



*Assessment of **Forest Fire Risks** and
Innovative **Strategies** for **Fire Prevention***

4-6 May 2010 Rhodes, Greece
Workshop report

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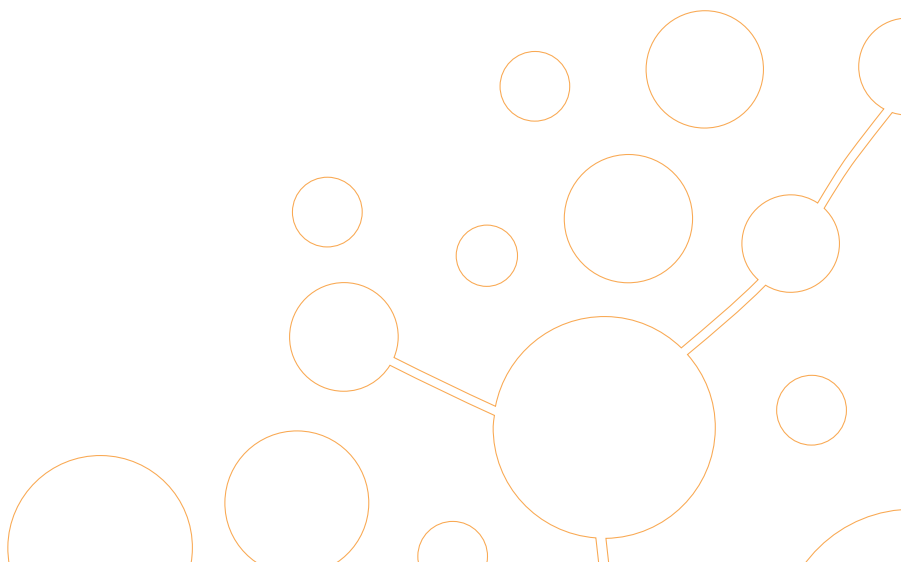
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WORKSHOP REPORT



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Foreword

Forests are vital for sustainable development and human wellbeing in Europe and globally. Sustainable forest management is of fundamental importance for combating desertification, for protection against natural hazards such as soil erosion and floods and for ensuring regular supplies of good quality fresh water. In addition, forests that are managed sustainably continue to provide a range of important goods and services.

Climate change and other challenges threaten forests and their protective and productive functions. Forest fire is one of the devastating elements predicted to increase as a result of climate change. Frequency and severity of forest fires, as well as areas affected by fires are expected to increase. In this situation, better information and more knowledge concerning future risks of forest fires and fire prevention is needed. Fire prevention measures deserve more attention. In addition to protecting lives, the environment and natural heritage, fire prevention is, in most cases, the most cost efficient strategy. With expected increasing risks, sharing the experiences of innovative strategies and highlighting current deficits across the pan-European region is highly relevant.

The Fifth Ministerial Conference on the Protection of Forests in Europe, *Forests for Quality of Life*, was convened in Warsaw, Poland, November 2007. At this conference, ministers and high-level representatives of 41 European countries and the European Union endorsed the Warsaw Declaration and Resolutions. The ministers responsible for forests in Europe also endorsed a Ministerial Statement on forest fires. Expressing sympathy to and solidarity with people and governments that were suffering the consequences of recent forest fires, the ministers stated their readiness to explore further measures to prevent forest fires.

As a follow-up of the Ministerial Conference, the workshop on «The assessment of forest fire risks and innovative strategies for fire prevention» was convened in Rhodes, Greece, 4-6 May 2010. This report provides a summary of the workshop and its outcome.

I take this opportunity to thank all the co-organisers and the participants for their active contributions to the workshop. A special thank to Irini Nikolaou, Iordanis Tzamtzis and Inazio Martinez de Arano for their efforts in organising the workshop and writing this report. I also thank the Hellenic Ministry of Environment, Energy and Climate Change and the Union of South European Foresters (USSE) for providing financial support for the workshop, and the European Commission for organising a meeting of their experts on forest fires back-to-back to the workshop.



Arne Ivar Sletnes

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Head of FOREST EUROPE Liaison Unit Oslo

Introduction

At the Fifth Ministerial Conference on the Protection of Forests in Europe (Warsaw, 5-7 November, 2007) the ministers responsible for forests in Europe committed themselves to ensuring that forests and sustainable forest management play an active role in sustainable development and for the general wellbeing of European society. The ministers also endorsed a Ministerial Statement on forest fires, following catastrophic fires in several European countries. With this statement they expressed their solidarity with the people and governments of the countries of Southern Europe who have suffered from the effects of huge forest fires in recent years.

6 As a pan-European follow-up to the Warsaw Ministerial Conference, FOREST EUROPE, together with its partners, decided to convene a workshop on forest fire prevention. Because wildfires are one of the biggest threats to our forests, and are expected to intensify due to climate change, the workshop was convened under the focus area «Forests and Climate Change - Mitigation and Adaptation» of the FOREST EUROPE Work Programme.

The «Workshop on the Assessment of Forest Fire Risks and Innovative Strategies for Fire Prevention», was held on 4-6 May 2010 in Rhodes Island, Greece. It was co-organised by the Greek General Directorate of Development and Protection of Forests and Natural Environment, the Department of Forests of Republic of Cyprus, the Union of South European Foresters (USSE), the Ministerial Conference of the Protection of Forests in Europe (FOREST EUROPE), the Food and Agriculture Organization of the United Nations (FAO), the United Nations Economic Commission for Europe (UNECE) and the Silva Mediterranea Committee. The workshop was financially supported by the Hellenic Ministry of Environment, Energy and Climate Change and the USSE. The European Commission (Directorate-general Environment and the Joint Research Centre) contributed indirectly by organising its spring meeting of the group of experts on forest fires back-to-back with the workshop.

The objectives of the workshop were to review the current national forest fire prevention systems in European Countries, to identify innovative strategies, best available

practices and possible policy instruments, and to develop policy conclusions and recommendations in relation to forest fire prevention in Europe. This was carried out with a view to building upon the existing knowledge and promoting the outcomes at a policy level.

The 73 participants were technical experts, forest policy advisors and policy makers, representing governments, NGOs and other stakeholders. The participants represented 19 countries. They displayed a broad interest and contributed to the successful outcome of the workshop by providing different opinions and approaches.

This report summarises presentations and discussions from the workshop. It is aimed at disseminating the outcome to a broader audience.

Background

Forests and Forest Fires

Forests and forest ecosystems are of key importance for the social, economic and environmental viability and development of the European continent. Forests play significant roles in rural and urban communities by providing goods and services. They constitute an important economic factor and at the same time supply complex, dynamic, highly valuable natural ecosystems that also facilitate and protect biodiversity.

Forest fires are an integral part of life for some types of forests in Europe (particularly Mediterranean forests), but fires can also be deemed as a threat because of their increased reoccurrence frequency.

Major social and economic changes in land use have affected the wildland/rural interface and resulted in increased amounts of biomass and a higher exposure to man-induced fire. Population movements from rural to urban areas, abandonment of traditional land uses in rural environments, reduced use of forests for raw material production, increased recreational use of forested areas, continuous growth of the forest/urban interface, inadequate public information and awareness, insufficient policies and inadequate forest management are some of the key factors leading to the increased forest fire risks. These factors have contributed to increased numbers of forest fires in Europe during the past decades. More than 50,000 forest fires larger than one hectare erupt each year in the most affected countries, with an annual average of 500,000 hectares of burnt forests in the European Union. In the EU, large fires (≥ 50 hectares) account for 75% of the total burnt area, representing 2.6% of the total number of fires. Man-induced forest fires represent about 95% of the overall number. Catastrophic fires in Russia, which resulted in the burning of millions of hectares, have also shaken European citizens in recent years.

The consequences are well known. Forest fires have social, economic and environmental impacts, ranging from the combustion period up to decades after, especially the large fires. Fires affect human life and health, human property and wellbeing, cultural and natural heritage, employment,

recreation, economic and social infrastructures and activities, air quality and the balance of greenhouse gases. They can further have negative effects on habitats, tree, plant, animal and microbial communities and populations, as well as on biodiversity in general.

Forest Fires and Climate Change

The climate change currently affecting our globe will most likely exacerbate the current risks of forest fires. In particular, the climate of Southern Europe and the Mediterranean basin is projected to warm at a rate exceeding the global average. Precipitations are projected to decrease, while temperature variability, the number of dry spells and droughts and the intensity of heat waves are all projected to increase. Consequently, the length and severity of the fire season, the extreme conditions in many areas, the extension of areas of risk and the probability of large fires will increase. As a result, climate change will have an added impact upon the growth conditions and evolution of European forests and may, as a consequence, enhance desertification.

Fires will therefore remain the most serious threat to Southern European forests and at the same time continue to play an important role in other parts of Europe.

Forest Fire Prevention

Contrary to other natural hazards (earthquakes, storms etc.), forest fires are predictable. This, in principle, should leave modern societies with a degree of freedom, and an advantage for implementing efficient preventive strategies and measures. However, this opportunity has not yet been properly utilised.

With finite financial resources and increased areas subject to forest fires, the prudent response cannot be limited to promotion of more funding and equipment to fire management. It should be recognised that fire prevention is not only preferable but also a cost effective way to manage forest fires when compared to fire fighting and suppression. Even regions with well-prepared fire brigade departments, sophisticated ground and aerial equipment and a substantial number of fire fighters have been unable to inhibit disastrous large-scale forest fires in recent years. Even in those

situations, fires have caused severe ecological damage, which has had a tremendous impact on livelihoods, infrastructure and tourism. They have also had a dramatic toll on human lives. In response to the risks of forest fire, it is therefore better to have integrated strategies and policies for forest fire prevention while acknowledging trade-offs between environmental, social, and economic elements.

Despite recent advancements in forest fire prevention (see annex 4 for a compilation of existing knowledge and former work), for various reasons, prevention still constitutes a small fraction of budgets and receives little public attention. Financial support is weak and fragmented and there is a lack of effective instruments and exchange of best practices within and across regions. Regarding forest protection in the pan-European region, there is no common legal framework on forest fire prevention.

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There is therefore considerable room for improvement and innovation in comprehensive fire prevention programmes and activities. Fire prevention must be viewed as an indispensable part of sustainable forest management. This is also in line with the European Commission's and Member States' common vision «Forests for society: long-term multifunctional forestry fulfilling present and future societal needs and supporting forest-related livelihoods» as stated in the Commission Communication on the EU Forest Action Plan¹. Emphasising that *Preventing Fire Is Better Than Healing*, the aim of the workshop was to identify innovative strategies for fire prevention of pan-European relevance.

¹Communication from the Commission to the Council and the European Parliament of 15 June 2006 on an EU Forest Action Plan [COM(2006) 302 final] - not published in the Official Journal

Assessment of *Forest Fire Risks* and *Innovative Strategies for Fire Prevention*

The workshop was held in Rhodes Island, Greece 4-6 May 2010 and was followed by a meeting of the European Commission Expert Group on Forest Fires. During the workshop it became obvious that forest fire prevention requires more attention. There is a great need to promote forest fire prevention policies and measures across the European region and an urgent need to place forest fire prevention on the policy agenda. To achieve this, vigorous and sustained actions at different levels are necessary.

At the first day, *Session 1* was devoted to reviewing the current situation at international, EU and national levels. *Session 2* addressed causes of major fires and selected best practices/approaches to forest fire prevention. Each session included a plenary discussion of identified gaps and lessons learnt.

On the second day, *Session 3* was devoted to presentations on innovative strategies and policy instruments for forest fire prevention. Participants were split into three working-groups, focusing on different aspects of forest fire prevention. In the afternoon, a field trip was arranged to the area where the big fire of Rhodes took place in August 2008. Participants had the opportunity to discuss *in situ* the causes of this fire, failure of fire prevention measures, the damages that resulted and the costs and strategies used in its suppression.

The third day included a plenary discussion about innovative strategies and possible new policy instruments on forest fire prevention. Finally, *Session 4* involved a summary of the elements covered, a final discussion on conclusions and recommendations and the closure of the workshop.

Session 1: A review of current situation. Identifying major gap

The session was chaired by Mrs. Lorenza Colletti (Italian State Forest Service) and presented an overview on the situation concerning strategies and instruments for forest fires prevention. It aimed at identifying the major gaps and challenges that exist at different levels: global, European Union and national (where most of the practical activities are carried out).

The session was opened by Mr. Pieter Van Lierop (FAO) who presented the main developments on forest fire prevention at international level. He underlined the cost-efficiency when compared to suppression and the importance of having prevention plans and involving local communities. Some positive trends have been identified, for example the growing acknowledgment of the importance of prevention, the wise management of fire as a possible land planning tool and the continued revision of legal frameworks. However it was noted that there is a lack of complete, reliable and comparable information on forest fires at global level, even as basic statistics. Mr. Lierop underlined the challenges in preparing, updating and implementing prevention plans, and in raising political awareness on their importance even if fires are not occurring.

Mr. Ernst Schulte (European Commission) continued with a comprehensive review of the past and current EU activities and instruments dedicated to and related to forest fires: The first Community Forest Action Programme (1988-1992); the specific «Forest fire» 2158/92 regulation (1992-2002) that supported bottom-up prevention actions; Forest Focus 2152/2003 (2003-2006); and Life+ Regulation 617/2007 (2007-2013). Currently, along with Life+, there are also other instruments that can be targeted to facilitate forest fire prevention. These include Rural Development Regulation, Regional policies (Interregional projects, Solidarity Fund, Cohesion Policy) and civil protection measures and projects, as well as EU research programmes. The Commission also conducts some specific activities related to forest fire prevention: the Expert Group on Forest Fires and the European Forest Fire Information System (EFFIS).

Mr Schulte finished with a presentation of recent initiatives taken on this issue by EU bodies, such as the «White Paper on adapting to climate change», the «Green Paper on forest protection and information», the «Commission's communication on a Community approach on the prevention of natural and man-made disasters» and the «Council conclusions on a Community framework on disaster prevention within the EU» (see annex 4 for references to all documents). The relevance of participating in public debates and the need to use existing EU Forums to raise awareness on forest fire prevention was stressed.

In the final presentation, Mr. Kostas Papageorgiou (State Forest Service from Cyprus) gave an overview of existing forest fire prevention systems in some European countries. Based on a questionnaire sent to national contacts in advance of the workshop, he concluded that it is very difficult to generate a comprehensive picture of prevention strategies and budgets. Data is scarce at national level and responsibilities and budgets are often scattered over different national and sub-national bodies dealing with different aspects of forest fire prevention. Compiling information across countries to present an overall picture of the situation at European level is even more challenging because definitions, actions and approaches to prevention differ significantly from country to country. From the information collected, it seems that public expenses are more oriented towards suppression than prevention (at least 60% of the estimated budget is absorbed by suppression measures). It is often difficult to ensure sufficient funding for fire prevention because these activities appear to the political level as less urgent or stringent. On the positive side, a growing acknowledgement of the relevance of fire prevention has been detected.

After an open discussion, the chairperson of the session underlined the importance and efficiency of prevention measures carried out at local level. She stressed the importance of wider and agreed systems and strategies, e.g. a common template for prevention plans and a common system of information. She also emphasised that there was an urgency to overcome the lack of proper global statistics, of establishing stronger EU action instruments and of national coordination in fire budgets, knowledge and responsibilities. Finally, the need to strengthen attention to prevention within the wider forest fire policies was highlighted. Especially in relation to the current risk of budgetary cuts as a consequence of the financial crisis, the vulnerability of prevention measures due to their low level of visibility was stressed.

Session 2: Building on past experience

Session 2, chaired by Mr. Andrea Camia, opened with a keynote presentation on the causes of large forest fires in the Mediterranean region. Next followed presentations of five

successful bottom-up examples of fire prevention in different European regions. Based on these presentations, workshop participants discussed and identified lessons that could be drawn from the experiences.

Mr. Gavriil Xanthopoulos highlighted the strong impact and seriousness of large fires in the Mediterranean region. Large fires have serious ecological, economical and social impacts, and are also important in relation to civil protection.

Frequently, big fires exceed the capacity of the fire fighting services to control them. It is therefore important to take appropriate preventative measures in order to avoid catastrophic events and, in case they occur, to be prepared for them. Experience shows that when weather conditions are extreme and fuel (increased vegetation, dead biomass etc.) has built up, different sources of ignition (natural lightning, human negligence and arson) can cause forest fires that may be catastrophic if fire fighting services are unable to quickly bring them under control. Mr. Xanthopoulos stressed that prevention efforts should not only focus on human induced fires. Public education campaigns, better fire investigations, punishment of arsonists, better surveillance etc. are required. In addition, safe levels of forest vegetation should be maintained through forest management and fuel reduction projects in areas close to settlements. There is also a need for the development of sophisticated pre-suppression plans that can be effectively carried out by well-trained and adequately equipped fire fighters. Special attention should be paid to wildland urban interfaces. The role and responsibility of local communities with regard to fire prevention efforts were highlighted, as well as the need for more financial resources for prevention together with clear priorities on allocation of these resources. An urgent need to investigate the current allocation of resources was also stressed.

Mr. Christian Pinaudeau made an encouraging presentation of the forest fire prevention schema that forest owners have managed for the past 50 years in Aquitaine, South-western France. The key message could be summarised as: «yes we can». Recurrent catastrophic fires decimated the Aquitaine forest during the first half of the 20th Century. Since then,

there has been a dramatic reduction in areas burned and the number of large fires. The explanation for the reduction is a prevention scheme that is run by forest owners who are organised into fire prevention associations, with compulsory membership. Every forest owner must contribute with a per-hectare fee and these resources are complemented by public funds. Prevention actions undertaken include maintenance of tracks, firebreaks, water points, fuel management and monitoring for early detection. Preventive measures against forest fires in this area seem to be effective and economically efficient.

Mr. Patrick Deblonde presented an example of regional fire management by public authorities in the Department of Var in Southern France. In this region, forest fire prevention takes place in a context of under-managed, semi-natural Mediterranean forest of low productivity, high fuel loads and an extensive urban wildland interface. The strategy focuses on minimising the number of fires and strengthened initial attacks. Legal obligations are in place to manage forest understory in wildland urban interfaces that are defined and mapped. The costs are shared by the national budget, the European Agricultural Fund for Rural Development (EAFRD), municipalities and private sources. Around 70% of the total budget is spent on fire suppression and 30% on prevention. The fire management cost per hectare was reported to be higher in this Mediterranean part of France than for the Atlantic case presented (Aquitaine).

The third bottom-up example was a Portuguese case study prepared by Mr. Nuno Calado. He introduced the overall Portuguese strategy against forest fires and UNAC's (Union of the Mediterranean Forest) approach to forest fire prevention. In response to Portuguese forest ownership, which is mainly private and highly fragmented, forest fire prevention is based in Forest Intervention Zones, which groups forest properties in a given territorial area. The overall aim is to mitigate the adverse consequences of fires by reducing the probability of fire, fire risk and fire impact in each defined Forest Intervention Zone. A common forest fire prevention plan is mandatory for each zone if it is to receive public financial support. Actions undertaken include specific fire risk assessment and auditing procedures, vegetation manage-

ment, early detection, and support to infrastructures. Positive results are reported but a number of problems still remain, such as how to tackle land abandonment, the lack of profitability of forestry, how to secure investments through appropriate insurance schemas, and how to achieve the active involvement of forest owners. To move from planning to active practices there is a need for targeted approaches for different forest owners, taking individual needs and expectations into consideration.

Fourth, the presentation of Mr. Kostas Papageorgiou and Mr. Antonis Sarris showed an example of fire management plan set in a village recently affected by a large fire, namely the Moniatis village in Cyprus. Although efforts were made to bring the fire under control shortly after it was detected, the fire went out of control because of failures in fire prevention. A comprehensive plan was developed in the aftermath of this incident. This included new access roads, fire brakes, training of volunteers and a fuel management programme for wildland rural interface. Technical and financial support was given by the government and the plan was built around the active involvement of the local community. A key issue that came out of this case was the need to keep the local population motivated concerning forest protection, because people tend to forget about former fires as time passes.

The session was brought to a close with the presentation by Mr. Mariano Torre and Mr. Alvaro Picardo of the *Plan 42* implemented in Castilla y León, Spain. *Plan 42* attempts to reduce the number of fires by changing the attitude of those who deploy fire to clear vegetation through the application of vegetation management practices without fire. It is made up of a five year vegetation management plan based on mechanical shrub conditioning and on the promotion of silvopastoral activities aimed at breaking up the continuity of fuels. The strategic vision behind *Plan 42* is that when or where forestry is profitable, forests will be managed and thus fire risks will be lower. Investments in silviculture to improve the structure of existing seminatural forests and alternative ways to improve profitability of Mediterranean forestry are therefore sought. In the meantime, landscape-level vegetation management programmes are needed in order to minimise the risk for large catastrophic fires.

At the close of the first day of the workshop, participants expressed their impressions, ideas, and raised their questions to the presenters in a plenary session.

Several comments and suggestions were made that stressed the importance of active management in the bottom-up approach, the need to put resources into active management of the landscape and to consider how the market could be utilised for promoting forest management. Other attendees pointed out the need for higher social and political recognition of sustainable forest management as a provider of valuable environmental services and of renewable raw materials such as cork and wood. The public recognition of the contributions made by sustainable forest management fall well below those of other sustainable practices such as, for example, organic agriculture.

The problem concerning many forest properties with an absentee owner was raised along with related difficulties in identifying responsibilities for the lack of management.

It was suggested that as 2011 is the International Year of Forests, some advantage could be drawn from this occasion in order to raise the visibility of fire prevention and to consider the needs for adaptation to climate change.

The importance of evaluating how policies have influenced European forestry was also stressed along with how to further improve land management. In this regard, Mr. Schulte of the European Commission invited debates on the possible future EU forest policy, specifically in relation to the «Green paper on Forest Protection and Information in the EU: Preparing forests for climate change».

Session 3: Innovative strategies and policy instruments

Session 3, chaired by Mr. Jesus San Miguel, reviewed innovative practices and approaches to forest fire prevention. The session included six presentations on innovative strategies covering different aspects of prevention. After the presentations, the participants were divided into three working groups focusing on a specific topic, with the aim of producing recommendations and proposed actions.

The last part of the second day was devoted to the field trip (see annex 2).

Efficient analysis of fire prevention measures could become an important tool for supporting decisions. In his presentation, Mr. Robert Mavsar proposed a methodological approach. Unfortunately, the data required is not readily available because impact assessments of forest fires are often incomplete, efficacy of prevention measures is almost never conducted, and total costs of prevention policies are unknown due to fragmentation of measures and budgets across different levels and actors. Improving the information sources could support future choices in forest fire prevention as an integral part of fire management.

Mr. Gavriil Xanthopoulos presented an innovative European project called INCA, *Linking civil protection and planning by agreement on objectives*. The starting point is the need to emphasis prevention, and that significant improvements must be made in overcoming fragmentation of prevention policies across different sectors and, notably among civil protection and landscape planning. The approach facilitates agreements on objectives between the various stakeholders and then agreements on structural and non-structural measures to be taken. The main challenges in respect to fire risk prevention are the inclusion in spatial planning procedures and in activating the role of civil society.

Mr. Alain Chaudron presented a methodology and preliminary results of an assessment of forest fire risk in France in 2030 and 2050. The Forest Fire Weather Index for continental France was projected into the future in a fine spatial resolution, based on IPCC climate scenarios. This was coupled with future vegetation sensitivity index based on vegetation type and topographic conditions. Different governmental bodies used the projected increased fire risk (+30% increase in high risk areas for 2040) to evaluate potential impacts and the need for new or revised policies. These included spatial and city planning to avoid expansion of the wildland urban interface, vegetation management, protection of infrastructures, etc. Finally, current total expenditure in prevention was calculated summing up budgets of all of the public and private actors involved to be able to estimate new

budget requirements. Preliminary results show that in order to maintain current levels of preventions a 20% increase in the total prevention budget will be necessary for 2040.

The two year exercise involving three different Ministries (Agriculture, Ecology and Interior) was considered useful for planning new preventive measures. As many countries will face similar challenges, they were invited and encouraged to build upon the French methodology.

Mrs. Lorenza Colletti described the Italian State Forest Service as an environment police corps whose core was established in the year 1822. This service is responsible for forest fire prevention and management. She described the investigation activities increasingly being carried out by the task force called NIAB, which specialises in research on the cause of forest fires. Understanding the origin of fires, fighting arson, enforcing the law, and communicating this to the media are considered relevant prevention tools. These areas can also greatly benefit from international cooperation.

Mr. Eduard Plana presenting a case from Catalonia (NE Spain) focused on the need for a holistic approach to forest risk management. He stressed the need for balancing the economic, social, and environmental factors that affect and are affected by forest fires. These, he said should be integrated into land-use and spatial planning. In areas where forestry is not profitable, efforts should focus on reaching more fire tolerant landscapes. This means setting up cost-effective fuel (vegetation) management strategies that can break the continuity of large fuel loads and allow for low intensity fires in some areas. This would require the integration of positive and negative externalities of all human-made activities related to any increase or decrease in fire risk, for example including the cost of fire prevention as regards housing in the wildland urban interface. In addition, it would require the promotion of self-protection attitudes in society and the assumption of responsibility on ignition control. Mr. Plana argued that the wildfire issue cannot be solved without reducing fuel loads and fire risk continuity in the landscape. He said this will require cross-sectoral and institutional coordination, as well as society's active participation.

The final presentation on innovative strategies was the «Fire Paradox Project» by Mrs. Cristina Montiel. One of the main objectives of the project was to provide the basis for new legislation and long-term policy measures in the European region in order to overcome to the imbalance in fire management policies on suppression and prevention activities. She stressed the need for new policy approaches at regional, national and pan-European level as well as for a flexible legal framework for updating and harmonising the legal and policy instruments. A Framework Directive on Fire was proposed as a common reference for implementing the integrated fire management concept at both national and regional level. This fire management concept implies acknowledging the potential use of prescribed burning as a tool for forest fire prevention, as well as the potential use of backfires as a fire suppression tool.

The summaries of the presentations given at the workshop are available in Annex 1, while the full presentations can be downloaded from the FOREST EUROPE web site at www.forestseurope.org/Forest_Fire_Prevention/Workshop.

Working groups

After the presentations on innovative strategies, workshop participants were divided into three working groups, dealing with separate topics related to forest fire prevention. Participants were asked to share views and highlight possible weaknesses and obstacles with the aim of providing a series of actions and recommendations. The conclusions and recommendations from the working groups (also available at the FOREST EUROPE web site) were presented to the plenary and were incorporated into the overall conclusions and recommendations of the workshop.

Working group 1: Forest fire prevention policy - How to make a difference

Chairperson: Ms. Irini Nikolaou

In spite of the progress that has been made with respect to forest fire prevention policy, there is still a need for significant improvement. In this context, participants in the working group were asked to identify a set of key actions or approaches that may help to further advance forest fire prevention in the European region.

The group underlined some disadvantages that characterise the current reality. These range from inadequate funding, mechanisms for support and implementation of forest fire prevention, a lack of balance in policy with regard to prevention and suppression as well as flaws in education. The latter one is of great importance in promoting public awareness and establishing the culture of an endeavour to prevent forest fires.

Participants proposed a series of measures to overcome these obstacles. Specifically, the group recommended i) better balance between prevention and suppression policies; ii) more efforts in data collection on forest fires and forest fire prevention and suppression measures; iii) the establishment of interdisciplinary national committees for data collection as well as for assuring data coherence at the European level; iv) continuous evaluation of the economic impact of forest fires and efficiency of prevention and suppression policies; v) the formulation of forest fire prevention guidelines to be followed by the different countries, and vi) better education concerning forest fires and how they can be prevented. The group also unanimously requested that FOREST EUROPE addresses the forest fire prevention issue during the next Ministerial Conference on the Protection of Forests in Europe.

Working group 2: Financing mechanisms and forest fire prevention

Chairperson: Mr. Nuno Calado

The key role that forests play in climate change mitigation and the increased risk of forest fires as a consequence of climate change converge in the urgent need for an updated forest fire prevention strategy in Europe. In this context, and taking into account budgetary constraints, participants in this working group were asked to provide innovative ways to finance forest fire prevention.

With regard to forest fire management budgets, the working group recommended an increase in the budgetary share dedicated to forest prevention measures with specific funding *allocated to preventive forest management and awareness raising campaigns*. These were aimed at reducing the probability of and to limit the effects of forest fires.

In order to overcome budgetary constraints, it was recommended that countries and international institutions make existing financial resources and budgets (rural development funds, occupational training, education, etc) available for implementation of fire prevention measures. The group also recommended that funding schemes should be linked to specific and comprehensive prevention plans and programmes, and that financial resources should be available for bottom-up prevention activities, managed at the local level.

Working group 3: Integration of forest fire prevention in the international forest agenda

Chairperson: Mr. Alain Chaudron

Participants in working group 3 were asked to provide recommendations on how to increase the visibility and relevance of forest fire prevention on the international agenda, with special focus on EU and pan-European levels.

At the global level, the group recommended building on the attention currently being given to the role of forests in climate change mitigation. Increased communication based on solid and coherent data collection was recommended in order to place more emphasis on the risks of forest fires and to highlight the need for effective fire prevention measures. All relevant international events should be used for these communication efforts (COFO, Mediterranean Forest Week, the Ministerial Conference on the Protection of Forest in Europe etc.)

At the European level, the group recommended that forest fire prevention should be seen as an integral part of sustainable forest management. This means that work should be carried out to ensure that forest fire prevention is an integral part of adaptation strategies and sustainable management plans. The group also recommended improved cooperation and experience sharing and highlighted the need for strengthened and harmonised data collection across countries.

At the European Union Level, the working group recommended overcoming the lack of data on the economic efficiency of managing forest fires (prevention, suppression and rehabilitation) and the need to establish a knowledge

and information exchange network. The group also asked for increased coordination among the different policies and institutional bodies involved, with a specific call for cooperation between the Council working groups on *civil protection* and on *forestry*. Furthermore, the contributions of the «Council Conclusions on Prevention of Forest Fires» (April 2010) and the need to integrate forest fire prevention in deliberations concerning the «Green Paper on Forest Protection and Information in EU: Preparing forest for climate change» were emphasised.

Field trip

Field trip participants visited an area burnt during the big forest fire on Rhodes, which burned more than 13,000 hectares in 2008. A key lesson learned was that the final cost of four days of intensive fire suppression efforts involving 10 aircraft, 9 helicopters and over 2000 firemen, could have facilitated many decades of forest fire prevention for the entire island of Rhodes. Before returning to the town of Rhodes, the participants visited Lindos, a picturesque coastal village. *For the full report of the field trip see Annex 2.*

Session 4: Conclusions and recommendations

On the third day, the final plenary, chaired by Mr. Christian Salvignol, concluded the discussion on innovative strategies and possible new policy instruments for forest fire prevention. The proposals and conclusions of the working groups were presented, participants discussed alternative strategies and possible new actions within a broader context and Mr. Salvignol gave a brief review of the workshop and the work that had been done. The final conclusions and recommendations were prepared with the active contribution of the workshop participants. At the conclusion of the event, all the participants were invited to contribute their personal brief message of priority with regard to the overall output of the workshop.

Conclusions and Recommendations

The importance of forest fires, and in particular fire prevention, was highlighted through the presentations and dialogue during the workshop. In response to climate change and the expected future magnitude of forest fires in Europe, both fire prevention and fire management measures were stressed. Especially for the Mediterranean region the need for measures that make it possible to live in harmony with forest fires was recognised. The need for more efficient and sound policies, strategies and measures, which should be implemented to fill gaps and to step up efforts to effectively prevent and manage forest fires were emphasised during the workshop.

The final conclusions and recommendations of the workshop are divided into four categories. The first category concerns messages referring to the International and Pan-European level, the second to the European Union, while the third category contains conclusions and recommendations relevant at national level. The fourth category contains suggestions and remarks with reference to financing mechanisms in relation to forest fire prevention.

International/Pan-European level

General messages:

1. Forest fire prevention should be promoted as an integral part of sustainable forest management
2. Current attention to the role of forests in climate change should be used to raise awareness about the risks of forest fires and the need for preventive measures

Proposed actions:

3. Improve cooperation between different bodies/working groups
4. Strengthened harmonised data collection and sharing of experiences across countries
5. Fire prevention to be integrated in adaptation strategies
6. A common understanding of forest fire prevention (definition, activities) is needed
7. FOREST EUROPE, EU and FAO/UNECE are asked to develop and promote revised template/guidelines for Forest Fire Prevention Plans, which should also reflect the outcome of the workshop

8. FOREST EUROPE is asked to address the issue of forest fire prevention at the Ministerial Conference, 14-16 June 2011, in Oslo, Norway
9. Increase the visibility of prevention in forest fires and forest management communication, also taking advantage of every opportunity that arises during the International Year of Forests 2011
10. Improvement of existing mechanisms of data collection and forest monitoring in order to share information and knowledge on forest fire prevention
11. Use all relevant events (e.g. COFO October 2010; Mediterranean Forest Week Avignon April 2011; Ministerial Conference Oslo June 2011) to draw attention to prevention of forest fires

European Union

General messages:

1. Lack of data on economic efficiency on forest fire management (prevention, suppression and rehabilitation)
2. Many initiatives and lack of coordination

Proposed actions:

3. Disseminate and share experiences
4. Build up and replicate the best practices of fire management
5. Establish a sustainable and clear method of funding
6. Make sure that funding reaches local actors and facilitates involvement (local multipliers)
7. Evaluate the effects and the efficiency of prevention
8. The EFFIS should include additional information on forest fire prevention in order to identify the various situations in the countries. This should be done using «common language» that would lead to harmonisation and standardisation
9. Council working groups on civil protection and on forestry must work together
10. Integrate forest fire prevention in the responses to the Green Paper on Forest Protection and Information in the EU: Preparing forests for climate change
11. EU member states and the commission to implement actions foreseen in council conclusions on prevention of forest fires of 26 April 2010

National level

General messages:

1. Encourage development of national forest fire prevention plans taking into consideration the particularities of the countries or the local conditions, the principles of sustainable forest management and future needs due to climate change

Proposed actions:

2. Ensure that forest fire management, including fire prevention and suppression, is an integral part of sustainable forest management and coherent with all relevant policies and integrated in adaptation strategies
3. Provision of future forest fire risk (climate change, social change, etc.) for the purposes of defining sustainable prevention policies, action plans and budgets
4. All education programmes should include raising awareness and education on forests and forestry
5. Promote the economic dimensions of forests in order to provide low cost prevention
6. Encourage all countries to provide data on forest fires and forest fire prevention
7. Tools needed to strengthen support and implementation of forest fire prevention:
 - Data collection of the financing of prevention, suppression and restoration
 - Establishment of an interdisciplinary national committee for data collection and validation
 - Standardisation and harmonisation of the data
 - Estimation of economic impact of forest fires
 - Balance in prevention and suppression policies at local level
 - Enhance cooperation of all stakeholders in prevention processes including, among others, spatial planning
 - Forest education

Recommendations concerning financing mechanisms

1. Increased importance must be given to forest prevention measures, also on specific budget allocations, with the aim to reduce the probability of fire occurrence and to limit the effects of forest fires. Within these measures, significant weight should be given to fire *preventive forest management* measures and *awareness raising* campaigns
2. All EU member states should develop a comparable information system regarding forest fires investment distribution in order to develop a harmonised system such as the one at EFFIS
3. Countries should encourage and promote the use of the existing financial resources for implementation of fire prevention measures
4. Following the scheme of the previous EU regulation (Reg. EC 2158/92) specific budgets for prevention, including bottom-up activities, should be made available
5. The funding schemes should be attached to specific prevention plans and programmes
6. Due to the role that European forests can play in climate change mitigation, forest fire prevention policies should be developed to enhance forest protection and therefore, fire prevention

Finally, all the workshop participants were asked to contribute to the outcome of the workshop by providing their personal «three word priority message». These messages are presented as they were expressed.

Participants' priority messages

1. Data harmonisation and sharing
2. Prevention is integral part of sustainable forest management
3. Coherence in cross-sectorial policies
4. Include prevention in national strategies
5. Strong effort needed for data collection on costs
6. Need for sustained specific budgets
7. National education programmes
8. National regulations
9. Cooperation and work to learn and replicate best practices, relevance of local level
10. Wild fire management should be included in prevention measures
11. Integrate land use planning into the picture
12. Support best practices for fire management at the local level
13. Template and guidelines also at EU level
14. Funding must reach local actors
15. Keep responsibility at the owner/manager level
16. Bottom-up/territorial approaches & local multiplier
17. Need for guidelines earlier
18. Include sustainable forest management also at the international level
19. Countries must provide/collect harmonised information
20. Make effectiveness more visible to policy makers
21. Long-term policy framework and flexible legally binding instruments
22. Different EU policies must promote prevention (sustainable forest management)
23. Develop a framework for data collection utilisation
24. Fire prevention is integral part of adaptation
25. Evaluation of prevention
26. Education
27. A bigger share of budgets to be allocated to prevention
28. Allocate resources according to value of ecosystems
29. EU level legislation needed
30. Raise visibility of prevention at the international level
31. Feedback at EU and other levels concerning the impact of policies and budgets at local level
32. Methodologies for efficiency of prevention, evaluation of losses
33. Definition of prevention and prevention activities
34. Visibility of prevention
35. Compilation and sharing of experiences
36. Need for funds to raise awareness
37. Common framework for data collection on the implementation and costs of fire management measures
38. Establishment of a standardised system for efficient evaluation of fire management to enhance implementation of balanced and effective fire management programmes at national/regional levels

Annexes

ANNEX 1: SUMMARIES OF PRESENTATIONS

Forest Fire Prevention Developments at the International Level

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Trends in forest fire prevention

Several trends can be seen globally regarding fire prevention:

1. The idea that forest fire prevention should be an integral part of fire management, or even forest or landscape management, and deserves the required budget is becoming more and more accepted among professionals. An obstacle for a real integration is that different agencies are often responsible for different activities. However several countries already make great efforts when it comes to fire prevention.
2. We understand more and more that fires are aggravated by demographic processes. This understanding has led to a greater focus on the general needs of communities since community education about forest fire prevention is not enough. Better access to forest resources, rural development activities inside and outside of forest may also help preventing wildfires.
3. We also recognize that the use of fire has long traditions in agriculture, and that ensuring strengthened capacities in the use of safe agricultural fires might be important in wildfire prevention. This presents the paradox of using controlled fire inside and outside forests in order to prevent uncontrolled wildfires.

4. In many parts of the world legal framework revisions are taking place in order to allow the introduction of new insights into forest fire management. These revisions help set rules to allow the use of fires, rules for allowing animal grazing in state forests, (e.g. Lebanon), or rules for allowing local people to obtain earnings from forest management of state forests (e.g. Syria).
5. More attention also goes to security measures taken by community members in the wildland urban interface to prevent fires from destroying houses and taking lives, e.g. the Fire Wise programs in the USA and South Africa.

Challenges and recommendations

The data available on fire prevention globally is limited. Surveys or research on this may shed some light on the prevention activities and strategies used in different parts of the world, and their success rates. More data is needed on the cost efficiency of wildfire prevention in comparison to fire suppression activities. In general, more research is needed on preventive silviculture. It is also challenging to convince policy makers and the public in general that the controlled use of fire can avoid bigger wildfires with even higher CO² emissions, and the importance of this in relation to the general attention to climate change and CO² emissions.

Forest fire prevention at the EU level

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20 Ernst Schulte, European Commission, Directorate general Environment (DG ENV), gave an overview on EU forest fire policy. He explained that forest fires are subject to Regulation (EEC) N° 2158/92 on the protection of the Community against fires before being handled by other Regulations, in particular on rural development and forest monitoring. Currently, forest fire policy has no legal basis, but is subject to major co-funding under rural development and regional policies at EU level. To be eligible for co-funding, the EU Member States need to establish national programmes which refer to fire prevention and/or restoration measures. This is done on a voluntary basis. The LIFE+ regulation (EC) No 614/2007 works on the basis of yearly calls for proposals and allows for co-funding of awareness-raising and forest fire prevention actions.

The Commission's expert group on forest fires is an informal and registered expert group, composed by members from a broad range of national bodies (agriculture, environment, civil protection). This group meets twice a year to further improve the European Forest Fire Information System (EFFIS, <http://effis.jrc.ec.europa.eu/>) established by the European Commission's Joint Research Centre on support to DG ENV. The expert group also serves as an information platform in order to exchange good practices and to learn lessons after problematic forest fires. The expert group supports the FAO fire management voluntary guidelines and the fire prevention recommendations of the Sabaudia workshop.

On 1 March 2010, DG ENV launched a Green paper on forest protection and information in order to initiate a debate on possible steps towards a future EU forest policy. A public consultation is open until end of July. Forest fires will be one of the issues subject to the debate.

DG ECHO also works on implementing a Community approach on the prevention of natural and man-made disasters [COM (2009) 82 final] and foresees adapting guidelines on minimum standards for disaster prevention in 2012.

Review of National Forest Fire Prevention Systems in European Countries

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In order to review the national forest fire prevention systems in Europe, a relevant questionnaire addressed to all national representatives at the Workshop was circulated. Completed questionnaires were received from Croatia, Cyprus, France, Greece, Poland, Spain, Turkey, Romania and Italy. The basic aim of the questionnaire was to map the correlation of the importance given to prevention in regards to the control of forest fires at a national level.

Through this study the following emerged:

- (a) There are no common and harmonized definitions with regards to the prevention of forest fires.
- (b) No analytic break-down of the budgets exist that are allocated to the prevention and control of forest fires respectively, so it is impossible to compare these budgets in any way and to resolve the funds that are dedicated to prevention and control of forest fires.
- (c) In most countries the prevention and the control of forest fires are responsibilities shared between different services. As a result the fire statistics as well as the relevant financial data are scattered and difficult to collect, analyze and consequently it is difficult to attain reliable and sound conclusions.

Based on the above mentioned constrains we can give the following general conclusions:

- Most of the Forest Fire Managers recognize that prevention is preferable to the control of forest fires, yet the majority reports that the biggest part of the budget pie is allocated to the control of the forest fires.

- In general the firefighting planes and helicopters, the big firefighting engines and the firefighting operations are more «spectacular» and more obvious to the mass media as well as to the general public and the politicians. Fire professionals and scientists must thus find ways and tools to make fire prevention and its importance more «visible».
- In order to have comparable and comprehensive forest fire data, a harmonized methodology must be developed and disseminated for use by the European Countries.

Short biography

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Examining the Causes of Large Forest Fires in Mediterranean Countries

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Forest fires are a serious problem in all the countries of Mediterranean Europe. Each summer thousands of fires in each of these countries mobilise significant resources for fire suppression. In exceptional years, when the conditions favor fire eruption, acceleration and spread, fires can get very large, with catastrophic outcomes. Over the last decades this has prompted serious efforts both within countries and at the EU level to address the forest fire problem, but so far the results are not satisfactory. Forest fire statistics are important and necessary tools for analyzing the fire problem and determining how to best manage it. Examination of such statistics in numerous studies in countries with Mediterranean climate, shows that, as a rule, a small number of fires contribute most to the total area burned. These few fires are the ones that grow very large under extreme weather conditions, exhibiting fire behavior that makes firefighters clearly unable to intervene for as long as the adverse weather persists. The term «megafires» has been used repeatedly to describe such fires and has received a lot of attention. The term describes those extreme fires «that exceed all efforts at control, regardless of the type, kind, or number of firefighting assets». Large fires have received increasing attention over the last years as their frequencies are rising, together with their destruction potential. The work presented here is an effort to examine this phenomenon focusing on what causes such large fires in countries with Mediterranean climate.

Wildfire causes

Large forest fires are nothing new. They are the result of extreme fire danger conditions like strong wind, high temperature, low relative humidity, etc. Under such extreme conditions any forest fire may grow large if not attacked effectively in its first moments. This introduces the firefighting response and effectiveness as

a second factor that may lead to large fires. Thirdly, the place and time of the fire eruption is a major factor in how the fire will evolve, and finally the values at risk play an important role. Trying to save properties and infrastructures, especially in what is called a wildland-urban interface (WUI) area, may lead to neglect of the forest and the overall fire perimeter, contributing to an increase in the final size of the burned area. In forest fire statistics, the term «fire cause» usually refers to the specific way in which a fire starts. However, in trying to understand the cause that leads to the increased frequency of large fires, their extreme characteristics and destruction potential, all these four causal factors should be considered.

Fires start from natural (mainly lightning) and human causes. Lightning distribution follows specific patterns ruled by the humidity levels in the atmosphere and landscape elevation. In inland areas of high elevation, lightning due to convective activity is likely even in less humid periods, and result in frequent lightning caused fires. As a rule, moisture and temperature conditions are not conducive to quick fire acceleration. Thus, an effective fire detection system combined with capacity for quick and effective initial attack may lead to quick suppression of such lightning-caused fires. On the other hand, in many countries with large areas of forests under continental climate, including parts of Mediterranean countries which are far from the sea, the combination of dry summer conditions with episodes of increased lightning activities, may result in a very large number of lightning caused fires. In such cases, when there are not enough initial attack forces available, fires have to be assigned priorities and some of them are not attacked immediately. Such fires have occasionally grown to significant sizes.

Human-caused fire starts may be accidental, due to negligence or due to arson. In order to improve fire prevention planning, it should be known if the probabilities for the three human-caused categories are equal.

Accidental fires, such as those caused by power-lines, car accidents, etc. are always associated with human activities. They may start under all types of conditions and are usually close to where people live, work or recreate. As a result, they are detected quickly and firefighting forces can reach them without difficulty.

Fires started by negligent behavior increase with human activity in a forested area, an agricultural area, or a WUI area. The public often dismisses this cause category in favor of motivated and premeditated arson, associating the latter with high fire danger conditions but both experience and scientific evidence show that the majority of forest fires in the Mediterranean countries, including large conflagrations, are the result of human negligence.

Arson is defined as the willful, malicious, deliberate and premeditated burning of a structure, forest, land or property. Depending on their motivation, some arsonists want to cause a relatively small fire focused as much as possible on the specific area they want to burn with some additional land sacrificed to avoid creating direct suspicions. Others, especially pyromaniacs, are interested in satisfying their instincts or other objectives such as terror. For them, the larger and more spectacular a fire, the better. Obviously, the latter are the most dangerous type of arsonists.

Examples of large fire causes

In Greece, the fires of the summer of 2007 lead to the death of 78 people. In June 27, 2007, a fire that started from powerline sparks near the village of Dervenohoria, was attacked ineffectively and one day later burned most of Parnis National Park near Athens. A month later, on July 24th, a fire that started in a garbage dump in Aigialia, although initially controlled was not guarded properly, re-started and burned more than 30,000 ha. Fire investigation found the following causes: An old woman burning grasses in an agricultural field (Parnon fire), another one cooking on an open fire in her yard (Paleohori fire), a shepherd practicing traditional (illegal) burning (Taygetus fire), a case of trying to eliminate criminal evidence in relation to a marijuana plantation (Sekoulas fire), property disputes (Mistos of Evia fire), as well as sparks from use of a metal cutting device (Mesorahi of Evia fire).

The situation in the other Mediterranean countries is not much different. All southern European countries have experienced extreme fire seasons and catastrophic single fires in the last two decades. For example, arson was the cause of the tragic Horta de Sant Joan fire, in Catalonia, Spain in 2009 killing five firefighters. Negligence, to the point of stupidity, from a group of 10 day-trippers who started a barbecue under extreme fire

weather conditions in a nature reserve of pine woodland in the Guadalajara province, resulted in a 12,000 ha fire that killed 11 firefighters.

Prevention measures

Having examined the causes of large fires it becomes obvious that all known fire prevention measures are needed. Prevention should not focus only on public education campaigns, better fire investigation, punishment of arsonists, better surveillance etc., but also on maintaining forest vegetation to safe levels, developing safer WUI areas, and of course preparing sophisticated pre-suppression plans that well-trained and equipped firefighting forces can apply affectively.

Forest Fire Prevention in Aquitaine, France

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Forests dominate the landscape in Aquitaine, South-West France, with 1.7 million hectares that represent 43% of the region. Forest Fires were common 60 years ago. Between 1940 and 1949 over 400,000 forest hectares burnt. In the last decade this figure is below 20,000 hectares (on average there are 1,700 fires per year of an average size of 1 ha). It can be said that forest fire prevention is winning the battle. A key factor explaining this great success is the fact that 50 years ago forest owners took responsibility for forest fire prevention and organised forest fire prevention around DFCI associations (Défense des Forêts contre l'Incedie).

Nowadays, there are 241 forest fire prevention associations formed by over 2500 voluntaries and around 60,000 forest owners paying €2.3/ha/yr for a total contribution of 2.7 Million €/year. This private funding represents 43% of the total prevention budget run by DFCI associations. It is complemented with resources from the Ministry of Agriculture (27%), EU FEADER funds (20%) and inputs from the regional government 6%, Conseil General (3%) and Ministry of the Interior (1%). In total DFCI has an annual budget of 4.6 Millions €.

Priorities are clear at DFCIs. The chain of efficacy is based on the sequence: 1) Prevention infrastructure and risk reduction management; 2) forecast analysis and surveillance, and 3) pre-positioning and initial attack. For this reason, since 1950, when DFCI associations became compulsory, forest infrastructure for fire prevention has dramatically increased while forest fire severity was decreased in the same proportion. Trails, water ponds, bored wells, info boards, etc. are built and maintained by forest owners in close co-operation with public services. Surveillance towers and GIS based technology allows efficient

real time communication between DFCI officials and firemen department for fast initial attacks.

In total prevention costs 4 €/ha/yr and is protecting 1.2 million hectares of productive forest that generates 34,000 jobs and a turnover of around 2.6 billion €. The effort is worth it and shows that prevention is possible when forest owners take the responsibility and there is an effective public-private cooperation.

Towards sustainable prevention of forest fires in French départements

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The south of France (32 *départements*) is considered as particularly sensitive to the risks of forest fires on a surface of more than 6.7 millions ha and needs annually half a billion euros of direct public aid for forest fire fighting (70 %) and prevention (30 %). The last annual results of forest fire prevention in France in 2009 (17 000 ha burnt, ratio of 79 % for extinguishing incipient fires of less than 1 ha) satisfies most of decision-makers since these were obtained after the catastrophic 2003 campaign (with more than 72 000 ha of burnt areas). However we also have to exam the results in terms of a sustainable efficiency which allows the sustainable protection and development (agriculture, forestry and town planning) of the basins at risk, and especially the forest habitat interfaces.

The example of the *Var department* case in the Mediterranean region is significant for the abandonment of agriculture and forestry on one side and the increase of the population (0,9 % a year) on the other side which mutually interact. A plan for protecting the forests and their surroundings (almost half a million ha) was elaborated and approved in application of the national forest code (*Plan de protection des forêts contre les incendies, PPFCl*) by the *préfet de département*. This plan in particular defines a strategy: to reduce the number of forest fires, to increase the rate of extinction of incipient fires, to reinforce the protection of people and property and to improve the quality of the protection works. The plan also defines an action plan for each of the main forest sectors and duration of 7 years (2009-2016). If the first annual results are relatively good, we established that the majority of fires (2/3) occurs outside the forests and have a human cause.

The analysis of this critical situation is common for the majority of the forest fire risks *départements* in the south of France, and especially in peri urban zones where the villages and cities are in

expansion. The land owners who don't manage their properties sell terrains for house building. One decision maker can regulate the supply and demand of terrains for building-sites: the mayor. Another decision-maker is in charge of the protection against forest fires in the basin at risk: the *préfet*, without being able in fact to limit in any case the housing without special and very long procedures such as the (communal) *Plan de prévention des risques*. This situation induces the incoherence between urban plans, building permits and the PPFCl: always more dwelling cases of peri urban zones in the Mediterranean region, the needs of many fire fighters first to protect residents and their houses in case of fires which are extinguished as incipient fires and finally the impossibility to fight quickly enough against eventual new fires in the same basin at risks.

This situation is dangerous because insidious. A lot of technical progress masks this evolution: the terrestrial survey and the aerial means allow us in normal situations to react at the right time, but with always higher costs for fire fighting against incipient fires and for people and house protection.

Forest Fire Prevention Initiative of Moniatis Village. A Bottom-up Example of Fire Prevention in Cyprus

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In Cyprus as in many other countries of the Mediterranean basin, fire is considered as one of the principal destructive agents of forests and other wooded lands. The fire hazard in Cyprus is quite high, especially during the summer period. This is because of the nature of the forests, the prevailing climatic conditions and the topographic conditions.

Moniatis village is located in the southern part of Troodos Forest at an altitude of about 650 m. The north boundaries of the village territory are extended to the delimitation line of the State Forest.

In 2007, a big catastrophic forest fire occurred with a total burnt area of 1182 ha. Half of this area was state forest land and half was private land, mainly covered by natural vegetation. Permanent houses, tourist villas, restaurants, orchards and other properties were among the destroyed infrastructure.

Before the fire, this area was a tourist destination due to its natural beauty and pleasant weather conditions. After the fire, the tourism disappeared and the growth stopped.

The reaction of the local authorities after the fire was imminent. They collectively approached all relevant governmental services and other key actors and called for guidance, technical assistance and funding, in order to establish an adequate and coherent forest fire prevention regime for their area. The Department of Forests responded immediately and supported this initiative.

With their persistent demand, they have promoted the development and implementation of a comprehensive forest fire protection plan consisting of a network of roads and fire brakes as well as water points and reservoirs, network of fire nests,

fuel management program for the cleaning of the house yards etc. Also, groups of volunteer firefighters have been developed, equipped and trained.

The implementation of the plan was financed by National and European Union Funds, with the full support of the Department of Forests.

The lack of cooperation with nearby villages for development of common prevention plans (Network approach) and some legal constrains concerning the construction of prevention measures in private land, were the major problems for the implementation of the above bottom-up project.

Short biography

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The Plan 42. A Program to Change the Behavior of Fire Users

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Forest fires are a worldwide problem. Every year between 300 and 400 million ha are burned, according to the FAO (Report about the status of forest in the world 2003 FAO).

The answer to this problem has been the implementation of costly extinction systems in developed countries, especially in Europe. However, there are no strategies in place that modify the causes. This is due to the fact that the causes, though they are well known by experts, are a mystery for the whole society and the media.

The current state of evolution of the Mediterranean is closely connected with the number of fires and with their severity. This is forest fire central point. Neither the number nor the severity of the fires can be understood without understanding the actual state of vegetation. Forest fires are often caused by the use of fire as a vegetation management tool by farmers and stock breeders. The vegetation is in a very unfavorable development stage due to rural abandonment and the changing production models of the last 50 years: pastures are being transformed into bushes and will become woods in the end. This state of the vegetation reinforces the traditional use of fire; the remaining rural population wants to control the vegetation for maintaining grassland or lands free of scrubs. These farmers still use fire as a primary form of clearance, as they have always done, and as a result the number of fires is very high. At the same time, the

current vegetation has a very combustible structure due to the high proportion of fine fractions, both living and dead, and there are large areas with high fuel loads without discontinuities horizontal or vertical. This increases the risk of catastrophic fires, and the predictions regarding future climate changes will further increase this risk.

However, change is possible. A tree-based economy is the permanent solution, as areas with this kind of economy have no more fires. For example in the Urbion Forest Model County, located in the Duero river springs, large fires were common until the 60's. Then the forestry economy became important and the fires disappear at last. The lesson learned from this case is that stock breeders had needed to assume that economic forestry can be important and can go together with livestock. This is the main idea of the Forest Model; gather people living in a county around forest management as a way to integrate different approaches. Unfortunately, our forests are currently made up of bush and thin trees, preventing an economical use. Furthermore, a lot of Mediterranean species are not in the traditional timber market and most likely will not be in the future unless new profitable markets, such as bioenergy, are developed.

The solution is therefore to modify the current structure. We must manage the vegetation structure in order to be able to control catastrophic wild fires. This is urgent and we should do it in a landscape scale. The effect of structure management will in addition increase the chance of some economical value of the forest, and may contribute to the solution. At the same time we should work in order to change the tradition of using fires.

The PLAN 42 is a program for reducing the number of forest fires through changing the habit of using fire. It is located in the counties with most fires: 154 municipalities (7% of the total) that suffer 50% of the fires of Castile and Leon. Its methodology consists on working directly with users of fire to implement alternative tools for vegetation management. It also aims to train rural people in activities to promote forestry development since that is not part of their experience nor tradition. The forest economy has a positive impact on the severity of the fires because it creates much less dangerous structures. Furthermore, the population has no need to use fire for two reasons: because forest does not require it (counterproductive) and because

the structure produced allows the livestock activities without need of thicket control. The Plan 42 star action is a program about vegetation management without fire, leading livestock producers through the development of 5-year management plans for grazing called Silvopastoral plans. The annual investment for each farmer ranges from 7,500 to 8,000 Euros, allowing an average of 36 hectares cleared for the livestock, which accounts for 25% of their pasture lands.

In the first stage: 2003-2008 from working with 470 stock breeders:

- 17,000 ha of host/cleared surface
- 70,000 ha of total farm land area
- 3.6 M € annual investment

In the second stage, which is part of the «Aid for the forest environment» Rural Development Program 2007-2013, contracts have been incorporated since 2008. It is expected to involve a total of 550 new stock breeders and next year, reaching:

- 22,000 ha of new host surface (cleared surface).
- 82,000 ha of total holdings area
- 4.4 M € annual budget

The Plan is thus working with more than 1000 farmers and the objectives will shortly be reached. Almost from the first year we felt a positive impact of the program, on the number of fires, as well as on the danger the fires posed, especially in the worst municipalities where the program works with more farmers. From an average of 14 fires per year the number has dropped to 7 and the combustibility of the most dangerous regions has decreased to some extent. Until now farmers were the main arsonists through their use of fire to regenerate pastures. Through this program they stop doing so because they experience that the clearings and regulation of livestock provide better pastures and better profitability of their livestock than fire clearance. They are beginning to appreciate the need to focus the livestock on places that provide quality grasses, allowing the rest of land to grow trees since that may in the future be of greater importance to the local economy. In these areas where forestry was earlier almost unknown, people are starting to consider forestry as a future possibility. Trees are no longer the grassland enemies that they used to be for the local people.

Evaluation of economic efficiency of fire prevention

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Forest fires are a societal problem that causes significant environmental and economic impacts. To combat the forest fires problem forest managers can apply different management measures. These include prevention (e.g. education, publicity campaigns), fuel treatment (e.g. prescribed burning, thinning, mechanical fuel removal), pre-suppression and suppression, and restoration measures. Fire prevention includes a set of measures with the objective to reduce the probability of fire occurrence or to limit the effects of a fire (Velez, 2003).

One of the thorniest questions in fire management is to determine how the limited financial, equipment, and human resources should be most efficiently spent and distributed among alternative fire management options. For example, economic models can help to estimate whether investments in forest fire related measures (e.g. prevention, suppression, fuel management) are financially justified, or to choose the most efficient amongst several alternatives (i.e. the combination of investments in fire prevention, fire fighting and amount of wildfire allowed). In this context, fire prevention has to be considered as an integral part of fire management. Because, fire prevention does not only influence the probability of fire occurrence and limit its effects, but in combination with other fire management measures also influences the extent of losses and benefits provoked by forest fires, and the needed resources for fighting the fire problem. Thus, also the evaluation of the efficiency of fire prevention has to be evaluated in the frame of integrated fire management and not separately.

Although there has been considerable development of economic methods (e.g. non-market valuation methods) and models (e.g. C+NVC model), important problems still remain to be solved in the future. In this respect, the main issues are

the inadequate understanding of the impacts of forest fires on the spatial and temporal provision of goods and services (e.g. how the quality and quantity of a good or service is affected and for how long); the potential effect of the changes caused by forest fires on society's wellbeing (e.g. what is the value of the losses); the impact of fire management measures on risk, extent and severity of forest fires (e.g. quantify the effects of different management measures).

Short biography

Robert Mavsar is senior researcher in the EFI Mediterranean Regional Office EFIMED. He is working in the fields of environmental and forest economics and the valuation of non-market goods and services, and economics of forest fires.

INCA Project: Risk Prevention Through «Agreements on Objectives» Between the Stakeholders

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Natural hazards are a significant problem in our modern world which strives for growth, stability and safety, but often sees its efforts fall short. Natural disasters make the news more often, becoming especially impressive and painful where human-caused actions, such as poorly planned population concentration in large urban centers, lead to increased risks and vulnerability. Moreover, current and projected climate changes are very likely to lead to new challenges of uncertainty and an increase of extreme events. This calls for more flexibility and better coordination of response strategies with an emphasis on prevention, as, through numerous examples, it has become clear worldwide that even the best response to a risk once the event is in progress does little to avert the disaster.

One of the main reasons natural disasters are on the rise is that current prevention of risks caused by natural hazards is fragmented, among others, between civil protection and spatial planning. Considering this fragmentation as an area in which significant improvements can be made, nine European organizations from Germany, Greece and Italy (table 1) work on a project called INCA aiming to address this weakness in a fresh and innovative way.

Table 1. The organizations participating in the INCA project.

National Research Council, Institute of Research on Population and Social Policies (coordinator), Italy
Dortmund University of Technology, Germany
City of Dortmund, Germany
T6 Ecosystems srl, Italy
Associazione Nazionale Comuni Italiani Lazio, Italy
Lazio Region - Regional Civil Protection Department, Italy
Harokopio University of Athens, Greece
National Agricultural Research Foundation,
Institute of Mediterranean Forest Ecosystems and Forest Products Technology, Greece
Region of Attica, Greece

INCA is a project realised with the contribution of the Civil Protection Financial Instrument of the European Commission. The project aims to bridge spatial, functional and operational gaps and divergence in approach, competence and perspective between civil protection and spatial planning by a collaborative process with concrete results to make measures and actions of risk prevention and mitigation efficient, effective, strategically aligned and sustainable. In order to achieve this, the project proposes a new concept called «Agreements on Objectives». The concept aims on risk prevention and damage mitigation by integrating non-structural and structural measures and activities in both fields. It offers a practical, goal-oriented, consensual alternative to the more rigid and restrictive spatial planning.

The concept is being developed in three regions in Europe that serve as test areas. These regions differ from each other in their profile and character as regards human, spatial development and physical geography. They are the City of Dortmund in Germany, the Area of Eastern Attica in Greece, and the Province of Viterbo in Italy. The three countries represent among others different legal-administrative systems. In the three areas it is tried to develop concrete agreements on objectives for flood (in Dortmund) and forest fires (in Eastern Attica and Viterbo) prevention and protection. Once these agreements are achieved, they will guide the daily work of the involved civil protection operators as well as spatial planners.

The basic idea behind the definition of commonly agreed protection goals and objectives is that spatial planning and civil protection should decide together by means of a structured governance process on the paths, policies and actions towards the reduction of a given risk level (e. g. in % within a certain period of time). This refers to decisions at both the strategic and operational level; success is going to be measured by means of a quantitative outcome control. This will lead to aligned and targeted planning and implementation measures that are compatible with the whole disaster cycle. In short, the steps to be followed for applying the INCA methodology are as follows:

- Step 1: Definition of problem/issue
- Step 2: Creation of working group
- Step 3: Definition and agreement on common objectives
- Step 4: Agreement on mitigation measures
- Step 5: Agreement on indicators and measuring values
- Step 6: Definition of appropriate stakeholders (target group) and information policy
- Step 7: Continuous monitoring and review of risk governance process as well as continuous consultation

This is a new planning philosophy intended to substitute the current one that leads to inefficient funding and implementation of disconnected single projects and an overall disregard for effectiveness and meaningful end results.

The project started at 1st January 2009 and will last twenty months. In Eastern Attica forest fires is one of the most serious problems manifesting itself practically every year. It is a multi-dimensional problem: its causes and impacts involve such issues as public administration fragmentation and bureaucracy, lack of communication between Forest and Spatial policies, the civil society and prevailing political culture, fluidity of land ownership rights and their historical origins etc. Therefore the main challenge of forest risk mitigation has been specified to several sub-objectives:

1. Elimination of forest fires (and ensuing losses) owing to negligence;
2. Intensification of research for the detection of the mostly unknown causes of the phenomenon;
3. Active enrolment of the civil society in forest fire prevention, preparedness and reforestation issues;
4. Enhancement of the role of Spatial Planning (administrative and legislative) in Forest Fire Risk mitigation.

Through multiple meetings involving INCA partners and other shareholders, mainly local authorities (figure 1) certain mitigation measures were agreed upon and are currently being tested in practice. The results so far, especially in regard to the willingness of certain people from the staff of state and local authorities to contribute to the participatory process are very encouraging. It is hoped that once fully developed and applied, the INCA concept will lead to more efficient regional governance and flexibility in local risk prevention and response actions. The concept is flexible and transferable to all spatial levels for all hazard types and all EU Member States.

More information about the INCA project can be found at www.project-inca.eu

Assessment of Forest Fire Risk in France in 2030 and 2050 and Adaptation Policies

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A methodology of the study on the extension of the risk of forest fires in France in 2030 and 2050 related to climate change was conducted at the initiative of the French Ministers of Agriculture, Ecology and Interior. They asked their general inspection to realize this mission in order to assess the effects of climate change on public policy prevention of fire risks in French forests. This study was conducted with the four main following topics:

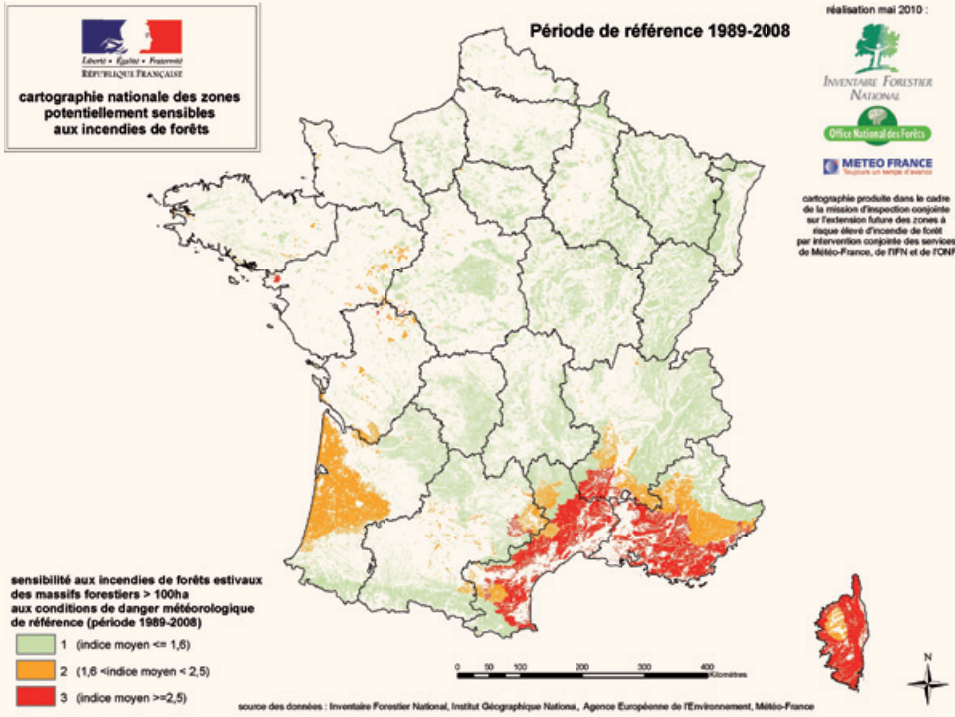
1. Taking into account the evolution of climatic factors.

The study was based on analysis of the Forest Weather Index (FWI) commonly used in Europe (see for example the website of the European Commission EFFIS). Meteo-France has calculated the FWI on a daily 8km x 8km grid over the last 50 years. Once the calibrated model, it was able to project the value of the FWI 2010-2100, using three climate scenarios of the IPCC.

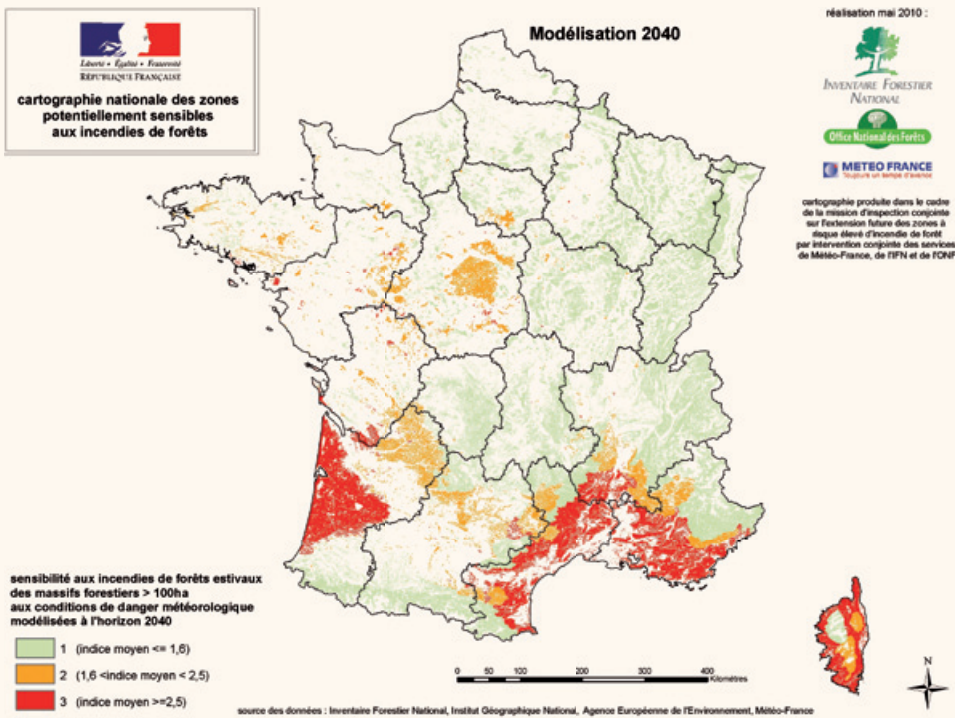
2. Taking into account the sensitivity of vegetation and its crossing with climatic factors. The National Forestry Board (ONF) and the National Forest Inventory (IFN) have developed a sensitivity index of vegetation, especially based on a factor related to vegetation (Forest types, Biogeographical regions, Altitude) and a factor related to the available water (soil, exposure, slope). By combining climatic data and vegetation data the joint mission can then propose a national map of areas potentially sensitive to forest fires at different times.

For example the three maps below show the sensitivity of summer forest fires forests over 100 ha.

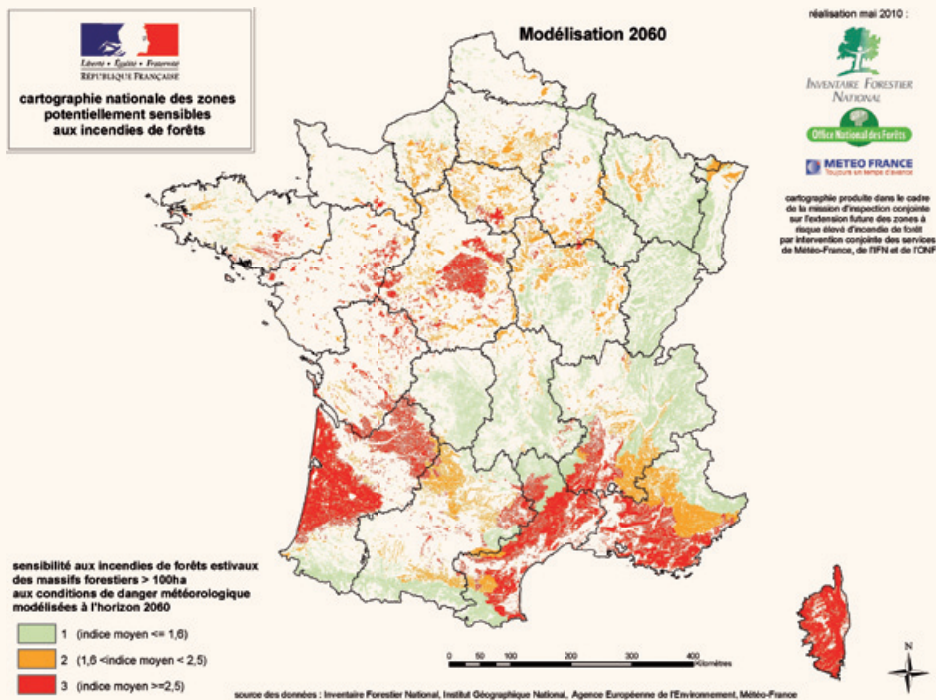
These maps are working documents, reproduced for illustrative purposes only, the sole purpose of clarifying the method. They clearly show a strong and rapid expansion of sensitive areas in the coming decades: at maturity in 2050, half of the metropolitan forests will be affected by forest fire hazards.



Risks of forest fires for the reference period (1989-2008)



Risks of forest fires for the year 2040



Risks of forest fires for the year 2060

3. The impacts on public policy in France.

This part of the study is a contribution to the National Plan of Adaptation to Climate Change, currently being finalized. For planning policy, the inter ministerial mission recommends to reduce and to deal with the Wildland-Urban Interface (WUI) to prohibit urban sprawl of natural areas, to preserve agricultural cuts, to design systems adapted to fight against fire and to promote self-protection of new construction. In legislative terms, it proposes to make enforceable the departmental plans for the protection of forests against fires and to organize the compatibility with local development plans, which would inevitably lead to conflicts of interests.

For forest policy, in addition to the adaptation developed elsewhere (choice of species and provenances, adoption of more dynamic silvicultural models of Forestry), the zoning of forests where specific measures apply (Article L321.6 of the French Forestry Law) for example will have to be reviewed in this context of Climate Change.

4. The evaluation of costs and their evolution in the context of adaptation to Climate Change.

First, the inter ministerial mission analyzed the current costs of policies to prevent and fight against forest fires in France, which is not so easy in a country where the decentralized local governments are free to govern themselves. Thus, for the year 2008, the cost amounted to € 537 million, distributed as follows:

- 1/3 for the prevention and two thirds for the fight. The costs of reconstitution are not counted.
- 36% for the state, 61% for local government (mainly county fire services and emergency) and less than 3% for private forest owners.

The evolution of these costs and funding scenarios obviously depend on the risk level allowed, the means used and the choice of burden sharing between the state, communities and landowners. Thus, the extension of surfaces (of the order of + 30% by 2040) would result in additional costs, policies to prevent and control equivalent of about 20%.

In conclusion, the objective of this presentation was not to highlight the case of a particular country in the Mediterranean, but to highlight the issue of the evolution of the risk of forest fires in the context of climate change. If France has the means to conduct a heavy study, during over two years, with involvement of senior experts from three jurisdictions and three public institutions, to prepare changes to term public policies, it is clear that these questions also arises in similar terms in many countries. In countries affected by these developments it is better to anticipate and prepare to implement new preventive measures rather than waiting for the next disaster summer. An original methodology was developed. This is the first time - to our knowledge - that climatic data and vegetation data are coupled to such a scale. It is why the presentation was made at the workshop of Rhodes under innovative practices. France is ready, once the final report published, to share the methodology and results with interested countries, including FOREST EUROPE signatory countries, *Silva Mediterranea* countries, the European Union member states as well as the European Commission.

Short biography

Alain CHAUDRON is senior adviser for international forest affairs in the French ministry of Food, Agriculture and Fisheries. He chaired FAO's European Forestry Commission from 2006 to 2008 and is member of *silva mediterranea* Expanded Executive Committee.

Forest Fire Causes Investigation in Italy

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Mrs. Lorenza Colletti gave a presentation describing the Italian State Forest Service (CFS), an environment police corps whose core was established in the year 1822 and that is traditionally quite active in each phase of forest fires fighting, also in prevention and information: starting from 2004 CFS fully became an environment police corps and increased its activities in law enforcement and investigations. She described in details the investigation activities growingly carried out by the task force called NIAB, specialised in the research of forest fires cause to fight arsonists and established with the new national fire law. 353 agreed on in the year 2000. Such activities are quite important as some 98% of the Italian fires have a man-made cause. Intentional or not, and need to be seriously reduced to avoid damages to human lives, natural resources and infrastructures. It has been underlined that the work of the task force NIAB has also a clear preventative nature: that's way, in order to prevent such crimes, the results obtained by NIAB receive a lot of space on mass media, in order to discourage people potentially interested from putting on fire for any possible reason. She also showed many picture of CFS staff engaged in control and investigative activities carried out on burnt areas that again according law 353/2000, are permanently registered in a specific «burnt land cadastre».

Short biography

Graduated in forestry and with a MSc in environmental sciences, since 1994 she works mainly on international and EU forest and fire policies and poplar cultivation promotion. On 2002-2006 she has been working at Brussels in the European Commission - DG Environment on forest fire prevention, forest health and Mediterranean forestry. Author of more than 70 scientific publications, she is a known forest communicator.

Integration of Fire Risk in Land Use Planning and Forest Management Tools in Catalonia (NW Spain)

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The complexity of causal framework on wildfires and some aspects like the «fire paradox» show us that fire risk management strategies should have a wider focus than the current preventions and extinction common policies. Generally, current forest policy do not integrate, from a holistic point of view, forest fires risk from its underlying causes perspective, and there is a lack of a coherent framework with spatial planning. Current land use changes result in changing risks, that next require adaptive strategies. Examples of land use changes are abandonment of grazing or forestry, resulting in fuel accumulation and increased Wildland/Urban Interface (WUI). In addition, climate change are expected to increase the wildfire risk.

Wildfire risk management (WRM) shall integrate suppression-civil defense and fire prevention as well as land-use patterns assessment (forestry, grazing, agriculture and settlements) and social demands and perceptions. WRM approach focuses on:

- From the ecologic perspective, wildfire can be seen as a natural perturbation of the ecosystem. Thus, efforts are focused on reaching landscape patterns that are more tolerant to fire perturbation. The challenge is to harmonize the interest of forest owners, society and managers, especially in non profitability lands as in Mediterranean forests where fire risk is higher.
- From the social perspective, the goal is to improve society's understanding of the role of fires in the ecosystems, and of the exposition to risk (to promote self-protection attitudes and the own responsibility on ignition control). Considering the influence of mass media and leaders of opinion in social perception («facts are facts but perception is the reality»).
- From an economic perspective, it is important to improve

cost-effectiveness, to integrate information on costs and benefits of alternative activities as well as the positive and negative externalities related to the wildfire risk decrease or increase. Examples are supporting forestry and grazing as a fuel control activity, or including prevention cost in the price of housing in WUI. In the current context of risk both suppression and prevention measures are needed. The challenges for the economists are therefore to quantify the benefits of rural development in wildfire severity reducing (prevention + suppression + restoration costs) and at the same time taking landscape identity, biodiversity and environmental services, social demands, etc. into account.

From our experience founded on several wildfire events and close to 200.000 ha burnt land during four summers (1986-1998), some lessons learnt related with WRM at land use planning level are:

- Fuel accumulation is the main driving force of wildfires (more relevant than ignition causes, zero risk doesn't exist).
- Our efficiency in low-intensity fires make us more vulnerable to high-intensity fires in extreme conditions («fire paradox»). At the same time, suppression (high intensity fires) and emergency management (simultaneous fires and WUI) capacity have a limit.
- Fire has a behavior pattern. The knowledge of wildfire propagation patterns and fire types (e.g. north or south wind spread patterns) provide guidelines for more cost-efficient fuel management strategies.
- Because of the complexity of wildfire hazard, a cross-sectoral approach, strong institutional coordination and social participation it is needed.

As a general conclusions, suppression and prevention planning goes together, and it is necessary to integrate WRM into forest and spatial planning in order to reduce landscape vulnerability.

Providing guidelines for a cost-efficient fuel management from the prior knowledge of fire behavior pattern have several applications:

At *suppression system* level: improve the efficiency through a pro-active approach to be prepared for future extreme fire behaviors (pre-suppression actions)

At *forest management and prevention* level: fire ecology species

adaptation (fire regime), productive or prevention objective priority, prescribed burning, incentives for adapted forest management to fire risk, etc.

At *land use and spatial planning* level: integrations of grazing and agrarian mosaic as a prevention infrastructure, or reducing WUI vulnerability and increase self-protection capacity.

Some specific proposals to integrate WRM into forest and spatial planning which are developed in Catalonia are:

1. Include fire behavior knowledge into multi-scale hierarchic forest planning model, from the general guidelines at strategic planning (region), as a reference point for sub-regional ones at tactical level (units of 50-200 thousands hectares) which offers the final guide for the forest unit plans at operational planning. In public financing or support, it is fundamental to ensure coherence between treatments at forest level (mostly private ownership) and priorities at territorial level.
2. Give a specific legal frame and financial support for areas where preventions or pro-active fuel management is a priority (strategic points identified from fire behavior pattern assessment). These shall be included in a general functions map of forest land, being coherent with other protection, environmental and productive objectives.
3. Enhance forest plans normative rank in order to strength the linkage between spatial planning and forest ones, to make easier the fire risk assessment integration in settlement or infrastructures planning (also related with the chance of assume prevention measures cost because of the fire risk associated).

Short biography

Head of Wildfire and Territories Department, Forest Sciences Centre of Catalonia (CTFC). Forest engineer. More than 10 years of experience in wildfire research, especially from the socio-environmental approach. He has also participated in the development of several forest policy tools at territorial planning level and in research around social perceptions and demands over forest lands.

Adapting Legislation for Promoting Integrated Fire Management in Europe

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Taking into account that wildland fires is one of the most significant problems affecting European territories and societies, especially in wildland-urban interfaces, and likewise considering the great heterogeneity of political measures and regulations on wildland fire management, their insufficiency or inadequacy in many cases, and the wide diversity of situations in fire use that is present in Europe, it appears necessary to define a normative framework that can update and harmonise the different existing legislations and policies on the matter. The aforementioned framework must start from the knowledge of the current demands and necessities as well as from the acknowledgement of diversity. It must therefore be flexible enough to improve and favour the effectiveness of the adopted measures by the competent political-administrative authorities.

The FIRE PARADOX Integrated Project, funded by the European Sixth Framework Programme and carried out, from 1st March 2006 up to 28th February 2010, by 36 partners (universities, research centres, public bodies, networks, small and medium enterprises and non-profit organisations) from different European and non-EU countries, and coordinated by the School of Agronomy - Technical University of Lisbon, has established the scientific and technological bases for defining new practices and policies on integrated fire management in Europe.

The contributions of the FIRE PARADOX Project to policy and legislation on integrated fire management in Europe consisted of performing a thorough, complete analysis and assessment of the regulations, policies and practices involving fire

management and fire use as a management tool, pursuing the aim of setting out proposals including new political approaches which promoted good practices. Definitely, it is about defining the basis for the new political and juridical measures that could develop integrated fire management systems adapted to the European context.

As a last resort, the contributions made by the FIRE PARADOX Project regarding policy and legislation intend to promote a responsible, useful fire use, adapted to the different contexts and socioeconomic and spatial demands, according with technical requirements and social interests. That is, a positive approach is set out, aware of the regulation of fire as a tool for wildland fire risk management (prescribed burning and suppression fire) and land management (crop and livestock uses, landscape management and nature preservation).

In order to make practical proposals oriented to give response to these necessities, the following threats and opportunities on the matter of wildland fire management policies and legislation have been identified in the FIRE PARADOX Project:

- There are significant contributions and advances in some national and regional regulations which provide an interesting starting point to establish a future common legal framework of reference for the Member States.
- Although the European Union law has contributed to the approximation of the laws of Member States, there are still big differences between countries, even within large national spheres, which make difficult the effectiveness of integrated wildland fire management.
- Wildland fire risk management is absent or insufficiently developed in the forest policy documents of many countries, although climate change and trends of global change mark them as new risk areas.
- The different impact of fire risk in the various regional contexts and the different political-administrative systems existing in each country make necessary a flexible political and legal approach on the matter of integrated wildland fire management. But the scope of the problem and the needs of coordination to deal with it, likewise demand a Community approach in order to provide efficient, common solutions to general challenges.

Consequently, from the FIRE PARADOX European Project, the initiative of a new European Framework Directive has been set out. A new Regulation which would cover the political and legal gaps that exist at present in some countries and which would also give response to the current realities and demands, by means of defining an integrated fire management system adapted to the complex and specific European context.

Although wildland fire management is competence of the Member States, the Community scope of the problem of wildland fires and the higher effectiveness of the European Union to reach adequate results at European scale justify the initiative of facing a harmonisation of the laws on the matter, based on the article 175.1 of the European Union Treaty.

In any case, the different impact of this problem in the various regions of the Union justifies a flexible harmonisation, being the Framework Directive the proper juridical act to achieve basic homogeneity of a quite scattered regulation (since wildland fires have transversal caused and effects involving multiple matters and sectors), which enabled to accomplish common objectives through the considered means by each Member State.

It is true that the European Union has announced several Regulations on the matter of wildland fire prevention since the year 1992, whose validity has gradually expired. Other initiatives on the matter, of sectoral nature too, have been set out in the European Rural Development Regulation and in the European Union Communications on natural disaster prevention and response. But neither of these norms featured an integrated, permanent nature to deal with a problem of bigger and bigger scope and consequences in Europe.

That is why a renewed, integrated and long-term approach for wildland fire management in Europe is recommended. Wildland fires are not only a problem of Mediterranean countries. In the rest of the regions, the risk is also present although intensity and significance are variable. The Union intervention, from an integrated, framework perspective, is justified by several reasons:

- a. By the trans-boundary effects that wildland fires may generate and pose.

- b. By the existence of many diverse environmental causes and consequences related to this risk but also of different nature, which require coordination at European Union scale.
- c. Because wildland fires are a middle- and long-term problem linked to the effects of climate change.
- d. Because means and costs involved in actions taken as for integrated wildland fire management are on the increase.

Domains of experience and expertise: Regional Geography; Mediterranean forest history: landscape and territorial aspects; forest ownership and land tenure; linking forest policy to land use planning; spatial policies and legal framework assessment, promoting dialogue, participation and collaboration among public institutions and private stakeholders.

On the other hand, fire management as a tool of land management appears in each and every country and region of the Union, setting the challenge and need of a proper regulation in order to accomplish the pursued aim in a reliable, effective manner.

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Regarding the proposed juridical form, it's worth mentioning that Directives force Member States to achieve the goals set in the Community norm but entrust each State with the choice of the means to accomplish it (art. 249.III of the European Union Treaty). Besides, the Protocol No. 2 of the Treaty states that «Other things being equal, directives should be preferred to regulations and framework directives to detailed measures». Therefore, the initiative for a new Framework Directive on wildland fire management means an opportunity to harmonise and update the national regulations on the matter, defining a common reference which guaranteed effectiveness and adaptation to the specificity and diversity of the European context. It is set out as a proper way to avoid uniformism in the juridical treatment of the matter in the whole territory of the European Union and at the same time to establish a harmonising, basic and minimal arrangement, flexible enough to avoid an undesired homogenisation.

Short biography

Prof. Cristina Montiel-Molina, Female, 45, 1992: PhD Thesis: Origin, evolution and current situation of public utility forests in Valencia's region, University of Alicante, Spain; 1989: Master's Degree in Land Planning, University of Alicante, Spain; 1989: Maitrise in Geography, University of Aix-Marseille II, France; 1988: BSc in Geography from University of Alicante. Director of the Department of Regional Geography and Physical Geography; Chair of the Research Group Forest Policy and Economics, University Complutense of Madrid. Coordinator of Module 7, Policies and Practices Assessment in FIRE PARADOX project

ANNEX 2: Field Trip

The Big Fire of Rhodes

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The field trip was arranged on Wednesday, 5 May 2010, to the south of the Rhodes island close to the village of Laerma. The objective of the trip was for the participants to see part of the area burnt during the forest fire that occurred in 2008 and to learn about some of the restoration measures (anti-erosion works) that were implemented afterwards. All participants were impressed as they had the chance to observe the actual magnitude of the destruction "from the inside". The trip began by Thari monastery, where the participants walked within a fire break for some distance and then, following a path through the burnt forest, returned to the base after having circled the area. During the trip the participants had the opportunity to look at the disconcerting images left behind by the great catastrophe. Participants could also stop at key points where they were able to observe some of the restoration work that included log and branch erosion barriers, wood dams, as well as the process of the natural regeneration. During the walk the participants were briefed about the big forest fire of Rhodes.

The forest fire of Rhodes occurred on 22.08.2008 and broke out at 11:40 am at the Ag. Isidoros point, Municipality of Attaviros. *Pinus brutia* was among the dominant species of the incinerated area. The cause of the fire was identified as negligence and the wind was NW-4-5 bf at the time of the eruption.

The consequences of the fire were 13,240 ha of burnt area, from which 10,479 ha was not formerly burnt, 2,761 ha double burnt (formerly reforested) area and 1,207 ha was agricultural land. Concerning infrastructures the results were one destroyed house and many store houses, a great number of cultivated areas, machinery, equipment and domestic animals. The total fire fighting force that struggled with the forest fire for five days comprised 1,230 fire fighters from the Fire Brigade Service, 1,000 people from the Greek armed forces, 200 volunteers, 75 fire fighting vehicles, 46 other vehicles, 10 aircrafts and 9 helicopters.

The disastrous fire caused huge ecological disturbance and it will take 30 to 40 years before the forest is restored to its former state. The loss of important goods (raw material), services and functions (soil retention, erosion protection, water quantity and quality regulation, air quality regulation, recreation etc.) that the forest used to provide, and the reduction of biodiversity (habitats, flora and fauna loss) are of great significance. In addition, the total suppression cost was estimated at about 16 mill. €, while the total cost for restoration works which included 734,158 km log erosion barriers, 8,292 km barriers from tree branches and 3,468 m² wooden dams was appr. 3,4 mill. €.

The success rate for the implemented measures is estimated to 85% and today, 2 years after the big fire, regeneration work seem to be necessary only for those areas that have burnt twice, given the fact that natural regeneration progresses at a satisfying rate.

ANNEX 3: List of Participants

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ANNEX 4: Background Documents

Forest fire prevention: where are we?

The following references provide an overview of existing knowledge and former work on forest fire prevention. The documents and information present the progress made and the work done at international and European levels, and by the research community.

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FIFTH MINISTERIAL CONFERENCE ON THE PROTECTION OF
FORESTS IN EUROPE

5-7 November, 2007, Warsaw, Poland



MINISTERIAL STATEMENT

on the occasion of the
Fifth Ministerial Conference on the Protection
of Forests in Europe

5-7 November 2007, Warsaw, Poland

We, the Ministers responsible for forests in Europe, would like to express our sympathy to and solidarity with the people and the Governments of the countries of Southern Europe who have suffered during recent years from the effects of huge forest fires, the families of people who lost their lives, and those who lost their homes and their ways and means of life, with special reference to the disasters in Greece in the summer of 2007.

We would also like to express our readiness to explore further measures to prevent such forest fires and to restore the economic, social and ecological potential of the affected areas, as soon as possible.

