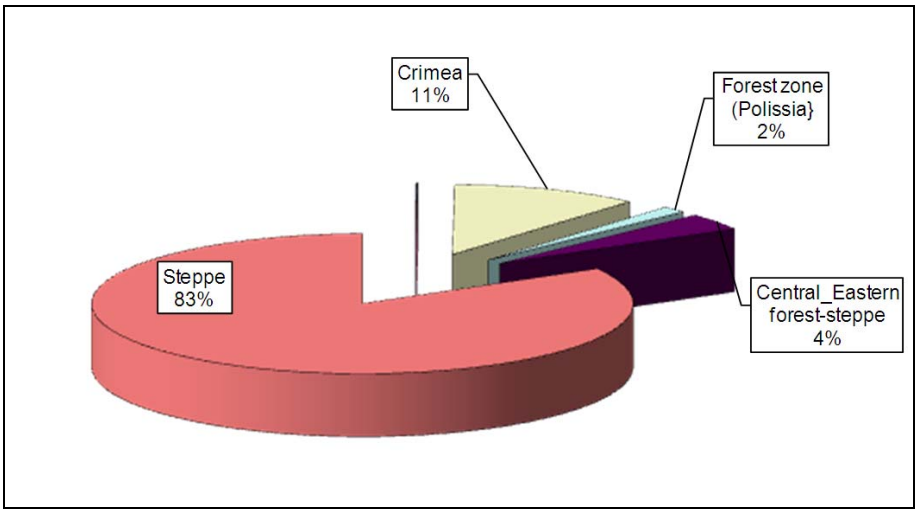

Figure 5. Distribution of fire-affected areas in different natural climatic zones of Ukraine in 2007.

1.2 Reasons or underlying causes of human-ignited fires

In 2007 in the forests under the jurisdiction of the State Agency of Forest Resources a total of 5 024 fires were registered. 98 % were caused by people. The majority of fires are caused by forest visitors (up to 93-96% in some years), up to 4 % are caused by sparks from vehicles, up to 3% by agricultural burning, and up to 1% started by different economic activities on forest lands (geology, electric and natural gas grids, forest harvesting, etc.). Dry lightning is also sometimes mentioned among the causes of fire. However, their share usually does not exceed 1%. The majority of forest fires arise on distances up to 100-200 meters from local, regional or national roads. The share of such fires in total constantly increases.

A vivid example of negative consequences from human ignition is the catastrophic fire in Crimea around famous resort area near Yalta and Alupka cities in August 2007. The fire was ignited by a tourist who lost his way and tried to attract attention of a rescue helicopter establishing small camp fire on a rock outcrop. After the rescue team detected and rescued the tourist, he dumped the glowing remains of the camp fire down from the rock to a Crimean Pine chaparral site. The resulting fire burned 973 ha, including crown fires on an area of 274 ha, and destroyed a unique forest and caused high economic losses.

Agricultural burning is the second most widespread cause of forest fires. In general, accordingly to analysis of satellite images, 70% of the total amount of wildfires in Ukraine is agricultural burnings and grassland fires. Often agricultural enterprises conduct burnings illegally on agricultural fields after harvesting of agricultural crops, or peasants burn the vegetative residuals on small gardens. If fire prevention measures, such as fire breaks and barriers between borders of field and forest do not stop the fire spread, fires enter forests and may result in large fires.

Villagers very often are not aware of or do not follow the ban of burning vegetation residues on lands in contaminated by radionuclide zones. Small land owners use burning for cleaning up their fields and for soil fertilizing. Often forest fires caused by villagers who are still living in the Chernobyl Exclusion Zone. Fires are also caused by agencies and enterprises working inside or nearby forests: gas pipelines, power lines, and other constructions in forest lands.

The prevention of people-caused fires is a key issue to reduce wildfires in Ukraine. Currently there is not enough attention paid by the authorities to promote fire prevention efforts.[1]

[1] Editorial note: See contributions in this volume of IFFN on the Advanced Seminar “Wildfires and Human Security: Fire Management on Terrain Contaminated by Radioactivity, Unexploded Ordnance (UXO) and Land Mines” and the “Chernobyl Resolution on Wildfires and Human Security”

1.3 Extreme fires in 2007

In 2007 two extreme forest fires occurred in Ukraine: In Kherson Oblast (20-23 August 2007) and on the South coast of the Crimea peninsula (24-28 August 2007). These fires caused significant public resonance, attracted big attention of the mass-media and the Ukrainian government. The Minister of Emergencies of Ukraine was in charge personally for coordinating the suppression of both fires. The President of Ukraine personally participated in the suppression of the Kherson fire. Such resonance gives the certain hopes for greater attention of the Government to the problem of forest fires and on the need to take strategic decisions for improving fire management capacity.

The Golopristansliy (Kherson) fire: This was the largest forest fire in Ukraine for the last ten years. For suppression of this extreme fire the forces and equipment of forest enterprises, Special Fire Forces of the Ministry of Emergencies, supported by aviation means and the Army forces worked hand in hand. The local authorities unfortunately did not involve local reserves (people and equipment from other enterprises of the Oblast). In total, 900 forest service peoples from enterprises of State Agency of Forest Resources of Ukraine participated in the fire suppression. The total area of forests burned was 7 300 ha, including a crown fires affecting 6 200 ha. The tentative damage was 79 million UA hryvnas ($US 15.8 million).

The Crimean – Jalta - Alupka fire: According to the conclusions of the Forest Fire Working Group of the Republican Committee of Forestry and Game management of the Autonomous Republic of Crimea (RCFGM) the total area burned between 24 and 28 August 2007 reached about 900 ha, including 250 ha of crown fires. Up to 400 fire fighters of the RCFGM, 19 fire trucks from forest enterprises, 479 fire fighters and 50 fire trucks of the Ministry of Emergency of Ukraine, 89 fire fighters and 12 fire trucks of other fire departments and also three helicopters and one fixed-wing airplane of the Ministry of Emergencies of Ukraine took part in fire suppression. The fire caused incidentally by a tourist who lost his way in mountains and ignited a signal fire on top of a rock so that he could be seen by the rescue service. The mobilization of forces was initiated in accordance with the mobilization plan of Yalta Mountain Forest Natural Reserve (YMFNR) and the instructions on interaction with forces of the Ministry of Emergencies of Ukraine in Autonomous Republic Crimea in the case of large forest fire suppression. The fire was difficult to control and could not be stopped in its early stage of development because it started in an inaccessible location in the mountains, and was driven by a strong gusty wind with speed up to 20 meters per second and with air temperature over 30°C. The fire developed to a crown fire storm and sparks lifted by the strong winds caused new centers of fire (spot fires). After the intervention of the Ukrainian State Base of Aerial Forest Fire Fighting the fire has been put out after five days.

1.4 Fire Damages in 2007 (social, economic and environmental)

In 2007 the forest fires did not result in direct negative social losses, e.g., losses of houses or infrastructures. This is because the forest lands are used exclusively by forestry operations and are not used for building construction or other economic activities. The ratio of economic and ecological losses owing to fires is predetermined by natural zone where they happened. In the North of the country and in the Central regions (Carpathians, Polissia, forest and steppe regions) where the share of forest lands is relative high (10-25%), the main losses consisted in costs of lost wood production and in ecosystem damages.

However, the ecological damages from extreme fires in the South of the country are very significant, because the burned forests represent unique natural habitats. These forest ecosystems were formed during decades and, probably, decades will be necessary for their restoration. Immediately after the large fires in the Tsurupinsk and Golopristan *Rayons* of the Kherson *Oblast* in August, 2007, the government of Ukraine allocated to State Agency of Forest Resources of Ukraine 14.3 million hryvnas ($US 2.9 million) from the reserve fund of the state budget for overcoming the consequences of forest fires and to restore the burned forests (Figure 6).

1.5 Fire prevention measures in 2007

Fire-prevention measures are an essential part of the fire management system in Ukraine. Planning and implementation of pro-active actions is responsibility of permanent forest users. All preventive

actions include precautionary measures (legislation, fire propaganda, administrative measures) and technical measures to reduce wildfire hazard and limit the spread of fires. In the beginning of the fire season (in April) the State Agency of Forest Resources of Ukraine and the forest enterprises take preparatory measures (Table 3). These include the regulation of public access to forests at times of increased or high fire danger at local and regional levels, the development and coordination of regional mobilization plans for better preparedness and fast response to large fires by different fire forces.

Technical prevention measures include creation and maintenance of fire breaks, maintenance of fire suppression equipment, communication means, and fire fighter training. For example, before the extreme fire season of 2007, between 2002 and 2006 annually 420-500 km of 30-m fire barriers and up to 47 000 km of fire breaks (width: 1.4 m) were created. Fire breaks maintenance took place on 240 000-250 000 km. Up to 3 838 hours of aviation patrolling in high-risk regions were flown. In recreational zones networks of camp fire sites for tourists were prepared. Before the 2007 fire season annual costs for nationwide fire prevention measures only for the forest enterprises of the State Agency of Forest Resources of Ukraine (68% of forests) reached 22-25 millions UA Hryvna ($US 2.7 to 3.1 million).

Table 3. Nationwide fire prevention measures in Ukraine before the catastrophic fires of 2007

Indicators	2002	2003	2004	2005	2006
Creation of fire barriers (30-m) (x 1000 km)	0.42	0.44	0.45	0.46	0.50
Creation of fire breaks (1.4 m) (x 1000 km)	45.2	46.2	46.6	47.3	46.9
Care for fire breaks (x 1000 km)	240.1	245.5	247.7	251.4	249.4
Forest protection by aviation (flight hours)	2637	2957	3183	3613	3838

Figure 6. Burned Scotch pine forest in Kherson after an extreme crown fire in August 2007. The destruction of forests by fire increases the occurrence of sand storms that were typical for the region 50-100 years ago. Photo: Ministry of Emergency of Ukraine.

When fire weather danger increases to high and extreme levels, local forest authorities make statements on local radio stations, TV channels and other media to alert population from visiting forest. Nevertheless it is necessary to note, that currently public awareness, especially in densely populated areas, is very much limited. This direction of fire prevention requires improvement of content and methods, including active use of social network, seminars, education in school etc. Local population usually does not realize the ecological values of forests and very often unintentionally causes fires, especially during traditional holidays in spring and summer when many people visited

forests for rest. It is also clear need to improve quality of educational work at the national level – in national newspapers, radio and TV.

Current Ukrainian forestry legislation obligatory require from local forest enterprises to clean forests from fuel (dead wood) in order to keep forests in a satisfactory sanitary and low fire-hazard condition. The high density of forest roads and high population density in most part of the country helps with early detection and localization of fires, fast arrival of firefighting forces. Unfortunately, the system of preventive measures, which is quite effective in common climatic conditions, does not work well at approach of such critical conditions as a long drought and a strong wind.

1.6 Response to fires in 2007

Kherson oblast fire

Day 1. On 20 August 2007 at 11:30h a forest fire was detected by foresters in Golopristanskiy forest hunting enterprise initially on area of 0.03 ha in quarters 67 and 68. Immediately after this information was transferred to person on duty, 30 firemen, 10 fire engines and three tractors were dispatched to the fire. Due to strong impulses of wind and heated air in the area the fire spread in all directions. Fine burning branches and cones were scattered by the wind over distances of 150-300 meters (spot fires). Additional forces of the State Agency of Forest Resources of Ukraine and the Ministry of Emergency were requested. At 15:35h 24 fire engines, eight tractors and 90 persons were mobilized additionally. The resources provided by Kherson Oblast fire administration included 65 firemen, 19 fire trucks, 8 tractors and by Ministry of Emergencies – 25 firemen and five fire engines (Figure 7).

Figure 7. Fire fighting by forest enterprise personnel in Kherson oblast, August 2007. Photo: Official website of the President of Ukraine.

The area of a fire soon reached 1000 ha. The supervising of suppression took by the vice-head of the State Agency of Forest Resources of Ukraine. At 22:00h on 20 of August the State Agency of Forest Resources of Ukraine received permission from Government to mobilize aerial firefighting services of the Kiev-based company *Aviant* and a letter of guarantee that payment for services of an AN-32 airplane will be covered. Since Kherson airport was out of operations the plane arrived at the first fire only in the morning of 21 August 2007. On 20 August at 16:40h ground fire suppression started in Tsurupinsk area nearby the local forest game management enterprise. The Minister of Emergencies of Ukraine and the President of Ukraine arrived at the command centre of fire (Figure 8).

Figure 8. The Minister of Emergencies of Ukraine reports to the President of Ukraine the Kherson fire operation details (Kherson, 21 August 2007). Photo: Ministry of Emergencies of Ukraine.

Day 2. On 21 August 2007 at 06:00h the Head of State Agency of Forest Resources of Ukraine arrived to coordinate fire fighting personnel assigned from the State Agency of Forest Resources of Ukraine reserve. In addition 10 000 liters of gasoline and 3 000 liters of diesel fuel were allocated for firefighting purposes (Figure 9).

Figure 9. Command Centre of Kherson fire suppression. Kherson oblast, August 2007. Photo: Ministry of Emergency of Ukraine.

Additional finances for the firefighting operations total 680 000 UA Hryvnas ($US 136 000) were provided by Kherson oblast forestry administration. After redistribution of resources from Northern and Carpathian regions of the country, expenses for catering food for the firefighters of 100 000 hryvnas ($US 20 000) were provided as well (Figure 10).

Figure 10. Catering food for the firefighters during the Kherson fire operations on 23 August 2007. Photo: Ministry of Emergencies of Ukraine.

Day 3-4. The head of the State Agency of Forest Resources of Ukraine directed 13 special fire brigades with a total of 383 persons equipped for fire suppression and communication, field equipment for spending nights, food supplies and 15 fire engines to a fire from forest enterprises of other regions: the Republican Committee of Autonomous Republic Crimea, oblast administrations (Dnipropetrovsk, Mykolaiv, Odessa, Kharkiv, Zaporozhye, Zhitomir, Rivne, Cherkassy, Chernigov, Sumy, Kiev, Poltava). Besides fire fighters, 210 foresters from Kherson area were involved. Fire operation in Golopristan and neighbor Tsurupinsk forest hunting enterprises involved 118 fire engines, including 42 provided by the State Agency of Forest Resources of Ukraine, 22 forest tractors, 40 other technical equipment units.

Day 5. Since 24 August stage-by-stage replacement of staff of fire brigades was organized as operating conditions were extremely complex. On 24 August a strong wind was blowing for about 16 hours and in several places several crown fires started simultaneously. Additionally 28 fire fighters from Vinnitsa and 25 fire fighters from Khmelnitskiy regional forest administrations were allocated to fire suppression.

Yalta mountain forest nature reserve fire

The extreme fire on Crimea Mountains which occurred on 24 August 2007 can serve as a typical example of effective interagency response and interaction by fire forces to address a large fire. Below the description of stages of suppression of fire is given based on the official Report of the Governmental Commission [1].

Day 1. 24 August, 2007, 19:40: Person on duty of the Yalta Forest Mountain Natural Reserve (YFMNR) received the information that four fires were burning on forests high in mountains in quarters N11 of Alupka forest ranger district. The person on duty transferred the information to the director of the Yalta Forest Mountain Natural Reserve and to the Yalta Department of the Ministry of Emergency. At 20:20h the director of the YFMNR informed that fire is developed in an inaccessible mountain area. This information was transmitted to the Republican Committee of Forestry and Game Management of the Autonomous Republic Crimea (RCFGM). As a response, a fire engine and three firemen from Alupka forest range were immediately dispatched to the location of the fire. At 21:50h the firefighters constructed fire lines and requested further assistance. The strong wind continued and the fire size extended. Additional fire fighters and trucks were directed to the fire. At 22:00h two more engines and 14 foresters from YFMNR joined fire suppression. The burned area reached about 0.3 ha. The Director of YFMNR took command of fire suppression. At 22:20h the first Vice-Head of RCFGM arrived at the scene. At 23:55h additional 22 fire fighters from the Yalta Department of

Emergency arrived. Wind squalls (gusts) reached 20 meters per second, and the fire spread to inaccessible places (Figure 11, 12).

Figure 11. A fireman from the Yalta Forest Natural Reserve creates a fuel break during the large fire in Crimea, August, 2007. Photo: Maxim Svolynskiy.

Figure 12. Large fire burning near Yalta city, Crimea, August 2007. Photo: Maxim Svolynsliy.

Day 2.* 25 *August 2007, 06:30h: A command centre for fire suppression was established with the arrival of the Head of Republican Committee of Emergencies in Autonomous Republic of Crimea, Head and First Vice-head of RCFGM, and the director of JFMNR. Additional forces were dispatched to the fire perimeters. At 07:00h the strong winds continued and the fire moved towards Yalta city.

Additional help from the Ministry of Emergency was requested. At 07:05h an observer reported that the fire continued to extend. New forces were dispatched. At 12:15h an MI-2 helicopter assessed the fires situation from the air and reported that burned area at that time exceeded 5 ha, and also observed cases of transition of surface fires to crown fires.

Ground forces and technical means take all measures to control the fire front. At 20:00h the fire continues to extend, it was impossible to keep fire inside of the existed for the moment perimeter, it was difficult to determine the area affected because of strong smoke. The wind constantly changes direction and amplifies. With approaching darkness crown fires developed and fire fighters were dislocated from the dangerous spots.

Day 3. 26 August 2007, 03:20h: Situation in the fire becomes complicated because of gale-force winds. The uncontrollable situation demanded to request additional fire forces from forest enterprises of other oblasts. Supervision of fire suppression took the Vice-Head of Council of Ministries of Autonomous Republic Crimea. During the day, Head of the Supreme Council of Crimea, Chairman of Council of Ministries of Crimea and Minister of Emergencies of Ukraine arrived and took part in organizing fire suppression. On the evening the fire front development was stopped, but some fire spots continue flared up inside the fire perimeter. With the change of wind direction the fire moved towards Alupka city and tourist cable system to Aj-Petri Mountain.

Day 4. 27 August 2007: For preventing damaging by fire the Aj-Petri tourist cable system and because of inaccessibility of the terrain for ground fire forces, the Ministry of Emergencies of Ukraine called aircraft An-32 for aviation support of fire suppression (Figure13). Information on the escalating fire is directed to Office of the Public Prosecutor of the Autonomous Republic Crimea.

Day 5. 28 August 2007, 10:30h: The fire was stopped on the external perimeters, fires burning inside the perimeters were controlled. Suppression was finalized.

Figure 13. Aerial firefighting operation by AN-32 aircraft during the fire suppression near Yalta and Alupka cities, Crimea, August 2007. Note the potential threats of aerial firefighting from power lines and mountains. Photo: Maxim Svolynskiy

2. National cooperation in responding to the 2007 fires (inter-agency, involvement of civil society)

The experience of the extreme wildfires of 2007 revealed that the main problem of controlling large fires is insufficient due to ineffective interaction of forestry enterprises fire forces, which are responsible for forest fire management, with regional and national forces of the Ministry of Emergencies of Ukraine and military forces. Lessons learned from the 2007 fires showed that forces and means of fire suppression of the forest enterprises are not in a position to effectively suppress

fires during critical weather conditions and on large areas of fires. In case of future critical fire weather conditions similar to 2007, only joint fast response of fire forces of forest enterprises and the Ministry of Emergency, and in some cases forces of the army, will allow prevent the development of fires at early stages and will not allow its development in an extreme situation.

In case of the Kherson fire, the main problem was the rather late reaction of the forces of the Ministry of Emergency, which is usually better equipped and prepared for fighting extreme fires. Regional forces of the Ministry of Emergency waited until the fire would be localized by the state forestry enterprise forces. Limitation of resources for rapid initial forest fire suppression, and first of all, lack of fuel for wide scale and fast response of ground forces and aerial operations, resulted in a delay of joint reinforcements at a time when the fire became practically uncontrollable. Finally, only the intervention by aircraft changed the situation to the better. Nevertheless the general expenses for aerial firefighting considerably exceeded those that were necessary for early coordinated response. Another reason of the failure of rapid fire suppression was the insufficient involvement of local authorities. The local authorities did not effectively assist by mobilizing additional necessary human and material resources from local to regional levels. Local rural communities of generally low living standards did not have an opportunity to actively assist in fire fighting.

The mass-media played a positive role. Wide informational coverage of the fire suppression operations, participation of leaders of Ministries and of the President have played a positive role in mobilization of reserve resources of the government for successful suppression. The activities even continued after the fires: The President of Ukraine visited the place of fire three month later after fire in November 2007 to participate in the restoration of burned forests (Figure 14).

Figure 14. The President of Ukraine, Mr. Victor Yuschenko, participated in restoration works of burned forests, autumn 2007, Kherson Oblast. Photo: Official website of the President of Ukraine[2]

However, in evaluating and judging the large fires of 2007 mass media and NGOs widely criticized the insufficient performance of the forest enterprises. Nevertheless, in most cases the low efficiency of the fire forces of the forest enterprises was not related to organizational weaknesses, but to unsatisfactory material supply, absence of reserves, and the moral and physical deterioration of human and material fire fighting resources. Thus, the interaction of different organizations and departments in the preparedness and suppression of wildfires must be improved radically.

[2] http://www.president.gov.ua

3. International Cooperation

The international meeting on "Reducing Risk of Disaster from Catastrophic Wildfires in the Chornobyl Irradiated Forests" was held in the National Agricultural University, Kiev, Ukraine, 26-27 July 2007.[3] The meeting was organized by Yale University, School of Forestry and Environmental Studies, Global Institute of Sustainable Forestry, and by the National Agricultural University of Ukraine. The meeting was sponsored by the Chopivsky Family Foundation and held under the auspices of the United Nations International Strategy for Disaster Reduction (UNISDR), the Global Fire Monitoring Center (GFMC), and the Government of Ukraine, with participation of the Council of Europe (CoE), the Organization for Security and Cooperation in Europe (OSCE), the World Conservation Union (IUCN), the Ministry of Ukraine of Emergencies and Chornobyl Affairs, and the State Forestry Committee of Ukraine. The meeting brought together more than 80 participants from Belgium, Belarus, France, Germany, Spain, Switzerland, Russia, Ukraine, and USA, representing government and international organizations [3, 4].

Participants at the meeting were presented with a comprehensive picture of the current wildfire risk situation in the forest still contaminated by radioactive fallout from the 1986 Chernobyl nuclear disaster. Concerns included fire risk assessment ability, potential effectiveness of the currently existing forest fire suppression systems, potential of proactive forest thinning to reduce fuel hazard, fire detection abilities, and technical and human resources allocated to fire management. The ecological, social, and economic consequences of potential catastrophic radioactive wildfires were discussed. The critical components of the problem were specified and fire risk forecasts were demonstrated. A strategic plan for disaster risk reduction with preliminary cost estimates was presented, entitled "First Draft of Proposed Implementation Plan and Budget for Reducing the Risk to Kiev and other Areas of Forest Fires with Radioactive Smoke from Forests impacted by the 1986 Chornobyl Nuclear Disaster". It has been revised and edited.

The 2007 meeting was followed by the "Advanced Seminar "Wildfires and Human Security: Fire Management on Terrain Contaminated by Radioactivity, Unexploded Ordnance (UXO) and Land Mines". This seminar addressed consequences of wildfires and fire management on contaminated terrain and was conducted in Kiev and Chornobyl, Ukraine, 6-8 October 2009, by the Global Fire Monitoring Center (GFMC) in the frame of the activities of the Council of Europe (CoE) and the joint project "Enhancing National Capacity on Fire Management and Risk Reduction in the South Caucasus" (Environment and Security Initiative [ENVSEC]), the UNISDR Regional Southeast Europe / Caucasus and Central Asia Wildland Fire Networks and the UNECE / FAO Team of Specialists on Forest Fire.[4] The results of the meeting are provided in detail in this issue, including the "Chernobyl Resolution on Wildfires and Human Security: Challenges and Priorities for Action to address Problems of Wildfires burning on Terrain Contaminated by Radioactivity, Unexploded Ordnance (UXO) and Land Mines" [5].[5]

Providing and receiving assistance

In 2007 the Ukrainian fire services provided assistance to suppress forest fires in Georgia. A helicopter was sent to fight fires in a natural forest reserve near Tbilisi. Within Ukraine international cooperation in fire management is not yet developed sufficiently. Therefore any requests for assistance to other countries were not given and help was not received.

4. Analysis and recommendations

The response to the fires in the North and the Central regions of Ukraine (forest zone and forest-steppe one) in 2007 was limited by insufficient coordination and interaction of the fire services of different agencies during critical weather conditions in the South and South-East of the country. This caused significant damages and financial losses due to large fires. The complexity of the 2007 fire season in Ukraine, the most adverse for the last years, is demanding to take action for reducing the

[3] http://www.fire.uni-freiburg.de/GlobalNetworks/SEEurope/SEEurope_1_radio.html
[4] http://www.fire.uni-freiburg.de/intro/team.html
[5] Editorial note: See contributions in this volume of IFFN on the Advanced Seminar "Wildfires and Human Security: Fire Management on Terrain Contaminated by Radioactivity, Unexploded Ordnance (UXO) and Land Mines" and the "Chernobyl Resolution on Wildfires and Human Security"

probability of recurrence of extreme fires in the future. Several working groups formulated the following conclusions and recommendations:

- Analyze the causes of forest fires and develop legal provisions to regulate responsibilities and legal sanctions.
- Provide modern technical means for forest fire stations.
- Increase the efficiency of response to fires by reducing the time lag between receiving information on a detected fire and the beginning of suppression.
- Provide inventory of fire roads, develop plans on reconstruction / maintenance of existing fire roads and creation new ones.
- Increase the number of fire ponds located in forests according to normative requirements to provide sustainable supply of water during suppression.
- Prepare a request to the State Agency of Forest Resources of Ukraine on additional financing from the State budget of Ukraine for increase flight time of aviation patrolling of most fire-endangered territories, and air patrols during high fire danger seasons with MI-8 helicopters fitted with helibuckets.
- Install two additional transmitters for increase of operating radio communication coverage.

In addition to the recommendations, which have been drafted by working groups, it is necessary to consider following recommendations developed by Ukrainian forest fire Focal Point:

- In connection with increase in frequency and intensity of extreme fires, enhance efforts in improvement of the national fire policy in the field of forecasting and prevention that are necessary for reducing of extreme situations in a forestry and, first of all, extreme forest fires. A fire policy should include both a strategy at national level, and mechanisms of interagency and international interaction in case of extreme fires;
- Initiate an inventory and mapping of fire-prone forests of Ukraine and with the purpose of allocation of potential critical territories and to provide decision support in case of extreme fire weather and large fire situations;
- Provide finances for aviation patrols and fast initial suppression response.
- Develop an advanced system of fire-prevention measures for the high-risk territories coordinated with local authorities, and also to create decision-support systems on the basis of GIS, satellite-derived information and models of fire behavior and forecasting.
- Develop a corresponding system for dispatching suppression forces;
- Provide appropriate fire suppression equipment, including, new off-road fire engines, water pumps, backpack pumps, communication means, and fuel reserves for emergency situations;
- Improve rules of mobilization of forces, inter-agency cooperation and communication for fire suppression operations;
- Organize advanced fire management training with participation of international instructors and neighboring countries aimed at improving the efficiency of inter-agency cooperation and international cooperation during fire emergencies.

References / Sources

[1] Report of the Government Commission about reasons and consequences of large forest fire in Yalta Forest Mountain Natural reserve, August 2007. Republican Committee of Forests and Game Management of the Autonomous Republic of Crimea, 2007, 20 p.

[2] Maksimenko, V. 2007. Will the forests burn? In: Forest and Hunting Magazine № 4, 10-11.

[3] Zibtsev, S. 2007. Global tendency of fire management. Notes from 4th Wildfire conference. In. Forest and Hunting Magazine № 2, 12-13.

[4] Popkov M., Savich Y. 2007. Will Chornobyl forests be in flames? Forest and Hunting Magazine № 5, 9-10.

[5] Goldammer, J.G., and S. Zibtsev (eds.) 2009. Advanced Seminar “Wildfires and Human Security: Fire Management on Terrain Contaminated by Radioactivity, Unexploded Ordnance (UXO) and Land Mines”, Kyiv / Chornobyl, Ukraine, 6-8 October 2009, Abstract Volume (this issue of IFFN, pp. 76-109).

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