Fire in Europe

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1. Hazard profile

The frequency and intensity of very large wildfires over the last ten years raises concern about the increased occurrence of 'megafires' worldwide. Devastating and almost uncontrollable fires like those, which have raged through Portugal, Spain and France in 2003, are a new type of megafire never encountered until recently. International experience is pointing to megafires becoming a common phenomenon in many parts of the world, driven in part by the consequences of global warming, i.e. the increasing occurrence extreme droughts, and by policies excluding the rational use of prescribed fire from areas to reduce those fuels that are determining the intensity and controllability of megafire fronts. As a general trend it can be observed that the wildfire problem worsened in the second half of the 20th century due to the abandonment of rural areas, the prolonged protection of forest lands and the growth of extensive wildland-urban interface areas. Notably in the countries bordering the Mediterranean Basin, fire is the main driver of vegetation degradation and destruction. As a consequence, the wildfire policies adopted by most European countries were focusing on fire exclusion regardless of the specific context. Besides the negative ecological effects of a general fire exclusion policy, successful fire suppression has lead to fuel accumulations among all vegetation types that are now bearing a high risk potential for catastrophic fire events. These, in turn, mainly shaped most policy-makers´ perception of fire as a disastrous force. The fires that devastated Portugal in 2003 or Galicia in the summer of 2006 are serving as good examples that processes aiming at inducing changes in wildfire policies or at adopting political measures are often an *ad hoc* reaction to the current situation, rather than a proactive measure to prevent an emergency situation and to reduce the difficulties and costs for mitigating the consequences of these extreme fires. The changing nature of these very large fires requires consideration of new national approaches to prevention and preparedness to help managing the risk to people, property and other values at risk, as well as national or environmental assets such as water and vegetation cover. Policies and practices may need to be revised and new research required to under-pin new directions.

New policies and practices must consider the history of land-use in Europe in which fire has been an important element in forestry, agriculture and pastoralism. The use of fire has contributed to shape landscape patterns of high ecological and cultural diversity, e.g. heathlands, open grasslands, meadows, and swidden (shifting) agriculture sites. In the Nordic countries historic natural fires caused by lightning and burning practises have also significantly influenced the composition and structure of forest ecosystems. The rapid socio-economic changes in the past four decades led also to a change of land-use systems and landscape patterns, resulting in elimination of traditional burning practises. New air quality standards and the generally prevailing opinion by the government administrations that fire would damage ecosystem stability and biodiversity, led to imposing of fire bans in most European countries. It is now becoming evident that the abandonment of traditional land-use methods have resulted in the elimination of disturbances, which have characteristically shaped many valuable landscape types and ecosystems. Changing paradigms in ecology and nature conservation currently lead to the reconsideration of fire-exclusion policies in certain sectors of nature conservation, forestry and landscape management.

2. Scientific background

2.1 The cultural and environmental dimension of vegetation fires

Europe is the continent with the third-largest population. Its demographic development and a long land-use history shaped a very high regional landscape diversity that is reflected by the complexity of socio-economic, cultural and ecological factors. However, since the second half of the 20th century Europe is facing dramatic land-use changes, especially the abandonment of agricultural lands and land-use practices on the one hand, and afforestation and reforestation activities fostered by conservation and environmental protection policies on the other hand. These changes are affecting also the fire regimes of Europe, which are predominantly anthropogenic with different specific regional impact. In the Northern and Central European countries traditional land-use practices over time have played a significant role in creating, maintaining, expanding or changing landscape components that now have high conservation value (Goldammer et al. 2007). The abandonment of traditional land-use fires led often to a loss of biodiversity and open landscape, whereas in the Mediterranean and Southeastern European countries the recent structural and demographic changes led to an increase of the fire hazard, resulting in about 300,000 to 500,000 ha of forests and other wooded land burnt every year in the region (for statistical details see: DG JRC 2006, Dimitrakopulos and Mitsopoulos 2006, Nikolov 2006).

Although the main reason for increased fire occurrence over the last decades is land-use change, climatic conditions play a very important role for fire occurrence and fire spread conditions. The fire-prone Mediterranean landscapes in Europe are likely to be affected by regional climate change that may exacerbate the current fire conditions. Recent predictions on climatic warning in the Mediterranean Basin indicate an increase in air temperature and a reduction in summer rainfall, resulting in a future increment in water deficit (Dimitrakopulos and Mitsopoulos 2006). These changes would lead to an increase in ignition probability and fire spread. Despite the lack of proper statistics on causes of wildfires in Europe, it can be assumed that by far most fires are started due to human activities (Varela 2005, Viegas 2005, Nagy 2005, Oliveira 2006).

Nevertheless, fire suppression measures have reached to reduce total annual area burned in relatively mild fire seasons (Xanthopoulos et al. 2006), but a latent potential for catastrophic fire events under adverse weather conditions reveals insufficient structural reforms rather than it reflects an increase of large fires driven by climate change, as could be seen in the case of Portugal (Viegas 2005, Oliveira 2006). Despite the great inter-annual variability, there is a significant increase of the annual area burned over the last decades (DG JRC 2006). This is, however, mainly a result of social and economic conflicts and tensions prevailing mainly at the interface between agricultural and forested lands. In addition, land-use policies and policy instruments led to an inappropriate use of fire, negligence, and very often to arson by the rural population or in peri-urban areas (Oliveira 2006). It is now generally being recognized that the rural exodus, the lack of active management in agricultural and forested lands, the absence of efficient prevention policies plus an exaggerated emphasis put on suppression policies have led to the accumulation of flammable vegetation, resulting in vertical and horizontal fuel continuity in most countries of Mediterranean Europe.

In Europe wildland fire issues are mainly addressed by forest policies. This reflects a poor understanding of fire as a cross-sectoral problem. Wildland fire issues are influenced by other sectors and public policies that need to be considered when analysing the situation and developing relevant policy instruments aimed at reducing wildfire risk and hazard. Among them are spatial planning, rural development and agricultural policies, but also energy, environmental or civil protection policies, to cite some examples (Montiel et al. 2007). The integration of these sectors and policies into fire management plans and strategies is essential on all organizational levels in order to achieve the necessary structural changes (Oliveira 2006). An important step forward towards an integrated European wildland fire policy will be the efforts of several projects sponsored by the European Commission that aim to establish the use of fire for hazard reduction (prescribed burning, suppression fire) (Fire Paradox 2007) and a standardized European competence-based training system (EuroFire 2007).

2.2 Atmosphere and Climate: Reduction of net carbon emissions from vegetation fires

Vegetation fires have the potential for a positive feed back loop to global climate change because of the emissions of carbon dioxide and other greenhouse gases (Andreae and Merlet 2001). It is now increasingly accepted that vegetation fires are a significant source of radiatively active emissions. Taking into account the changing nature of recent large-scale fires in Mediterranean Europe, there is now a new interest in techniques that have the potential of reducing the net carbon emissions from vegetation fires in the context of the Kyoto Protocol. While it is generally believed that successful fire prevention and fire suppression will result in a reduction of pyrogenic greenhouse gases – a concept valid for a limited time period – the long-term consequences of successful vegetation protection in some ecosystems contribute to the build-up of fuels and an increasing risk of high-severity fires. Additional fuel build-up as a consequence of the rural exodus and land-use change in Europe has additionally contributed to an overall increase of extreme fire hazard. The direct and indirect effects of megafires and extreme weather, e.g. extreme precipitation events and storms affecting freshly burned areas, are resulting in soil denudation, increased and often irreversible damage to vegetation, and to site degradation. Consequently, the potential of terrestrial carbon storage is reduced.

Measures to prevent extremely severe fires and stabilize ecosystems by reducing fuel loads include the revival of traditional land-use (agro-forestry or silvo-pastoral systems), the use of phytomass as renewable energy source and the use of prescribed fire. Prescribed burning, as a means of reducing net carbon emissions to the atmosphere, needs to be properly explained to decision makers and to the general public in order to reach general acceptance. Similarly to natural fire cycles, prescribed fires generate cyclic carbon emission pulses. In the long term, however, the net release of carbon to the atmosphere will be neutral or even negative due to the overall stabilizing effect of fuel treatment by fire and the long-term increase of carbon sequestration on properly managed ecosystems.

The prescribed burning projects and programmes that are currently conducted in the greater Eurasian region are largely in the hands of a restricted number of specialized teams. The initiation of a policy dialogue in Europe is necessary to revise legislation and to sanction best practices in prescribed burning. In this context a clarification is needed on the role and contribution of future fire management concepts in Europe in relation to the Kyoto Protocol. While it is clear to the fire management specialists that sound prescribed burning technologies will keep the terrestrial carbon stocks on burned sites in a long-term equilibrium, they also need to be sensitive to the concerns of those who fear that excessive fire use may lead to site degradation and a depletion of terrestrial carbon stocks. This perception is particularly relevant in the political context of climate-change and the desiccation and vulnerability of organic soils and peatlands. The discourse on the increase of prescribed burning activities in the United Kingdom, recently fanned by the study of Yallop et al. (2006), will certainly be followed-up by those who are concerned about fire smoke impacts on human health and security.

The consolidation and expansion efforts of the Eurasian Fire in Nature Conservation Network (EFNCN 2007), involving international cooperation and personnel exchange, will play an important role in technology transfer and enhancing a dialogue between those countries that had abandoned fire practices for too long time. This process will be flanked and supported by the UNISDR Global Wildland Fire Network and its four regional networks that are operational in Eurasia (Baltic Region, Southeast Europe/Caucasus Region, Central Asia, Northeast Asia) (UNISDR 2007).

2.3 Transboundary effects of wildland fires: Threats to human health

Smoke from fires burning in European countries and adjoining regions are subject of medium- to long-range transboundary transport. During the last years vegetation fire smoke generated in western Russia was repeatedly transported to the neighbouring countries. In early 2006 smoke exposure was particularly severe in Finland where the air pollution exceeded the limits of the maximum permissible amount of airborne dust in city air of 50 micrograms per cubic metre of air for almost two weeks. Part of the emissions originated from the pollution transported from wildland fires in Russia, Ukraine, and Belarus. But also in Scotland and the north of England pollution from agricultural fires in Russia caused dangerously high levels of particulate matter smaller than about ten micrometers (PM10). Concentrations were high enough to breach the air-quality standards in some locations (DEFRA

2006). As a consequence the UK government was pushing for a revision of the United Nations Convention on Long Range Transboundary Air Pollution to prevent similar occurrences in the future.

But also other forms of transboundary air pollution triggered by wildland fires may play an important role under future climate change scenarios. Climate change appears to be contributing to the release of toxic mercury in the most northern wetlands of North America (Turetsky et al. 2006). Mercury, released once into the atmosphere with the launching of the industrial age, falls back onto Earth and accumulates, particularly in North American wetlands. Recent research reveals that, as a consequence of climate change, mercury reserves once protected in cold northern forests and wetlands, will increasingly become exposed to burning. Mercury is released to the atmosphere with fire smoke. Turetsky et al. (2006) quantified organic soil mercury stocks and burned areas across western boreal Canada; it was assumed that, based on ongoing and projected increases in boreal wildfire activity due to climate change, atmospheric mercury emissions will increase and contribute to the anthropogenic alteration of the global mercury cycle and to the exacerbating mercury toxicities for northern food chains.

After the accident of the Chernobyl Nuclear Power Plant, which occurred in April 1986, large areas of the Ukraine, Belarus and the Russian Federation were exposed to radioactive contamination. Currently the main contaminants of these areas are the long-living radionuclides caesium (^{137}Cs), strontium (^{90}Sr) and plutonium (^{239}Pu). Radionuclides of caesium account for the largest contaminated areas in these states. Elevated radioactivity transported airborne from fires occurring in radioactively contaminated vegetation of Eurasia, notably radioactive caesium (^{137}Cs), has been observed after forest fires in the Chernobyl nuclear accident zone (Dusha-Gudym 1992, 2005; Dusha-Gudym and Orlov 1994.). It is assumed that wildfires burning on former nuclear weapons test sites in Central Asia, e.g. in Semipalatinsk Region (Kazakhstan), result in release and uncontrolled aerial transport of radionuclides and may affect neighbouring countries also in Europe (see Wotawa et al. 2006, see also Goldammer 2006).

2.4 Fire and human security

One of the most pressing fire problems in Europe is arising from the heritage of armed conflicts in the region. On the Balkans and in the Caucasus region large forested areas and other lands are contaminated by unexploded ordnance (UXO): minefields, other terrain with uncontrolled contamination of landmines, and UXOs on former combat theatres. Between Bosnia-Herzegovina where about 100,000 ha of forest lands are contaminated by landmines, and the Line of Contact between the disputed territories of Azerbaijan and Nagorno-Karabakh, large areas of land cannot be managed or otherwise be stepped on, e.g. for fire suppression, because wildfire-triggered explosions represent a deadly risk for humans (GFMC 2007b). The use of prescribed fire to facilitate UXO clearing, however, is investigated in the case of the large UXO contaminated terrains of Germany (WW-II combat theatres in the Berlin-Brandenburg region and former military exercise areas and shooting ranges).

3. Methods of fire hazard assessment

3.1 Forest Focus

In the context of the European Environmental Policy, since 1986 the EU has influenced forest fire prevention through Council Regulations on the protection of the Community's forests against fire. Since January 2003, the provisions of these single-issue regulations have been integrated into a new scheme together with provisions of earlier regulations on the monitoring and protection of forests against atmospheric pollution. This concerns the Regulation (EC) of the European Parliament and Council Nº 2152/2003 of 17 November 2003 regarding monitoring of the forests and of environmental interactions in the Community (Forest Focus). Bringing together earlier Regulations on Forest Pollution and Forest Fire, it represents a Community scheme for harmonized, broad-based,

comprehensive and long-term monitoring of forests in Europe. Forest Focus aims to monitor and combat the threats to forests from air pollution and forest fire, and also to address issues such as biodiversity, impacts of climate change, carbon sequestration, soil and the protective function of forests. Therefore Member States are requested to collect a set of information on forest fires enabling them to meet the objectives laid down in the Regulation. The set of information focuses to contain at least a number of standard items, comparable at Community level, the so-called "minimum common core of information on forest fires". The collection of such a set of information may be confined to high and medium-risk areas in the Member States.

The Forest Focus regulation was effective from the year 2003 and it expired at the end of 2006. However its provisions will most likely be carried further on in the LIFE+ regulation that is currently under development. LIFE+ will be an integrated platform of instruments for environmental management and protection of the European Commission. It will bring together the various scattered provisions that were developed in many separate regulations over the past into one regulation.

3.2 Data collection and availability: The European Forest Fire Information System (EFFIS)

In 1997 the European Commission DG Joint Research Centre set up a working group dedicated to the development and implementation of advanced evaluation methods for forest fire risk and mapping of burnt areas at the European scale. These activities resulted in the European Forest Fire Information System (EFFIS) that is part of the Regulation (EC) No 2152/2003 (Forest Focus) since 2003. The main objective of EFFIS is to provide information relevant to protecting forests against fire by considering both pre-fire and post-fire conditions (EFFIS 2007).

In a pre-fire phase, EFFIS provides forest fire risk forecast based on existing fire risk indices. These indices allow for a harmonized assessment of forest fire risk at the European scale Currently, the dynamic forest fire risk forecast indices are available on the EFFIS web site and sent to the Member States Services daily from the 1 May until 31 October.

In a post-fire phase, EFFIS estimates the annual damage caused by forest fires in the southern EU. All burned areas larger than 50 ha, which account for around 75% of the total area burnt in southern Europe are mapped every year using satellite imagery. The first cartography of forest fire damages in southern EU was produced on year 2000 and continued for the subsequent years. Additionally, as from 2003 a new activity for rapid assessment of forest fire damage has been developed in order to map all the fires larger than 100 ha twice during the fire season: at the beginning of August and at the beginning of October.

In addition a EU Fire Database is also included in EFFIS. This database contains the forest fire information compiled by some of the EU Member States. The Regulation EEC No 804/94 (now expired) established a Community system of information on forest fires for which a systematic collection of a minimum set of data on each fire occurring, the so called "Common Core", had to be carried out by the Member States participating in the system. According to the currently in force Forest Focus regulation (EC) No 2152/2003, the forest fire common core data should continue to be recorded and notified in order to collect comparable information on forest fires at Community level.
The forest fire data are therefore provided each year by individual Member States, checked, stored and managed by JRC within EFFIS. At present the database covers 14 Member States of the Union.

The public access to the database currently allows the users to retrieve general information such as maps of the number of fires for a selected year and for the countries for which data are available. It is envisaged to add further analysis possibilities in the near future.

The outcome of research topics on forest fires currently investigated at the JRC will be implemented in EFFIS in the forthcoming years. These topics are all related to the post-fire phase and refer to forest fire atmospheric emissions, vegetation regeneration, and post-fire risk analysis.

3.3 Global Monitoring for Environment and Security (GMES)

GMES (Global Monitoring for Environment and Security) is a European initiative for the implementation of information services dealing with environment and security. GMES will be based on observation data received from Earth Observation satellites and ground based information. These data will be coordinated, analysed and prepared for end-users. Through GMES the state of the environment and its short, medium and long-term development will be monitored to support policy decisions. The widespread and regular availability of technical data within GMES will allow a more efficient use of infrastructures and human resources within Europe. It will help to create new models for security and risk management, as well as better land and resource management.

PREVIEW is an EC FP6 Integrated Project that aims at developing new geo-information services for atmospheric, geophysical and man-made risk management on a European level and is part of the European GMES initiative. Within the project, the fire platform aims to provide a complete line of products in order to cope with the different aspects of fire risk management from the prevention phase to the post crisis phase.

The services delivered by the fire platform are supposed to cover a broad range of fire management aspects with respect to uncontrolled wildfires. They are aimed to support namely four phases of disaster management: prevention, early warning, crisis and post-crisis. There are six services to be developed in order to achieve these objectives.

In a prevention phase a tool for collecting important fuel parameters (fuel type, fuel load and canopy cover) will be developed to provide long-term change data. Also these products will be used as data inputs for a fire spread model.

Regarding an early warning phase several fire risk indices are developed aiming for improved spatial resolution and paying attention to regional characteristics (vegetation types, vegetation cycles, climate). Therefore, a set of dynamic fire risk indices at enhanced spatial resolution building on existing indices of the EFFIS Danger Forecast system of the JRC will be developed and calibrated for Mediterranean (France) and boreal (Finland) areas. These should favour the consistency of both JRC and National Meteorological Services approaches for monitoring the forest fire risk at international and national or regional level. Additionally, there will be specific integrated work on winter fires in Italy and specific integrated work on Spain and Portugal.

For a crisis phase there are two services foreseen. First, the development of a fire monitoring service has the objective to provide the continuous near-real-time observation of fire parameters such as location, fire temperature, fire intensity. This is supposed to take advantage of the synergy between new systems (MSG SEVIRI with 15 minutes temporal resolution) and the currently operating sensors MODIS and NOAA-AVHRR. A second service will develop a high performance fire spread model (Fire Propagator) with an easy to feed model engine and a powerful display interface to be used during extinction activities. It will consist of a physical model and a model implementer as an operational tool.

Finally, for a post-crisis phase a fire damage assessment tool will be developed to obtain burnt area for a season and fire impact (level of damage on vegetation).

4. Results and Trends

4.1 Research and development

Besides the progresses achieved in fundamental fire research in Europe, for the Mediterranean region well documented in the EUFIRELAB („a wall-less Laboratory for Wildland Fire Sciences and Technologies in the Euro-Mediterranean Region“) (EUFIRELAB 2007), several European research projects and practical experience in various countries highlight the need to design fire management

and wildfire hazard mitigation policies adapted to the European situation. Several projects under the auspices of the Global Fire Monitoring Center (GFMC) or sponsored by the European Commission are currently underway to support these aims. The above-mentioned Eurasian Fire in Nature Conservation Network (EFNCN) provides a platform and networking mechanism for those who actively apply or conduct research in prescribed burning for the purpose of nature conservation (biodiversity management, habitat management), landscape management and forestry. The region of interest is temperate-boreal Eurasia and the adjoining countries of Southeast Europe, Caucasus, Central and Northeast Asia. The network is closely associated with the EU Fire Paradox project, the EU LIFE project "Rohrhardsberg, Obere Elz und Wilde Gutach" (EU LIFE 2007) and the EU Leonardo da Vinci EuroFire (cf. below) project and supports the advancement of the use of prescribed fire in Eurasia.

The Fire Paradox Project "An innovative Approach of the Integrated Wildland Fire Management Regulating the Wildfire Problem by the Wise Use of fire: solving the Fire Paradox" (2006-2010) is an Integrated Project funded by the European Commission within the Sixth Framework Programme (Fire Paradox 2007). The overall objective of this Integrated Project is the establishment of scientific and technological bases for new legislation and policies in Europe and in Mediterranean North Africa region. With this strategic vision, the final aim is to contribute actively to set the bases for a fire management policy that would prevent the current disastrous social, economical and environmental consequences of wildfires in southern Europe. Therefore Fire Paradox aims to create the scientific and technical foundation for practices and policies consistent with the concept of integrated wildland fire management, i.e. allowing an adequate balance between the management of natural resources and the management of unwanted fires.

4.2 Capacity building

In most countries of the European Union and adjoining countries the responsibilities for fire prevention and control are usually split between various agencies and stakeholders. In most countries there is no specialized "forest fire service", which would be especially trained and equipped for the specific conditions of wildland fire suppression. The fire services, sometimes also units of civil protection agencies, in general have limited training and consequently limited competence in wildland fire management. This has been recognized by a number of national fire services throughout Europe, including the International Association of Fire and Rescue Services (Comité Technique International de prévention et d'extinction du Feu – CTIF), which in partnership with the Global Fire Monitoring Center (GFMC) in 2005 approached the European Commission's Leonardo programme to finance a project to improve capacities and competence of European fire services in the wildland fire arena – the EuroFire project. The project, granted by Leonardo in 2006, brings together partners with international expertise and experience in wildland fire research, management and training in order to develop, evaluate, produce and distribute a new European-wide, multi-lingual on-line training resource. The EuroFire project will research and review competency-based wildfire training systems and identify best practice examples from Europe and around the world. This research will then inform the production of competency-based basic training materials specifically for use in European countries. This will provide a module-based training resource that can be used by industry practitioners to update their knowledge, learn new skills or increase their understanding of wildfire management techniques.

4.3 International Cooperation

A number networking mechanisms and cooperation activities aimed at enhancing international cooperation in wildland fire management have been developed in Europe since the 1990s (Goldammer 2003, UNISDR 2007). These arrangements are predominantly legally non-binding cooperation agreements and some legally binding bilateral agreements for mutual support during fire emergencies between countries. Examples of voluntary cooperation efforts include:

- UNISDR Regional Baltic Wildland Fire Network: An initiative to foster the cooperation in wildland fire issues in the Baltic region go back to the late 1990s and are a focus activity of the Work of the UN-ECE/FAO Team of Specialists on Forest Fire. With the creation of the

Global Wildland Fire Network the regional cooperation is referred to as “Regional Baltic Wildland Fire Network”. The overall aim of the regional initiative is in line with the Baltic 21 Action Programme, an initiative for the application of the Agenda 21 in the Baltic Sea Region, Article 15 of the Helsinki Convention, and the objectives of the work of the Nordic Council (UNISDR 2007).

- In the Mediterranean Region the FAO “Silva Mediterranea” is the focal point for the Global Wildland Fire Network. It has been suggested recently to replace this network by the enlarged EFFIS system and the forest fire expert group of the EC Directorates-General ENVIRONMENT ENV.A.5 Civil Protection / ENV.B.3 - Forests and the JRC Institute for Environment and Sustainability (UNISDR 2007).
- In South East Europe regional networking was initiated in 2002, at that time called “Regional Balkan Wildland Fire Network”. At a regional consultation in the Republic of Macedonia in 2005 members of the Balkan Network decided to invite neighbouring countries and to expand its area of joint activities to Southeast Europe. Subsequently the network was renamed “Regional South East European Wildland Fire Network”. With the growing interest of the countries adjoining to the regional, notably in the Caucasus region, it was suggested in 2006 to broaden the geographic scope of the region by adding Caucasus region (UNISDR 2007).
- The Euro-Atlantic Disaster Response Coordination Centre (EADRCC), created in 1998 as the focal point for coordinating disaster relief efforts of the 46 Euro-Atlantic Partnership Council (EAPC) nations in case of natural or technological disasters within the EAPC geographical area (EADRCC 2007). The forest fire community linked through the websites of the GFMC and the EADRCC.
- The European Open Partial Agreement on the Prevention, Protection Against and Organization of Relief in Major Natural and Technological Disasters (EUR-OPA Major Hazards Agreement) (Council of Europe, Directorate of Culture and Cultural and Natural Heritage) with its specialized “European Center for Forest Fires (ECFF), Athens, Greece, and the Global Fire Monitoring Center (GFMC) as associated institute (ECFF 2007).

International exercises on cooperation in managing fire disasters included:

- BALTEX FIRE 2000 (Baltic Exercise for Fire Information and Resources Exchange) under the auspices of the UN-ECE/FAO/ILO Team of Specialists on Forest Fire (BALTEX FIRE 2000, Goldammer 2000)
- "Taming the Dragon – Dalmatia 2002" under the auspices of the Euro-Atlantic Disaster Response Coordination Centre (EADRCC 2002)
- European Forest Fire Exercise, Département Bouche-du-Rhône, France, 18-20 April 2004 (EU 2004)
- EASTEX FIRE 2005 (Eastern European, Near East and Central Asian States Exercise on Wildland Fire Information and Resources Exchange) in conjunction with the declaration of the UNECE/FAO Conference on Forest Fire Management and International Cooperation in Fire Emergencies in the Eastern Mediterranean, Balkans and adjoining Regions of the Near East and Central Asia” (Antalya, Turkey, 30 March - 3 April 2004) (EASTEX FIRE 2005)

4.4 Conclusions

At the last meeting of the Global Wildland Fire Network at the 4th International Wildland Fire Conference, held in Sevilla, Spain, May 2004, the joint Regional Session “Europe, Southeast Europe, Mediterranean North Africa and Caucasus“ assessed the overall fire situation in Europe and the prospects for enhancing international cooperation in wildland fire management, and released the following conclusions (Anonymous 2007):

1. The protection of the environment in Europe, the Mediterranean Basin and the Caucasus region cannot be effective without a Regional Strategy for Fire Management designed according to the distribution and intensity of the danger and developed in cooperation with the public and private stakeholders of the Forest Sector.

2. Rural abandonment and decline of the forest economy in the Mediterranean Basin is a major concern as climate change may aggravate the natural conditions of fire risk.
3. Special attention must be given to fires burning on radioactively contaminated lands, by fires on areas with unresolved conflicts and on territories with post-war hazards such as land mines and unexploded ordnance, as they affect human security and peace in the region
4. Priority is to be given to the prevention of fires caused as a consequence of the socio-economic changes in rural areas, and the promotion of the participation of the local population.
5. Some issues to be included in this Regional Strategy are:
   - Maintenance, improvement and enlarging of the European Forest Fire Information System (EFFIS) with standardized procedures for data collection and use of remote sensing for quick appraise of large fires impacts, as a tool to identify the high risk zones.
   - EFFIS to set a danger prediction network covering all Europe, the Mediterranean Basin and the Caucasus.
   - Definition of forest fire risk areas taking into account the fire incidents, fuels, value of forests, protected areas, forest-urban interfaces and forest ownership.
   - Analysis of forest fire emissions and impacts on human health
   - Studies on the silvicultural condition of woodland areas, including forest fuel and biomass maps in coordination with the national forest inventories.
   - Analysis of socio-economic impacts of fires
   - Studies on fire causes, including the use of fire at the rural areas and possible preventive actions in cooperation with the local population.
   - Scientific research programmes addressing the consequences of changes of climate, land use and land cover and socioeconomic changes on fire regimes, environment and society.
   - Creation and distribution of awareness materials in several languages.
   - Programmes of preventive infrastructures: preventive silviculture, roads, lookouts, and water reservoirs.
   - Joint actions on border areas, where appropriate, such as observation and monitoring networks with compatible communication systems (considering languages).
   - Promotion of bilateral and multilateral agreements, where appropriate, for cooperation in suppression activities, including standardized procedures of integration of resources.
   - International training courses
   - Programmes for burned areas restoration, giving priority to the surfaces destroyed by large, intense fires, where the environmental impact is the greatest.

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