



INTERNATIONAL FOREST FIRE NEWS

**No. 45
January – December 2015**

A Publication of

Global Fire Monitoring Center (GFMC)

UNISDR Global Wildland Fire Network

and the



UNISDR IWPM
**International Wildfire
Preparedness Mechanism**

NOTE

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Between 1988 and 2014, International Forest Fire News (IFFN) was an activity of the UNECE/FAO Team of Specialists on Forest Fire and the Global Fire Monitoring Center (GFMC) and published on behalf of UNECE Timber Committee and the FAO European Forestry Commission.

With the phasing out of the UNECE/FAO Team of Specialists on Forest Fire by end of 2014, the IFFN transited to the International Wildfire Preparedness Mechanism (IWPM), which was launched by the UNECE/FAO Regional Forum on Cross-Boundary Fire Management (see IFFN Issue No. 44).

All IFFN contributions published between 1988 and 2015 are accessible through country folders and other special files on this GFMC website:

<https://gfmcc.online/iffn/iffn.html>

Shaking hands with scientific journals

One year after the launch of the first trial issue of IFFN in 1988 (<https://gfmcc.online/wp-content/uploads/IFFN-Vol-I-01-1988.pdf>) an agreement was reached with the emerging International Journal of Wildland Fire (IJWF) that IJWF would provide a platform for thematic scientific publications. IFFN would provide the interface between landscape fire science and the community of practitioners and policy makers – see remarks in the first regular volume of IFFN of 1989 (<https://gfmcc.online/wp-content/uploads/IFFN-Vol-II-01-1989.pdf>, p. 16).

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**INTERNATIONAL FOREST FIRE NEWS (IFFN)
IS AN ACTIVITY OF
THE GLOBAL WILDLAND FIRE NETWORK (GWFN)
THE INTERNATIONAL WILDFIRE PREPAREDNESS MECHANISM (IWPM)
AND THE GLOBAL FIRE MONITORING CENTER (GFMC)**

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Editorial

Welcome to Volume 45 of IFFN! After 44 volumes published by GFMC as a mandated activity of the UNECE/FAO Team of Specialists on Forest Fire, the first issue under the aegis of the ***International Wildfire Preparedness Mechanism (IWPM)*** continues the tradition of a journal addressing the Science-Policy-Practitioners Interface (SPPI).

The GFMC through the Regional Fire Monitoring / Regional Fire Management Resource Centers will continue producing one issue per year – as logbooks of activities of the Global Wildland Fire Network (GWFN).

Freiburg, December 2015

Johann Georg Goldammer

Introduction to the Special Issue 6th International Wildland Fire Conference

The 6th International Wildland Fire Conference was held in Pyeongchang, Republic of Korea, 12 to 16 October 2015. The conference, held for the first time in Asia, was hosted by the Korea Forest Service and Gangwon Province, and held under the auspices of the United Nations International Strategy for Disaster Reduction (UNISDR) and the United Nations Food and Agriculture Organization (FAO).

The Minister of Korea Forest Service, Prof. Dr. Shin Won Sop, and the Governor of Gangwon Province, Mr. Choi Moon-Soon, warmly welcomed the conference participants.

In a video message the United Nations Secretary General Ban Ki-moon emphasized a “critical need to integrate fire management into natural resource management strategies at the global level” in the context of a planet continuing “to experience the cumulative impacts of global warming and urban sprawl.” Furthermore, the Secretary General recognized the important role fire management plays in achieving the new 17 Sustainable Development Goals, with particular emphasis in realizing Goal 15 aiming to protect ecosystems, manage forests, combat desertification, reverse land degradation and halting biodiversity loss.

The head of the UNISDR Office for Northeast Asia, Mr. Sanjaya Bhatia, on behalf of Undersecretary General Ms. Margareta Wahlström, welcomed over 3500 delegates from 73 countries represented by government officials, representatives of twelve regions of the Global Wildland Fire Network, international organizations, as well as by professionals from civil society. The Undersecretary General highlighted the emerging importance of vegetation fires globally, particularly in the context of climate change. She stressed the importance of the work of wildland fire scientists and practitioners for international risk and disaster reduction concerns and efforts – a contribution to meet the challenges of the Sendai Framework for Disaster Risk Reduction 2015-2030.

The Global Fire Monitoring Center (GFMC) welcomed the inputs of the Global Wildland Fire Network members to the conference and conveyed welcome remarks of the Council of Europe, EUR-OPA Major Hazards Agreement, and the Organization for Security and Cooperation in Europe (OSCE).

Conference participants, while acknowledging some strides in international cooperation and fire management activities since the previous 5th International Wildland Fire Conference in 2011, continued to express strong concerns for a number of larger issues. Some of the most widely shared concerns were the impacts of climate and global change, the application of fire in land-use change, increasing impacts of fire in the wildland urban interface and of smoke on human health and security. Looking forward, participants expressed common hopes for increased international cooperation and response mechanisms, exchange of information and technical and scientific expertise, increased data collection and application of monitoring and early warning measures, and for strengthening (local) education efforts, capacity building in Integrated Fire Management (IFM) and rural participatory, community-based initiatives.

The wildland fire management and scientific community shared reports with the conference participants regarding the progresses made since the last conference in 2011. Within the regions and at global level, major advancements have been noted in fostering capacity building at national level and by enhancing cross-boundary cooperation in fire management. Many of the initiatives, however, were borne and realized as voluntary commitments and activities with limited financial support. Participants therefore stressed the need for more financial support and governmental commitments for national and regional fire management efforts, international policy mechanisms, and especially for greater application of community based fire management practices.

The main outcomes of the Sessions of Regional Wildland Fire Networks and International Organizations are provided in this last volume of IFFN and on a dedicated website of the GFMC (<https://gfmc.online/iwfc/korea-2015.html>).

Welcome to the 7th International Wildland Fire Conference in Brazil 2019!



UNITED NATIONS

NATIONS UNIES

THE SECRETARY-GENERAL**WELCOME MESSAGE TO THE
SIXTH INTERNATIONAL WILDLAND FIRE CONFERENCE**

Pyeongchang, South Korea, 12 October 2015

Transcript of Video Message Presented at the Conference



Excellencies,

Fire professionals from the Korea Forest Service and the members of the International Liaison Committee for the IWFC,

Fire professionals from around the world,

Ladies and Gentlemen,

I am pleased to greet the participants in this important conference on wildland fire, which is taking place in Asia for the first time. I thank the Korea Forest Service and the province of Gangwon for hosting.

Your theme, “Fire of the past, Fire in future”, is particularly timely as the United Nations embarks on implementing the new vision adopted by the member states that seeks to transform our world by 2030. Safe guarding forests and wildlands will be essential to realizing the 17 new Sustainable Development Goals.

The management of wildland fires will contribute in particular to achieving Goal 15, which aims to protect ecosystems, manage forests, combat desertification, reverse land degradation, and halt biodiversity loss. As our planet continues to experience the cumulative impacts of global warming and urban sprawl, there is a critical need to integrate fire management into natural resource management strategies at the global level. I look forward to the contributions you will make to our common endeavor to build a safer and more sustainable world for all. Please accept my best wishes for a successful conference.

Thank you.

Secretary-General of the United Nations

Ban Ki-moon



Statement by the Special Representative of the United Nations Secretary-General for Disaster Risk Reduction

Margareta Wahlström
United Nations Undersecretary-General and Head of the UN Office for Disaster Risk Reduction

Presented by

Sanjaya Bhatia
Head of the UNISDR Office for Northeast Asia and Global Education and Training Institute (GETI)

Increasing disaster losses are an indicator of unsustainable development practices

Current development practices are failing to account for and address disaster risk. Economic losses now average of up to USD300 billion a year: A strong indicator of unsustainable development. Resilient and sustainable development works with nature not against nature. For all of you here – with so much experience in fire management on the ground – you know better than most how true important this is.

As your Statement from the 5th Wildland Fire Conference (2011) indicated, there is *'strong concern at the escalation of wildfires across the globe ... with a severe impact on communities, the environment and the world economy.'* You concluded that *'efforts should be strengthened in capacity building in wildland fire science and management and that this can be fostered by international cooperation and sharing of expertise and resources.'*

These observations remain as valid today as they were four years ago. The main themes of this conference – first the protection of global natural and cultural heritage from fire and second moving towards a cohesive global fire management strategy – will build on your past achievements and continue to address the key challenges of fire science and management

Wildland is an important part of 'natural capital': More needs to be done to protect it

A country's 'natural capital', including its wildlands, is an important part of national wealth. A country with a declining base of natural capital is unlikely to be able to achieve a sustainable increase in wealth.

It is true that in some ecosystems wildland fires provide benefits. However, many wildland fires are both a driver and a result of the degradation of natural capital. Wildland fires now affect all continents. The Western USA, Southeast Australia, Indonesia, and Southern Europe are among the many regions that have suffered recently.

Clearly more needs to be done. The Statement from your last Wildland Conference in South Africa four years ago contains many important recommendations that I fully support.

The importance of participation, a more systemized application of technology particularly in early warning systems, stronger awareness and use of key fire management principles, and the need for increased adaptation capacity in an era of global warming are all key elements of a more resilient and sustainable approach for wildland fire management.

Implementing the Sendai Framework will make development gains more resilient to disasters

The Sendai Framework is the first part of the post-2015 development agenda that provides a once-in-a-generation opportunity to implement development that is both resilient and sustainable. The Sendai Framework shifts the focus to reducing both disaster risk and disaster losses. In other words, it calls on governments and other actors at the international, regional, national and local level to manage disaster risk rather than only manage disasters.

The Sustainable Development Goals adopted last month in New York aim to 'transform our world'. Disaster risk is a theme that cuts across all of the 17 goals, including Goal 15, which focuses on the sustainable management of ecosystems and forests. The international development agenda is becoming more coherent. This is good news for all of you as policymakers and practitioners including those of you at this conference with a focus on wildland fire management.

Your long-standing approach to international cooperation and partnership is a global example

Both the Sendai Framework and the SDGs emphasize the critical importance of international cooperation and global partnership for sustainable and resilient development.

Your community of fire management policymakers and practitioners stands as a consistent global example of such collaboration in action. Since the First International Wildland Fire Conference in Boston in 1989 your community has remained committed and engaged in strengthening fire science and management.

The continuing health of this diverse community is in clear evidence at this conference with senior representatives present from a variety of sectors such as forestry, climate and meteorology, ecosystem, disaster and security, and human health.

Your concluding Conference Statement will form an important part of the growing and increasingly coherent body of international policy and recommendations in this a key year for resilient and sustainable development. This conference is a timely contribution to the implementation of the Sendai Framework. I encourage you to identify real solutions that will help communities and nations to better handle the adverse impacts of fires and to build safer, more sustainable societies for all.

Towards a Cohesive Global Fire Management Strategy

Keynote by Johann Georg Goldammer, Director, Global Fire Monitoring Center (GFMC)

1. Introduction

Globally, fire regimes are altering in parallel with and under the influence of socio-economic developments, land-use change and climate change. Increasing vulnerability of society to the direct and secondary effects of wildland fires, as well as their transboundary nature and consequences, are prompting countries and international organizations to define their common interests in enhancing sustainable and integrated fire management capacities. The requirement for systematic and efficient sharing of scientific and technical expertise, solutions and resources, including transboundary cooperation, means that the transition from informal information exchange and networking to a more systematic and formalized cooperation is more necessary than ever.¹

Several international (global) conventions, such as the three “Rio Conventions” (CBD, CCD and FCCC) and the Ramsar Convention on Wetlands are examples of international legal agreements that provide rationale and a catalogue of environmental protection obligations for signatory countries. However, none of these or any other legally binding convention, informal or voluntary international instruments, such as the *Sendai Framework for Disaster Risk Reduction 2015-2030*², explicitly address wildland fires as a driver of environmental degradation. Nor do they address the need for integrating natural and prescribed management fires in those ecosystems and land-use systems that require fire for maintaining their function, sustainability and productivity. There are also no protocols in place that provide internationally accepted standard methods and procedures for countries that provide and receive assistance in wildland fire emergencies that would ensure inter-operability, efficiency and safety of cooperating parties.

In preparation for, and following the International Wildland Fire Summit of 2003³, the international wildland fire community has taken steps to develop preliminary concepts, templates and guidelines with widely agreed-upon principles and best practices in fire management and incident command structures. Detailed operational standards are now needed to facilitate the exchange of fire fighting resources, including aviation, management personnel, and equipment.

At the level of multilateral bodies, such as the Association of South East Asian Nations (ASEAN), the UN Economic Commission for Europe (UNECE), the Asia-Pacific Economic Cooperation (APEC), the Council of Europe (European Open Partial Agreement on the Prevention, Protection Against and Organization of Relief in Major Natural and Technological Disasters – EUR-OPA), the Organization for Security and Cooperation in Europe (OSCE), the European Union (EU), or the Southern African Development Community (SADC), recent developments have revealed the interest of countries to enhance the capabilities of regional, transboundary cooperation in fire management. Experience gained in bilateral (reciprocal) agreements include common usage of the Incident Command System (ICS) – as practiced under agreements between North American countries (U.S.A., Canada and Mexico) and between the U.S.A. and Canada on the one side, and Australia and New Zealand on the other side. These experiences may serve as examples for developing other regional agreements or protocols.⁴

The Global Wildland Fire Network (GWFN)⁵ is a voluntary network which evolved in the late 1990s as an initiative of the Global Fire Monitoring Center (GFMC)⁶ and the UNECE/FAO Team of Specialists on Forest Fire⁷. The GWFN operates through the GFMC as a “Thematic Platform” under the United Nations International Strategy for Disaster Reduction (UNISDR), and promotes international cooperation in wildland fire management – notably through capacity building in wildfire prevention, preparedness and suppression, and the development of standardized procedures for use in

¹ The keynote address refers largely to the White Paper „Vegetation Fires and Global Change“ directed to the United Nations (Goldammer, 2013a, b) and the outcomes of the UNECE/FAO Regional Forum on Cross-boundary Fire Management (see section 2.6)

² http://www.preventionweb.net/files/43291_sendaimframeworkfordrren.pdf

³ https://gfmc.online/iwfc/summit_2003-introduction.html

⁴ See special issue of UNECE/FAO International Forest Fire News (IFFN) No. 29, with examples of agreements and Annual Operating Plans: http://gfmc.online/iffn/iffn_29/content29.html

⁵ <http://gfmc.online/GlobalNetworks/globalNet.html>

⁶ <http://gfmc.online/>

⁷ <http://gfmc.online/intro/team.html>, see section 2.6 of this chapter

international wildfire incident response. Lead institutions serve as coordinators of Regional Wildland Fire Networks and work with representatives of international organizations mandated or otherwise active in the wildland fire arena. These lead institutions are represented by the UNISDR Wildland Fire Advisory Group (WFAG), which provides advisory services to the UN system.

The application of fire management guidelines developed under the auspices of international organizations such as the International Tropical Timber Organization (ITTO) and the Food and Agriculture Organization (FAO) of the United Nations, coupled with major inputs of the regional network members, provide a voluntary basis of common understanding for best practices and solutions in fire management.

In the long-term, the GWFN is also aiming at developing an International Wildland Fire Accord (voluntary or binding under international law), which would be based on the rationale that there is a common international interest in protection of global vegetation cover against degradation or destruction and that common endeavors in fire management will contribute to disaster risk reduction. For example, reduction of the risks associated with direct fire damages to human assets and ecosystems, fire-generated smoke pollution affecting human health and security, release of greenhouse gases, secondary disasters such as landslides, erosion, floods and threats to biodiversity.

The following examples highlight achievements and ongoing activities, which reflect progress in the endeavor to enhance international cooperation in wildland fire management.⁸

2. Progress in regional cooperation in fire management

2.1 Association of South East Asian Nations (ASEAN)

As a consequence of extended fire and smoke episodes since the early 1980s and especially in the 1990s, ten member states of the Association of Southeast Asian Nations (ASEAN) commenced negotiations for an ASEAN agreement addressing regional air pollution resulting from land-use fires and wildfires. In June 2002 the Agreement on Transboundary Haze Pollution was adopted and came into force on 25 November 2003. With the ratification of the agreement by Indonesia in September 2014, all ASEAN member states are participating (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam).

This Agreement is historic, as it is the world's first regional arrangement binding a group of contiguous states aimed at tackling transboundary haze pollution resulting from land and forest fires (see also Khee-Jin Tan, 2005; Nguiragool, 2011).⁹ The Agreement requires the parties to:

- Cooperate in the development and implementation of measures to prevent, monitor, and mitigate transboundary haze pollution by controlling sources of land and/or forest fires;
- Develop monitoring, assessment and early warning systems, exchange information and technology, and allow the provision of mutual assistance;
- Respond promptly to requests for relevant information sought by a State or States that are or may be affected by such transboundary haze pollution, with a view to minimizing the consequence of the transboundary haze pollution; and
- Take legal, administrative and/or other measures to implement their obligations under the Agreement.

In 2015, the establishment of the ASEAN Haze Monitoring System (AHMS) and the ASEAN Coordinating Centre (ACC) for Transboundary Haze Pollution is currently being discussed.¹⁰ Pending the establishment of the AHMS and the ACC, the ASEAN Specialized Meteorological Centre (ASMC) in Singapore and ASEAN Secretariat, are co-performing the interim functions.

⁸ **Note:** Materials of this paper have been presented at the 5th International Wildland Fire Conference, South Africa, 9-13 May 2011 (<https://gfmc.online/iwfc/southafrica-2011.html>)

⁹ See ASEAN website „Haze Online“: <http://haze.asean.org/>, and the full text of the agreement at: http://haze.asean.org/wp-content/uploads/2019/11/ASEAN-Agreement-on-Transboundary-Haze-Pollution-AATHP-Reprint-2019_web.pdf

¹⁰ <http://www.channelnewsasia.com/news/asiapacific/five-asean-members-to/2011170.html>

2.2 European Union (EU)

In the 1980s and 1990s, there was some exchange of firefighting expertise within the EU but little formal cooperation. The European Union Civil Protection Mechanism was established in 2001 and further strengthened in 2007. It provided a new capacity for coordination for Europe and now plays a central role in EU level forest fire risk prevention and forest firefighting coordination. There are currently 32 countries participating in the Mechanism („Participating States”): The 27 Member States of the European Union (EU) together with Iceland, Liechtenstein, Norway, Croatia and the Republic of North Macedonia. The Mechanism, which is managed by the European Commission, has tools to cope with wildfires in three phases of the disaster management cycle.

The Emergency Response Coordination Centre (ERCC), launched in 2013, operating within the European Commission's Humanitarian Aid and Civil Protection department (ECHO), was set up to support a coordinated and quicker response to disasters both inside and outside Europe using resources from the countries participating in the Union Civil Protection Mechanism. The ERCC replaces and upgrades the functions of the previous Monitoring and Information Centre (MIC). With a capacity to deal with several simultaneous emergencies in different time zones, around-the-clock, the ERCC is a coordination hub facilitating a coherent European response during emergencies – including coordinated response to wildfires – helping to cut unnecessary and expensive duplication of efforts. It collects and analyses real-time information on disasters, monitors hazards, prepares plans for the deployment of experts, teams and equipment, and works with Member States to map available assets and coordinate the EU's disaster response efforts by matching offers of assistance to the needs of the disaster-stricken country. The ERCC also supports a wide range of prevention and preparedness activities, from awareness-raising to field exercises simulating emergency response.¹¹

2.3 Asia-Pacific Economic Cooperation (APEC)

In October 2010, the first *International Conference on Forest Fires: Management and International Cooperation in Preventing Forest Fires in APEC Region* was convened at the initiative of the Russian Federation. The aim of this conference was to strengthen cooperation between emergency services of the APEC member economies in order to emphasize the readiness of the region and to reduce the risks of disasters.¹² Following a comprehensive analysis of the problem of forest fires in the APEC region and other regions, the conference identified the urgent necessity for joint efforts, mutual help and cross-border cooperation in forest fire risk reduction. The conference released the “Khabarovsk Recommendations on Management and International Cooperation in Preventing Forest Fires in the APEC Region”. The following priority directions of international cooperation under APEC were among those proposed:

- Development of an international mechanism to monitor and enhance responsibility of APEC member economies to ensure forest fire protection on their territories and coordinate action under APEC using existing institutions of international cooperation, such as UNISDR Global Wildland Fire Network, ASEAN, UNECE and others.
- Promotion of economic cooperation in projects that aim to reduce the degree of fire risk and restoration of forests on lands degraded by fire and non-sustainable forest management;
- Development of bilateral agreements on cooperation in fire management, particularly between APEC economies sharing common borders, and a voluntary regional agreement on cooperation in fire management, aiming at harmonizing cooperation with neighboring regional entities such as the UNECE and ASEAN, particularly in light of the overlapping membership of some economies.
- Development of long-term fire management strategies in each economy that allow for mitigation of the consequences of climate change.
- Improvement of strategic and operational early warning mechanisms in the APEC region as a regional activity to be coordinated with the Global Wildland Fire Early Warning system.¹³
- Conduct regular consultations to exchange knowledge and best practice.
- Reconvene and contribute to the 5th International Wildland Fire Conference scheduled for 2011 (South Africa), and the following conference scheduled for 2015 (South Korea).

¹¹ http://ec.europa.eu/echo/what/civil-protection/emergency-response-coordination-centre-ercc_en

¹² <https://gfmco.online/wp-content/uploads/APEC-Fire-Conference-2010-Recommendations-ENG.pdf>

¹³ Website of the Global Early Warning System for Wildland Fires: <https://gfmco.online/gwfews/index-12.html>

A priority follow-up activity has already included a joint fire management study course offered to APEC countries in 2011, hosted by the Russian Federation.¹⁴

2.4 Southern African Development Community (SADC)

In the last two decades, vegetation fires have become a major concern in the region of the Southern African Development Community (SADC) with regard to the negative impacts they have on the welfare of the environment and humans.¹⁵ Uncontrolled wildfires cause forest and vegetation degradation as well as biodiversity loss. This can result in immediate and long-term impacts on the livelihoods of local communities and upstream impacts on national and regional economies. However, it is clearly recognized that fires are also needed to maintain healthy ecosystems and biodiversity of natural savannah and grassland vegetation types – many being adapted to regular fire occurrence. Prescribed burning is used to meet objectives often essential to sustaining livelihoods. Fire is used for conservation reasons, like removal of old growth, bush encroachment abatement, and to stimulate the growth of grazing grass. Additionally, fire is a tool for reducing fuel loadings to mitigate dangerous wildfires during the peak of fire seasons.

The SADC region of 14 Member States is home to 238 million people, of which approximately 75% are rurally based. The perceived rise in the number of wildfires negatively affects these rural communities, which are often situated near the forests that provide them with their basic needs. The on-going process of climate change has the potential to exacerbate this situation by altering the frequency, intensity, severity and seasonality of fires in the SADC region.

A SADC regional fire management programme was proposed in 2010. It provides a framework for cooperation on fire management issues across national boundaries. Fire management is a technical, socio-cultural and political challenge that requires an effective network of willing partners that include governments, the private sector, local communities and international partners to find the appropriate balance between developing and conserving natural resources and managing unwanted fires while at the same time promoting the safe and beneficial use of fire. The programme intends to foster cooperation and collaboration in fire management on a regional basis to move towards integrated environmental policies and fire management practices. It pursues a multiple stakeholder approach working closely with regional and international organizations to support five areas of fire management. These are: legal and regulatory aspects of fires; community based fire management; institutional strengthening and establishment of a fire management coordination centre; generation and dissemination of relevant fire information for detection and early warning and; associated capacity building in the respective areas.

The envisaged programme is based on the SADC Protocol on Forestry of 2002, which forms the policy framework for sustainable forest management in the SADC member states. Its objectives include the goal to achieve effective protection of the environment and to safeguard the interests of both the present and future generations.

The SADC Forestry Strategy of 2010 is based on the vision to develop and maintain a forest sector that contributes to rural development, poverty reduction and industrial progress, while continuing to retain vital ecosystem services such as water supply, climate change mitigation and biodiversity protection. The strategy thereby provides motivation for countries to cooperate for the protection, management, and sustainable use of their forests. The primary purpose of the strategy is to provide a framework for both regional cooperation and international engagement on forest issues by paying special attention to those issues that transcend national boundaries. The strategy's mission is to facilitate cooperation among member states to 'promote the active protection, management and sustainable use of forest resources through sound policy guidance and the application of requisite skills and the best available technology, in order to enjoy the multiple benefits of forests in perpetuity'.

There is increasing willingness by SADC member states to cooperate on fire management on a regional and international basis. There is also recognition that a regional framework based on cross-border cooperation is required to address issues of national, regional and transboundary fire

¹⁴ <http://gfmcc.org/online/intro/APEC-EMERCOM-Wildfire-Management-Study-Course-2011-Agenda.pdf>

¹⁵ The information provided in the chapter is taken from the SADC Regional Fire Management Programme Document, draft proposal (June 2010). Web source: <https://gfmcc.org/online/wp-content/uploads/SADC-Regional-Fire-Management-Programme-Draft-Final-6.pdf>

management. Member states have expressed the need for a regional agency or centre to foster and coordinate such cooperation and information exchange in fire management. Establishing an agency responsible for collecting and analyzing fire related data and formulating standardized rules, guidelines and procedures will ensure coordinated dissemination of relevant information and guide policy development. Furthermore, it would promote the integration of Community-Based Fire Management (CBFiM) to be included into national policies and fire management strategies.

The expected activities and outcomes of the SADC Regional Fire Management Programme include the establishment of a Regional Fire Management Coordination Center. This center will also facilitate and coordinate international and regional cooperation in fire management by providing a mechanism through which one country may request and receive wildfire suppression resources from another country. This mechanism should also encourage cooperation and exchange on other fire management activities such as training and lessons learnt. A SADC fire management programme will allow the development of a SADC Memorandum of Understanding (MoU) which will prescribe the conditions of cross-border cooperation to combat transboundary fires and include operational guidelines for the regional coordination centre.

The programme intends to foster regional-level interaction by developing guiding policy frameworks and procedures for several aspects of fire management. During the Consultative Workshop on the Development of a SADC Regional Fire Management Programme (January 2010, Maputo), participants from all SADC member states compiled capacity development measures that should be carried out by all SADC member states to ensure success of a regional fire management program.

Between 2010 and 2013 the Trilateral Cooperation Fund (TRI-CO Fund) project between South Africa, Tanzania and Germany (Trilateral Cooperation Fund – TRI-CO Fund) *Tanzania – South Africa Fire Management Coordination Project* was implemented to demonstrate the utility of coordination and exchange of techniques, resources, science and capacity building in fire management amongst contributing parties and SADC member states. The GIZ project *Transfrontier Conservation and Use of Natural Resources in the SADC Region* (2013-2015) is also addressing the cooperation of border-crossing processes in conservation, including transboundary fire management.

2.5 Latin America

Mesoamerica

Several developments during the last decade indicate the political willingness of nations in Mesoamerica to share information and resources in fire management. An important regional initiative has been launched by the First Central Mesoamerican Meeting on Forest Fire Protection (*Primera Reunión Mesoamericana de Cooperación en Materia de Protección contra Incendios Forestales*) held in Guatemala City in 2002. This regional meeting was organized within the framework of the project *Prevención y Combate de Incendios Forestales en Mesoamerica* of the *Programa Mesoamericano de Cooperación 2001-2002*, launched at the 4th Tuxtla regional dialogue. Delegates of Belize, Costa Rica, El Salvador, Guatemala, Honduras, México, Nicaragua and Panamá formally agreed to launch a programme of cooperation which includes the sharing of information and resources in fire management as well as in capacity building.¹⁶

A number of follow-up conferences and workshops have consolidated these dialogues and strategic visions for cooperation in fire management. The Mesoamerica Meeting was followed by a meeting in Honduras (*Taller para el Desarrollo de un Plan Estratégico Regional para el Manejo del Gorgojo del Pino y los Incendios Forestales en Centroamérica*, 26-30 August 2002) in which the representatives from Central America developed a strategic plan for fire and bark beetle management in Central America. The momentum created by the Mesoamerican Meeting and the Honduras Strategy is

¹⁶ In June 2003, consultations were held with the Government of Guatemala concerning cooperation between the *Mesoamerican Cooperation Regarding Protection against Forest Fires* and the GFMC. A Memorandum of Understanding was signed by the Mesoamerican Permanent Technical Group on Forest Fires (*Grupo Técnico Mesoamericano Permanente sobre Incendios Forestales*), represented by the President of the Coordinating Council of the *Sistema Nacional de Prevención y Control de Incendios Forestales* (SIPECIF), Guatemala, and Executive Coordinator of the Presidency of Guatemala, and the Global Fire Monitoring Center (GFMC), operating under the auspices of the UN International Strategy for Disaster Reduction (ISDR), concerning Cooperation in the Global Wildland Fire Network through active participation of the Regional Mesoamerica Wildland Fire Network.

currently maintained and coordinated by the *Comisión Centroamericana de Ambiente y Desarrollo* (CCAD). A Technical Commission on Forest Fires and Pests has been established under the CCAB/AP. In 2004 the Technical Commission requested the *Consejo Centroamericano de Bosques y Áreas Protegidas* (CCAB/AP) to officially create the Regional Central America and Mexico Forest Fire and Pest Network (*Red Regional de Centro América y México de Incendios y Plagas Forestales*) operating under the CCAD. The recommendations of the network were presented at the Pan-American Wildland Fire Conference on 23 October 2004, San José, Costa Rica.¹⁷ The Central American Strategy on Fire Management 2005-2015 (*Estrategia Centroamericana para el Manejo del Fuego*) was published in 2005¹⁸ and implemented in a number of regional activities in the following years.¹⁹

South America

In 2004, the Regional South America Wildland Fire Network was founded in Curitiba, Brazil.²⁰ In 2005 the South America Subregional Technical Workshop, sponsored by the FAO Latin American and Caribbean Forestry Commission (COFLAC) and facilitated by the Global Fire Monitoring Center (GFMC) developed the first draft of the South American Strategy on Fire Management 2006-2010 (*Estrategia de Cooperación de América del Sur para el Manejo del Fuego*).²¹ In the scope of this Strategy, it was decided to establish the *Regional South America Fire Management Network*. The network is co-chaired by the Brazilian Institute of Environment and Renewable Natural Resources (*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis – IBAMA*) and its Centro Nacional de Prevenção e Combate aos Incêndios Florestais (PrevFogo), the Federal University of Paraná (Curitiba, Brazil) and the National Forestry Corporation (CONAF) of Chile.

Together with the representatives from Central America and the Caribbean, the *Regional Strategy on Cooperation in Wildland Fire Management in Latin America and the Caribbean* was finalized in a regional meeting in Santiago de Chile in 2005 and presented and at the 24th COFLAC Session in 2006. In 2007, IBAMA and COFLAC signed an MoU on technical cooperation and development of the South American Strategy on Fire Management (*Memorando de Entendimiento Para la Cooperación Técnica y el Desarrollo de la Estrategia de Cooperación de América del Sur Para el Manejo del Fuego*) and agreed on an operational bi-annual plan for the Secretariat of the network (*Plan Operativo BIANUAL de la Secretaría Ejecutiva del Grupo de Trabajo de América del Sur de Manejo del Fuego*). In 2012, Prevfogo/Ibama carried out the 2nd Meeting of Regional Networks (South America, Caribbean and Central America). Hosted by Brazil, this meeting aimed to review the Cooperation Strategy for the Caribbean, Mesoamerica and South America in fire management, information exchange, and to strengthen cooperative actions among these countries. Effective inter-governmental cooperation in fire management has been proven during mutual assistance in wildfire emergencies in 2012 by the cooperation between the authorities of Argentina, Brazil, Uruguay and Chile, and in 2015 by the cooperation between Argentina, Uruguay and Chile. Progress can also be noted in development and use of common regional assets in wildland fire early warning and satellite monitoring, led by Brazil and *Red Latinoamericana de Teledetección e Incendios Forestales* (RedLaTIF).²² Since 1999, the Program for Reduction of Wildfires and Promotion of Alternatives to Fire-Use in the Amazon (*Amazon without Fire*) is underway. This project started as a bilateral agreement between Italy and Brazil (1999 to 2008). In 2010, it became a trilateral agreement among Italy, Brazil and Bolivia. Since 2015, the program has expanded to include Ecuador.

South America is also exchanging experiences and knowledge with other regions. As part of a Technical Training Program – Agriculture, Food Security and Social Policies – offered by the Brazilian Government, a Course on Climate Change and Forest Fires was conducted by Prevfogo/Ibama for representatives of 23 countries from the Pacific Islands, Caribbean and Sub-Saharan Africa. In 2012, Brazil hosted the International Workshop *Prescribed Burning as a Tool for Wildfire Prevention* in an effort to provide a forum for international discussions addressing a controversial topic in Brazil – the use of prescribed fire. The workshop allowed exchanging expertise with African countries with similar geography and challenges in fire management: Mozambique, Democratic Republic of Congo, Zambia, Malawi, Kenya, Tanzania, and Ghana.

¹⁷ <http://gfmco.org/GlobalNetworks/Panamerica/Panamerican-Conference.html>

¹⁸ <https://gfmco.org/wp-content/uploads/CCAD-FINAL-Estrategia-Manejo-Fuego-con-logos-2.pdf>

¹⁹ https://gfmco.org/globalnetworks/mesoamerica/MesoAmerica_6.html

²⁰ <https://gfmco.org/globalnetworks/southamerica/SouthAmerica.html>

²¹ <http://gfmco.org/globalnetworks/southamerica/Estrategia-Cooperacion-America-Sur-TCP-RLA-3010.pdf>

²² <http://www.redlatif.org/>

Since Brazil has been improving its strategies and is now developing an approach for integrated fire management (IFM) that considers community/indigenous people involvement, prescribed burning of low intensity for conservation of protected areas, and addressing prevention of wildfires and decreasing of GHG emissions. A National Integrated Fire Management Policy is being developed as a Federal Decree. The achievements of Brazil are shared with other countries and it is expected that they will influence all regional cooperation efforts.

Under the auspices of the *Organización del Tratado de Cooperación Amazónica* (OTCA), a framework agreement among the eight countries of the Amazon Basin was developed in 2013 and 2014. It includes operational regulations and a glossary. In 2015, a Memorandum of Understanding was drafted; the MoU remains to be signed at ministerial level. In 2015, a project entitled *Support of National and Regional Competency in Integrated Fire Management to Secure Sustainable Forest Management in Uruguay and through Cross-border Cooperation with Brazil, Chile and Other Neighbouring Countries of South America* was launched. The project is an initiative of GFMC, sponsored by the Federal Republic of Germany, in partnership with Uruguay, Brazil and Chile and in synergy with projects of the German Agency for International Cooperation (GIZ).²³

2.6 United Nations Economic Commission for Europe (UNECE)

In following up the recommendations of the 4th and the 5th International Wildland Fire Conferences (IWFC), the GFMC between 2010 and 2012, initiated the preparation of a project entitled *Safeguarding Sustainable Forest Management in the UNECE Region through International Cooperation in Fire Management*. An administrative arrangement was signed in March 2013 between the UNECE and the financial sponsor; the Federal Republic of Germany, entrusted the GFMC with the implementation of the project. The project was an unprecedented effort at the regional level of the UNECE, with participation of other regional organizations or representation outside the UNECE, including several UN agencies and secretariats, to highlight the current and future problems of wildfires affecting forests and other vegetation types or ecosystems, and to elaborate proposals for addressing the increasing threats of wildfires as a consequence of global change through international collaboration. Its core activity was the organization of the *UNECE/FAO Regional Forum on Cross-boundary Fire Management*.²⁴ The preparation of the Forum included:

- Study of the Contemporary and Expected Future Wildland Fire Problems in the UNECE Region²⁵
- Proposal: Building Resilience of Nations and Communities within the UNECE Region to Wildfire Emergencies and Disasters²⁶
- Adoption of Voluntary Guidelines for Fire Aviation²⁷
- Circulation and Evaluation of a preparatory enquiry / questionnaire on the status of fire management in UNECE Member States²⁸
- A White Paper on *Fire Management Policies and International Cooperation in Fire Management in the UNECE Region*²⁹
- A White Paper *Vegetation Fires and Global Change. Challenges for Concerted International Action. A White Paper directed to the United Nations and International Organizations*³⁰

In preparation for the Forum, a precursor event was organized – the international congress *Forest Fire and Climate Change: Challenges for Fire Management in Natural and Cultural Landscapes of Eurasia*. Among other, the congress resolution included recommendations which were relevant for the rationale and outcomes of the Regional Forum.³¹

The *Regional Forum on Cross-boundary Fire Management* was held on 28-29 November 2013 at the United Nations in Geneva. The Forum was attended by 49 representatives from 22 UNECE Member

²³ <http://www.giz.de/en/worldwide/12505.html>

²⁴ Draft Forum Outline and Agenda: <http://gfmcc.org/Intro/UNECE-Fire-Forum-2013-Draft-Outline.pdf>

²⁵ <http://gfmcc.org/iwpm/UNECE-FAO-Crossboundary-Fire-Forum-Report-1.pdf>

²⁶ <http://gfmcc.org/iwpm/UNECE-FAO-Crossboundary-Fire-Forum-Report-2.pdf>

²⁷ <https://gfmcc.org/iwpm/ifawg.html>

²⁸ <http://gfmcc.org/iwpm/UNECE-FAO-Crossboundary-Fire-Forum-Report-5.pdf>

²⁹ <http://gfmcc.org/iwpm/UNECE-FAO-Crossboundary-Fire-Forum-Report-6.pdf>

³⁰ <http://gfmcc.org/latestnews/Vegetation-Fires-Global-Change-UN-White-Paper-GFMC-2013.pdf>

³¹ <http://gfmcc.org/GlobalNetworks/BalticRegion/NovosibirskCongress.html>

States, from other regions, non-government organizations, regional and international organizations (ASEAN Secretariat, SADC Secretariat, Council of Europe, OSCE), and the following United Nations organizations and secretariats: UNECE / FAO Forestry and Timber Section; FAO; UN Office for Disaster Risk Reduction / UNISDR; OCHA Environmental Emergencies Section, Joint UNEP/OCHA Environment Unit, Emergency Services Branch; Secretariat of the UNECE Convention on Long-Range Transboundary Air Pollution. Recommendations of the Forum included but were not limited to addressing the:³²

- Need to promote the understanding of and the response to the transboundary effects of fire;
- Need to expand the scope of and strengthen international cooperation in fire management;
- Application of a holistic approach to wildland fire management at a landscape level;
- Adoption and continued development of the International Wildfire Support Mechanism (IWSM) and the voluntary International Fire Aviation Guidelines;
- Need to explore options for the transition from voluntary rules to a more formalized regulatory framework, including the “exploration of options for establishing a UN Secretariat mandated with the implementation of a global fire management programme that should have a key role in facilitating the free and open global transfer of knowledge”.
- Suggestion to seek the interest of UN Organizations to become involved.

Following the final meeting with members of the ToS on Forest Fire in June 2014 at the GFMC, in conjunction with the Joint Meetings of the Global Wildland Fire Network and the UNISDR Wildland Fire Advisory Group, the *International Fire Aviation Guidelines* and the proposed concept of the *International Wildfire Preparedness Mechanism* (IWPM) (replacing the earlier proposal of an *International Wildfire Support Mechanism – IWSM*) were finalized and published on the website of the IWPM (see also Section 7 of this paper).³³ Other documents that have been prepared during the Forum project (and quoted above) are available on the IWPM website.

2.7 Council of Europe (CoE)

The Council of Europe through its European and Mediterranean Major Hazards Agreement (European Open Partial Agreement – EUR-OPA) continued to support the Regional Network by sponsoring key facilities and outreach work.³⁴ After providing financial support for the establishment of the Regional South East Asia / Caucasus Fire Monitoring Center in 2010³⁵ and preceding activities to address the problem of fire management in territories contaminated by radioactivity, unexploded ordnance and land mines³⁶, the CoE financed the establishment of the Regional Eastern European Fire Monitoring Center in Kiev, Ukraine, in 2013.³⁷ Major investments in thematic outreach work included the development of the above-mentioned Guidelines *Defence of Villages, Farms and Other Rural Assets against Wildfires: Guidelines for Rural Populations, Local Communities and Municipality Leaders in the Balkan Region*³⁸ and the analysis of the state of fire management and wildfire threats in protected / conservation areas registered under the UNESCO World Heritage Properties.³⁹

2.8 Organization for Security and Cooperation in Europe (OSCE)

In following up the Concluding Meeting of the 22nd OSCE Economic and Environmental Forum “*Responding to Environmental Challenges with a View to Promoting Cooperation and Security in the OSCE Area*”, at which the GMFC presented the experiences and visions for enhancing fire management in the EECCA region and addressing the opportunities to follow-up the work of the UNECE/FAO Team of Specialists on Forest Fire⁴⁰, the 2014 OSCE Ministerial Council Decision

³² <https://gfmcc.online/iwpm/background.html>

³³ Additionally other documents that have been prepared during the Forum project (and quoted above) are available on the IWPM website: <https://gfmcc.online/iwpm/index-7.html>

³⁴ <http://www.coe.int/en/web/europarisks/gfmc>

³⁵ <http://www.rfmc.mk/>

³⁶ <http://gfmcc.online/globalnetworks/seeurope/Chernobyl-Resolution-Wildfires-Human-Security.pdf>

³⁷ <http://nubip.edu.ua/en/reefmc>

³⁸ http://gfmcc.online/Manag/CBFiM_11.html

³⁹ Pre-publication information: http://gfmcc.online/Manag/CBFiM_12.html, see also UNESCO presentation at IWFC-6

⁴⁰ The cooperative work between the UNECE/FAO Team of Specialists on Forest Fire and the GFMC respectively with the OSCE dates back to 2006 and is documented on a dedicated website of the GFMC:

6/2014 *Enhancing Disaster Risk Reduction* tasked the OSCE executive structures and the OSCE Office of Economic and Environmental Activities (OCEEA) with DRR, with emphasis on exchange of knowledge and experience in fire management (Item 6 of the decision). This high-level decision of 57 OSCE Participating States reveals the commitment of the organization to continue focusing the outreach work in wildfire disaster risk reduction in the follow-up of the work of the former UNECE/FAO Team of Specialists on Forest Fire.⁴¹

2.9 Bilateral reciprocal agreements with multilateral character: The partnership between North America and Australasia

Looking back a decade, the United States wildland fire season of 2000 at that time was the worst fire season in more than 50 years. Almost 100,000 fires burned more than 2.8 million hectares of forest and range lands. This was approximately twice the U.S. ten-year average. The season was long and difficult and firefighters faced dangerous burning conditions throughout the western U.S.A.

Faced with this unprecedented situation, and with a forecast for continuing hot and dry weather patterns, fire managers realized they would need to reach beyond U.S. borders for assistance. During the remainder of the 2000 fire season, the U.S. received assistance from more than 1200 Canadian firefighters, 96 fire specialists from Australia and New Zealand and 20 Mexican firefighters. These additional resources performed important roles in the U.S. firefighting efforts. Some international fire fighters provided much needed support to fire crews on the fireline while others performed as middle managers on incident management teams. International agreements with Canada and Mexico were in place prior to the 2000 fire season but none existed with Australia and New Zealand.

Throughout 2001 and up to August of 2002 fire managers, risk managers and solicitors from the U.S., Australia and New Zealand proposed and reviewed options to solve the liability concerns raised after the 2000 fire season. One alternative explored, was the purchase of sufficient liability insurance to meet the risk managers requirements. However, the cost was prohibitive and the policies would have become unwieldy and complex. The best possible solution was to change U.S. law that would give any international firefighter brought to the U.S. under the "Wildfire Suppression Assistance Act," tort liability coverage equivalent to that provided to U.S. Government firefighters. In August 2002, the bill was passed and signed by the President of the United States of America. The language in the bill provided the assurance required by Australia and New Zealand with the result that U.S. fire managers were once again allowed to request assistance from these countries. Signatures of the Secretaries of Agriculture and the Interior were quickly inked on the official Arrangement papers and posted overnight to Australia and New Zealand. The Australian States of Victoria, New South Wales, Tasmania, Western Australia, and South Australia and New Zealand signed these documents and within a week of the passage of legislation, 50 Australian and New Zealand fire specialists were again on U.S. fire lines filling critical mid-level management fire positions in operations and aviation.

Through mobilizations of firefighters and numerous exchange activities, these arrangements have repeatedly proven the value of having effective, flexible, cooperative and formal relationships, which are continuing until today.

3. Progress in developing guidelines, protocols and standards for increasing efficiency and effectiveness of transnational cooperation

In addition to bi- and multilateral agreements, the international community has, in recent years, developed a number of proposals, templates and models for improving governance, efficiency and effectiveness of international cooperation in wildfire disaster risk reduction, management and response. The "tools" include common international wildland fire terminology, methods for wildland fire risk identification at national, regional, and global levels and non-binding guidelines for fire management and smoke management – including dedicated eco-zonal fire management guidelines. The use of a standardized, commonly accepted wildland fire incident management system for international cooperation in a disaster situation has been proposed. The Global Wildland Fire Network

http://gfmcc.org/GlobalNetworks/SEEurope/SEEurope_8.html

⁴¹ Publication of the Ministerial Council decision at: <https://www.osce.org/files/f/documents/8/6/130406.pdf>, <https://www.osce.org/oceea/disaster-risk-reduction> and mirrored at GFMC: <http://gfmcc.org/intro/OSCE-Ministerial-Council-2014-Decision-6-Enhancing-DRR.pdf>

has also developed a template for international cooperative agreements for countries interested in entering formal relationships on reciprocal assistance with others facing similar issues. Training in fire disaster management through the development of internationally compatible standards and competency, as well as certification of international fire responders, are important elements of improving international cooperation in wildland fire management. The following highlights some key activities in this arena.

3.1 International wildland fire terminology

The fundamental prerequisite for international cooperation in fire management is a commonly agreed upon terminology – a language that is understood by all partners intending to develop cooperation in fire management. In a number of countries very useful terminologies have been developed. This includes English-speaking countries in which fire terminologies are becoming increasingly compatible at an international level. However, terminologies show some differences in the use and meaning of terms. In some countries specific terms have been developed that are unknown elsewhere. As the English language is becoming the major language used for international cooperation in fire management it has proven useful to develop a basic English glossary with explanations of the terms, which would then be translated directly. The “Global Wildland Fire Management Terminology”, first published by FAO (1986) was updated by the Global Fire Monitoring Center (GFMC) on behalf of FAO in 1999. The glossary has not been printed as it is considered a dynamic document, open for ongoing changes considered necessary. The glossary is available as an interactive search engine on the web.⁴² In the 1999 version, the only non-English language updated was German. The FAO also added French and Spanish in the FAO web-based terminology.⁴³ In 2010 the GFMC published the Russian and Mongolian version (together with English and German), which was updated in 2014 as a special volume in Mongolian and Russian to serve the cross-border cooperation in fire management.⁴⁴

3.2 International statistical wildland fire data collection

Internationally agreed upon methodologies and procedures for establishing fire databases and formatting national fire reports are not in place. However, such databases and national fire reports (assessments) are important decision support tools required at national, regional and international levels and for targeted cooperation in fire management.

The FAO “Global Forest Fire Assessment 1990-2000” (a special report of the Global Forest Resources Assessment 2000 [FRA-2000])⁴⁵ and reports from 12 Regional Wildland Fire Networks were summarized and evaluated in the “Fire Management Global Assessment 2006”⁴⁶. This exercise revealed the lack of compatible and up-to-date statistical data sets at the global scale. The concept proposed in the “Global Wildland Fire Assessment 2004” – an initiative of the GFMC – was used for a number of national reports submitted to the Regional Wildland Fire Networks.⁴⁷ However, the assessment covered only a small number of countries.

The effective flow of information from national and regional levels to a central repository for receiving, processing and disseminating fire data must be ensured. This central organization should also feed fire information back to countries and other users that are connected through a network of national fire management agencies. An earlier recommendation by the UNECE/FAO/ILO in 1996, in which it was proposed to establish a Task Force to produce a proposal for harmonized and coordinated data collection and reporting systems that will meet the demands of various user communities, remains valid and is considered a priority.⁴⁸

The next step in overcoming uncertainties and inconsistencies of fire inventories, is the development of a global satellite-based vegetation fire inventory. The Global Observations of Forest and Land

⁴² <https://gfmcc.online/literature/glossary.html>

⁴³ <http://www.fao.org/forestry/firemanagement/13530/en/>

⁴⁴ <https://gfmcc.online/literature/RUS-MON-GER-ENG-Glossary-Web.pdf>

⁴⁵ Global Forest Fire Assessment 1990-2000: <http://www.fao.org/docrep/006/ad653e/ad653e00.htm>

⁴⁶ Fire Management Global Assessment 2006: <http://www.fao.org/docrep/009/a0969e/a0969e00.htm>

⁴⁷ Global Wildland Fire Assessment 2004: <http://gfmcc.online/inventory/assessment.html>

⁴⁸ Initial proposal for a global fire dataset by the ECE/FAO International Conference “Forest, Fire, and Global Change”: https://gfmcc.online/iffn/org/ecefao/ece_3.html#Annex%20III

Cover Dynamics (GOFC/GOLD) project, an element of the Global Terrestrial Observing System (GTOS), sponsored by the Integrated Global Observing Strategy (IGOS), provides a forum for international information exchange, observation and data coordination (including calibration and validation of sensors and algorithms) and a framework for establishing the necessary long-term monitoring systems. The GOFC/GOLD Fire Mapping and Monitoring Theme aims to refine and articulate common observation requirements and make the best possible use of fire products from the available satellite observation systems – for fire management, policy decision-making and global change research.⁴⁹

3.3 Template for international wildland fire management cooperation

The International Wildland Fire Summit of 8 October 2003⁵⁰ provided an important forum for discussions of how to manage the future of international wildland fire management and share solutions to global problems. One of the outcomes of the Summit was a paper that offered a template and other information on cooperation in wildland fire management to countries interested in entering formal relationships and agreements with others facing similar issues.⁵¹ The paper is intended to enhance current international coordination and cooperation by providing information on the following:

- A template outlining areas to consider when developing international cooperative agreements;
- Listing of the types of cooperation and assistance that may occur between countries;
- The responsibilities of countries sending assistance and of those receiving assistance;
- Websites containing information and examples of existing cooperative agreements and arrangements.

3.4 The role of the International Wildland Fire Conferences

With the first International Wildland Fire Conference, hosted by the North American Fire Management Working Group (FMWG) in the United States (Boston, Massachusetts) in 1989, a forum was initiated which aimed to share knowledge and expertise in wildland fire management, research and operational techniques in North America. The second conference was held in Canada (Vancouver) in 1996 and saw already increased international interest and participation. The third conference, held in Australia (Sydney) in 2003, became the first truly global conference of its type, as it included the inaugural “International Wildland Fire Summit”. Since the planning of the Sydney conference and summit, the “International Liaison Committee” (ILC) of the conference series, has consciously involved international experts and leading organizations. This is largely due to the support offered by the U.S. Forest Service and the fact that they operate under the FMWG. The outcomes of the 2003 International Wildland Fire Summit and the following conferences in Spain (Sevilla) in 2007 and South Africa (Sun City / Pilaesberg National Park) in 2011, reveal that the IWFC have become the premier international forum on wildland fire policy, management, and transfer of science and technology applications.

The outcomes of the International Wildland Fire Summit included a Summit Communiqué and five strategic papers released by the Summit participants:⁵²

- Guiding Principles for Wildland Fire Management: Guiding principles are suggested for consideration by international collaboration on fire management projects.
- International Wildland Fire Management Agreements Template: This paper identified issues and provided a template to encourage countries to cooperate in dealing with wildland fire.
- Incident Command System (ICS): A globally implemented ICS will improve firefighter safety, efficiency and effectiveness in management response.

⁴⁹ GOFC/GOLD Fire Implementation Team: See section 6 of this paper.

⁵⁰ See section 3.4 of this chapter

⁵¹ Published in International Forest Fire News (IFFN) No. 29, p. 10-14:
http://gfmcc.online/iffn/iffn_29/content29.html

⁵² The outcomes of the International Wildland Fire Summit are published in the special issue of UNECE/FAO International Forest Fire News No. 29 (2003): http://gfmcc.online/iffn/iffn_29/content29.html. The Summit website at https://gfmcc.online/iwfc/summit_2003-introduction.html provides a full set of documentation of the Summit, its precursor events and the follow up.

- A Strategy for Future Development of International Cooperation in Wildland Fire Management: The Summit participants recommended a series of strategies that will build on the work of many groups, conferences and regional summits and produce a series of actions building towards enhanced international cooperation in wildland fire management.
- Community-Based Fire Management: The paper addressed the role of local communities to become involved in fire management, and examples of and suggestions for implementation.

The conclusions of the 4th and the 5th International Wildland Fire Conferences identified priority issues concerning wildland fires globally and recommended to systematically strengthen fire management at national, regional (multinational) and global levels. The calls for enhancing international cooperation in fire management are reflected by the outcomes of the regional sessions and the conference statements.⁵³ The 6th International Wildland Fire Conference in the Republic of Korea in 2015 will evaluate the achievements of the previous conferences.⁵⁴

4. Internationally compatible training standards and competency, and certification of international fire responders

Capacity building of human resources is a key prerequisite for efficient planning and implementation of sustainable fire management. Many countries that are in need of developing or reviewing fire policies or upgrading existing fire management methods and / or technologies, do not have the necessary resources or expertise in capacity building in fire management. International cooperation in fire management is critical to achieve this. Priority for international cooperation should focus on capacity building targeted at those groups responsible for developing fire policies, fire management planning and the subsequent implementation. Multi-stakeholder, inter-sectoral and inter-agency approaches will be a key consideration. It is also important to look beyond the responsible government agency to non-government organizations and the private sector to develop these capacities. Capacity building of instructors (training for trainers) is also a key prerequisite for the success of building capacities at local to national levels. Several fire management handbooks are available, and are tailored for use in countries that need to build fire management capacity. They strive to guide the application of advanced knowledge in fire ecology and fire management, including participatory approaches to fire management (Community-Based Fire Management).⁵⁵

Advanced international training courses for fire management specialists working in high-level positions in their country's public or private sector will support the development of a culture of trans-national cooperation. Experience has been gained by several UN interagency training courses conducted by the United Nations University (UNU) and GFMC in Africa and in the South Caucasus countries. For instance, two *Regional Fire Management Training Courses for the South Caucasus, Western Balkans and Adjoining Countries* have been conducted by the GFMC on behalf of the OSCE and the Environment and Security (ENVSEC) Initiative at the Regional Fire Management Training Center in Antalya, Turkey, in 2010 and 2014.⁵⁶ Progress has also been made in developing unified approaches for capacity building in fire management in Latin America through the joint efforts of the U.S. Forest Service, U.S. AID and its Office of U.S. Foreign Disaster Assistance (OFDA). An example is the joint firefighter mobilization exercise in 2010 in Ecuador, which for the first time has been held at pan-Latin American level (*Quarto Ejercicio Nacional y Primer Latinoamericano de Movilización para Brigadas de Control de Incendios Forestales*).⁵⁷

All of this progress has been made while keeping the vision in mind to establish a decentralized worldwide network of training institutions in which donor organizations can collaborate. The development of training materials for international use is desirable.

First steps have been taken to develop internationally acceptable and applicable competency standards that will ensure the smooth cooperation between firefighting units of different nations, i.e. their inter-operability in international missions. The EuroFire project was an initial project financed by

⁵³ See documentations of the conferences on <https://gfmco.online/iwfc/sevilla-2007.html> and <https://gfmco.online/iwfc/southafrica-2011.html>

⁵⁴ <https://gfmco.online/iwfc/korea-2015.html>

⁵⁵ <https://gfmco.online/manag/cbifm.html> and FAO (2011)

⁵⁶ http://gfmco.online/GlobalNetworks/SEEurope/SEEurope_1.html and <http://gfmco.online/GlobalNetworks/SEEurope/Antalya-2014.html>

⁵⁷ http://gfmco.online/GlobalNetworks/MesoAmerica/MesoAmerica_6.html

the EU Leonardo da Vinci programme and implemented jointly by the Global Fire Monitoring Center (GFMC) and partners between 2006 and 2008.⁵⁸ The EuroFire project team reviewed competency-based wildfire training systems globally to identify best practice examples from Europe and around the world. This research was the basis for the production of competency-based basic training materials specifically for use in European countries. The key target end-user groups for the EuroFire project included: firefighters; the rural and land-based sector; sectoral organizations and; education and training institutions. Meanwhile, EuroFire competency standards and training materials have been translated from the English base version to Armenian, Azerbaijani, French, Georgian, Greek, German, Macedonian, Mongolian, Russian and Ukrainian, and tested in Europe and neighboring countries in East Europe / Caucasus in the frame of the Environment and Security (ENVSEC) Initiative. The translation to Portuguese (Brazilian), Spanish and Turkish will be finalized in late 2015.⁵⁹

In future, competency-based standards could serve for certification of firefighters to be deployed on international fire response missions. In 2011 The "International Fire Aviation Working Group" (IFAWG) started to draft a set of voluntary guidelines for improving the safety, efficiency and effectiveness of international aerial firefighting missions (cf. sections 2.6 and 7 of this paper).

5. Fire management guidelines

Fire Management Guidelines are needed for the various user levels – ranging from practical guidelines for local fire managers to guidelines for land-use planning and policy development. Guidelines must consider the specific natural (ecological) conditions of vegetation fire, as well as the social, cultural, economic and political environment. Valuable examples of such guidelines already exist for local to global use. However, in many countries these guidelines are unknown, not applied, or are in need of adaptation for the specific conditions or simply need to be translated. Fire management guidelines for international use have been developed by international organizations since the 1990s, and are available on the Internet. These include:⁶⁰

- International Tropical Timber Organization (ITTO) Guidelines on Fire Management in Tropical Forests (1997)
- The WHO/UNEP/WMO Health Guidelines for Vegetation Fire Events (1999)
- The FAO Guidelines on Fire Management in Temperate and Boreal Forests (2002)
- The UN Fire Management Voluntary Guidelines (2006)⁶¹
- GFMC Guidelines "Defence of Villages, Farms and Other Rural Assets against Wildfires. Guidelines for Rural Populations, Local Communities and Municipality Leaders in the Balkan Region" (2013)⁶²

While guidelines have been developed primarily to assist countries in developing sound, sustainable fire management capacities – including fire management policies and implementation strategies – they also provide guidance on standard approaches or standards in fire management that have been proven effective internationally and which will facilitate international cooperation in fire management.

6. International systems to be shared: Global wildland fire monitoring and early warning

There are a number of fire management support tools that are based on international Earth Observation Systems (EOS). These systems include spaceborne sensors for fire detection and monitoring, and terrestrial networks of Hydrometeorological services for recording and forecasting of fire weather (cf. Ahern et al., 2001).

The Fire Mapping and Monitoring Theme of the Global Observations of Forest and Land Cover Dynamics (GOFC/GOLD) project (cf. section 3.2.) and GFMC are closely interacting with the United Nations Office

⁵⁸ EuroFire partners included the International Association of Fire and Rescue Services (CTIF) and Rural Development Initiatives Ltd.

⁵⁹ EuroFire project website with competency standards and training materials for download: <https://gfmc.online/eurofire/index-11.html>

⁶⁰ Overview / portal: <http://gfmc.online/literature/Fire-Management.html>

⁶¹ <http://www.fao.org/docrep/009/j9255e/j9255e00.htm>

⁶² http://gfmc.online/Manag/CBFIM_11.html

for Outer Space Affairs (UNOOSA), UNOSAT (Operational Satellite Applications Programme of the United Nations Institute for Training and Research – UNITAR), the International Charter “Space and Major Disasters”, and the Group on Earth Observations (GEO) with its Global Earth Observing System of Systems (GEOS).

A number of public providers of near-real time satellite-based observations of active fires and burned area allow free access to public domain data and free open source software (Alexandris, 2011), such as the Rapid Response system - part of NASA’s Land Atmosphere Near Real-time Capability for EOS (LANCE). Rapid Response provides daily MODIS imagery in near real time.⁶³ Monthly MODIS Burned Area images have been available in the *Web Fire Mapper* since 2010. The Fire Information for Resource Management System (FIRMS) – a part of LANCE since 2011 – integrates remote sensing and GIS technologies to deliver global MODIS fire locations and burned area information to natural resource managers and other stakeholders around the World. The operational transition of the FIRMS system to FAO in 2011 is now complete. Operational users are advised to use the services of the Global Fire Information Management System (GFIMS) hosted by the FAO.⁶⁴

Monitoring and modeling global emissions from vegetation fires is a component of Monitoring Atmospheric Composition and Climate (MACC), which is the current pre-operational atmospheric service of the European Global Monitoring for Environment and Security (GMES) programme. Its D-FIRE sub-project provides estimations of global emissions from biomass burning to the other MACC services and to the general public. The emissions are calculated in real-time and retrospectively from satellite-based observations of open fires (Kaiser et al., 2011).⁶⁵

In 2005, a global multi-hazard early warning system was proposed in the Hyogo Framework for Action. Subsequently, a concept for the development for a Global Early Warning System for Wildland Fires was endorsed by the United Nations and presented at the Third International Conference on Early Warning (EWC-III) in March 2006.⁶⁶ The Global Early Warning System for Wildland Fires is an activity of GOF-C-GOLD implemented by the Canadian Forest Service (CFS) and the Global Fire Monitoring Center (GFMC)⁶⁷ Its central aims are to develop:

- Early warning of fire danger on a global basis that will provide international agencies, governments and local communities with an opportunity to mitigate fire damage by assessing threat, likelihood and possibility of extreme fire behavior. This should enable implementation of appropriate fire prevention, detection, preparedness, and response plans before wildfires arise.
- A robust global operational early warning framework with an applied system that will provide the foundation upon which to build resource-sharing agreements between nations during times of extreme fire danger.
- Local expertise and capacity building in fire management for system sustainability through technology transfer and training.

7. Towards developing an International Wildfire Support Mechanism: A repeated proposal

As a result of severe fires over a number of years, national leaders have demanded a more coordinated approach to the management of wildfires, including receiving or sending firefighting assistance to other countries. However, the ability to effectively cooperate is still limited by organizational and communication barriers. In the USA, State and Federal legislators that are concerned at the lack of uniform emergency management protocols have directed federal, state, and local government to develop common incident management systems. The purpose is to provide a framework that enables wildland fire protection agencies to effectively facilitate clear response authority, acquire and mobilize resources, coordinate interagency actions and provide effective management during incident response. A fundamental element of incident management was the creation of the “Incident Command System” (ICS), which provides consistent terminology and

⁶³ <http://lance.nasa.gov/imagery/rapid-response/>

⁶⁴ expired

⁶⁵ expired

⁶⁶ Webpage of the website of the Global Early Warning System for Wildland Fires: <http://gfmcc.org/ewf/EWS.html>

⁶⁷ See chapter 21 of „Vegetation Fires and Global Change. Challenges for Concerted International Action. A White Paper directed to the United Nations and International Organizations”: <https://gfmcc.org/wp-content/uploads/Vegetation-Fires-Global-Change-UN-White-Paper-GFMC-2013.pdf>

established organizational structures to enable effective, efficient incident management. Australia and New Zealand, faced with similar emergency response issues, have evaluated incident management systems around the world and elected to adopt the ICS while modifying it to meet their specific needs.

The complexity of incident management, coupled with the growing need for multi-agency and multi-functional involvement during incidents, has increased the need for standard inter-agency incident management systems within countries and states as well as internationally. Many countries have chosen to adopt similar or common systems for addressing emergencies. Additionally, some countries have developed firefighting agreements based on a common system designed to enable interoperability when lending support across borders. In the past, this has usually occurred in the context of supporting adjoining States or Countries within the same geographical region. However, since 2000, we have seen examples of this being broadened by the provision of support occurring from different hemispheres. In 2000 and 2002, Australia and New Zealand sent critically needed incident managers to the USA. Similarly, early in 2003 the USA reciprocated by sending fire specialists to Australia. Canada and the USA frequently exchange firefighting forces, especially along their borders and New Zealand sent firefighting forces to Australia in 2002 and 2003.⁶⁸ ICS was also used commonly by all firefighting forces during the wildland fire emergency in Ethiopia in 2000.⁶⁹

If the purpose of adopting the ICS is to enhance cooperation between countries, through the sharing of resources such as fire management teams, it is highly recommended that the sending country and the receiving country both use the same emergency management system.

It is hereby proposed that there be broad-scale introduction of a single International Wildfire Support Mechanism (IWSM) based on the incident management components discussed previously, including the principles of the ICS. This system would not necessarily require that specific components, such as ICS, be used as the incident management system of the country receiving or providing firefighting assistance. However, IWSM components would need to be previously agreed upon, ideally in a formal arrangement, and utilized by all countries at the time of cooperation in wildfire emergencies.

An IWSM should also be considered as a candidate to be introduced in the UN-driven process to strengthen the international potential to respond to environmental emergencies. The UNEP and OCHA have established the Advisory Group on Environmental Emergencies (AGEE) as their most important cooperation and support mechanism for the response to environmental disasters. The AGEE is an international forum that brings together environmental experts from around the world to share information, expertise and lessons learned in order to improve response to environmental emergencies worldwide – particularly in developing countries. In 2007, AGEE founded the “Rosenberg Initiative”, which aims at strengthening the global regime that governs environmental emergency response and preparedness as well as initiated the establishment of the online Environmental Emergencies Center (EEC) in 2012.⁷⁰

In this context, the application of the principles of developing High Reliability Organizations (HRO) may be of interest (Weick et al., 1999). A cooperation project between the U.S.A. and France reveals the utility of mutual exchanges of expertise and “lessons learned” by HRO may contribute improving incident management (Vidal et al., 2011).

The international firefighting assistance exchanged during the wildfire emergencies in Greece (2007), the Russian Federation (2010) and Israel (2010) reveal the need for introducing a unified incident command structure similar to the ICS that is used for exchanging fire management personnel between the USA, Canada, Australasia and South Africa.

The development of internationally accepted rules or SOPs for the safe and efficient deployment of aerial firefighting assets is already underway. Following the International Wildland Fire Summit (2003), an interest group was formed at the 4th International Wildland Fire Conference and returned recommendations for concerted international action.⁷¹ In a series of International Aerial Firefighting

⁶⁸ See: International Arrangements on the Sharing of Wildland Fire Suppression Resources between the United States of America and Australia and New Zealand: http://gfmco.org/online/ifn/ifn_29/USA-Australia-NZ-Int-Arrangements.pdf

⁶⁹ See: The Ethiopia Fire Emergency between February and April 2000: https://gfmco.org/online/ifn/country/et/et_1.html

⁷⁰ <http://www.eecentre.org/>

⁷¹ <http://gfmco.org/online/sevilla-2007/groups/Session-Aviation-Communique.pdf>

Conferences (2008-2015) this idea became further consolidated.⁷² In 2010 the *International Fire Aviation Working Group* (IFAWG) was founded and officially launched at the meeting of the UNISDR Global Wildland Fire Network / Wildland Fire Advisory Group at GFMC.^{73 74} The terms of reference have been laid down in the IFAWG Charter:

The IFAWG is working under the framework of the UNISDR Wildland Fire Advisory Group (WFAG) / UNISDR Global Wildland Fire Network (GWFN) as an advisory committee with the following principal objectives:

- Sharing of relevant information, especially information that will support the promotion and improvement of safety in the sector;
- Providing a conduit or facilitation mechanism for the sharing of resources between jurisdictions;
- Identification of opportunities for international harmonization of operating practices and establishment of consistent standards; and recommend or initiate suitable harmonization action, including the development of voluntary guidelines;
- Providing advice and guidance to individual states and the United Nations regarding fire aviation through the UNISDR Wildland Fire Advisory Group / Global Wildland Fire Network.

After presenting the draft voluntary International Fire Aviation Guidelines (incorporating the International Manual of Common Rules for Fire Aviation) at the Geneva Forum in November 2013 (see also Section 2.7 of this paper), the progress of finalizing the guidelines, including receiving comments and suggestions, can be monitored on a dedicated website.⁷⁵ At the occasion of the International Aerial Firefighting Conference in Zadar, Croatia, April 2015, the European Commission, EU Member State authorities and fire aviation operators indicated a high interest in endorsing the concept and objectives of the guidelines. The progress of developing the International Fire Aviation Guidelines thus far shows consent towards developing an international voluntary regime for fire aviation.

However, at the time of the 6th International Wildland Fire Conference in 2015, the international community is not yet entirely ready to agree on broader global / international voluntary or binding *International Wildland Fire Accord*. Such an accord may include an International Wildfire Support Mechanism (IWSM) and would express the common interests of the global community and secure interoperability in cases of cross-boundary cooperation in wildfire emergency response for those countries or organizations which do not have signed legal bilateral or regional cooperation agreements. This was the main reason why the UNECE/FAO Regional Forum on Cross-boundary Fire Management could not yet elaborate further on the originally proposed IWSM.

Instead, an international task force, which followed up the Forum, suggested prioritizing first the establishment of the "International Wildfire Preparedness Mechanism" (IWPM). The IWPM, currently hosted by the Global Fire Monitoring Center (GFMC), is a non-financial instrument serving as a broker / facilitator between national and international agencies, programmes and projects to exchange expertise and build capacities in wildland fire management and particularly in enhancing preparedness to large wildfire emergency situations. The IWPM has been developed in tandem with the International Fire Aviation Guidelines and the International Manual of Common Rules for Fire Aviation.⁷⁶

8. Conclusions

The United Nations International Strategy for Disaster Reduction (UNISDR) and its Wildland Fire Advisory Group are working to strengthen the efforts of United Nations agencies, other international organizations, non-governmental organizations, and a large number of national agencies responsible for fire managements with the aim to reduce the negative impacts of wildland fires and to promote safe

⁷² See website of the last AFF Conference in Croatia in 2015, which includes the reports of all AFF conferences between 2008 and 2015: http://gfmcc.online/course/meeting/2015/meet2015_03.html

⁷³ <http://gfmcc.online/globalnetworks/Joint-WFAG-FAWG-ILC-FMAA-Meeting-June-2010-Agenda-final.pdf>

⁷⁴ IFAWG website: <http://www.ifawg.org/>

⁷⁵ <http://gfmcc.online/iwpm/ifawg.html>

⁷⁶ National agencies responsible for the management of vegetation fires as well as projects seeking or offering to exchange expertise in fire management are encouraged to contact the GFMC: <https://gfmcc.online/iwpm/index-7.html>

and ecologically benign models of fire use in ecosystem management. Similarly, the Global Wildland Fire Network (GWFN), facilitated by its secretariat, the Global Fire Monitoring Center (GFMC), is working systematically to enhance governance for intra- and inter-regional cooperation in wildland fire management throughout the world. The outcomes of the International Wildland Fire Summit of 2003 and the 4th and 5th International Wildland Fire Conferences in 2007 and 2011, reveal that many countries are ready to establish and strengthen regional and international dialogues on cooperation and exchange of information, research and wildland fire management, including through formalized agreements.

The way ahead between the 6th International Wildland Fire Conference of 2015 and the 7th International Wildland Fire Conference in 2019 in Brazil will be a challenge to the member states of the United Nations to respond to the consequences of accelerating climate change. Extreme wildfires, which have affected many countries in 2015, reveal that fire regimes are changing rapidly and dramatically at global level and require swift, targeted responses through international cross-boundary cooperation in fire management. The precursor work of the past two decades towards developing efficient voluntary or legal agreements – a voluntary *proto-regime* of the international fire management community – will provide rationale and a sound basis for the success of future efforts.

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White Paper on Vegetation Fires and Global Change

Vegetation fires and global change: challenges for concerted international action, produced by the Global Fire Monitoring Center, is a white paper directed at the United Nations and international organizations. It is a global state-of-the-art analysis of the role of vegetation fires in the Earth system and is published as a collective achievement of the world's most renowned scientists and research groups working in fire science, ecology, atmospheric chemistry, remote sensing and climate-change modeling. The aim of the white paper is to support the endeavor of the United Nations and international organizations and their affiliated processes and networks, to address global vegetation fires. The paper provides the rationale for coordinated international action in crossboundary fire management at a global scale. Margareta Wahlström, Undersecretary-General and Special Representative of the United Nations Secretary-General for Disaster Risk Reduction and Head of the UNISDR Office for Disaster Risk Reduction, who will deliver the opening speech at the 6th International Wildland Fire Conference, wrote the foreword.



Goldammer, J.G. (ed.). 2013. *Vegetation fires and global change: challenges for concerted international action*. A white paper directed to the United Nations and international organizations. Kessel Publishing House, Remagen-Oberwinter, 398 p. ISBN 978-3-941300-78-1. (Source: <http://www.forestrybooks.com/>)

Digital version for download: <https://gfmcc.online/wp-content/uploads/Vegetation-Fires-Global-Change-UN-White-Paper-GFMC-2013.pdf>

Towards a Cohesive Global Fire Management Strategy

Keynote by Tom Harbour, Director, Fire and Aviation Management, U.S. Forest Service

A Cohesive Global Fire Management Strategy – what does that mean?

We are in the midst of a fascinating change in our world. From the natural standpoint, stress on ecosystems is increasing. Fire, as well as invasive flora and fauna, and development, is causing significant change in ecosystems. Society is concerned about ecosystems; but at the same time, people are becoming more and more disconnected from the ecosystems, which surround them. Urbanization is a worldwide fact we are facing. The majority of people in our societies are transitioning from rural dwellers, connected to surrounding ecosystems by historical necessity, to urban citizens, connected to ecosystems only by virtue of personal interest. As ecosystems change and citizens move, fire remains a rather ubiquitous presence. Fire has not “learned its manners.” While we welcome fire at times to warm our homes and cook our food, large amounts of fire in the wildland emit smoke, reduce visibility, and when uncontrolled, can cause damage and threaten life. Most of the time, we would rather not have fire affecting our increasingly urbanized lives. However, the future is one where we will not be able to ignore fire. Our future must be more coherent in regards to the linkage of ecosystems and people. We need a strategy – a global cohesive strategy, to binds those elements sustainably together. A Cohesive Global Fire Management Strategy – what does that mean, why do we need it, and who is responsible? Cohesion – the action or fact of uniting the whole; and strategy, a plan of action or policy designed to achieve a major or overall aim. Understanding these terms, as connected and linked, is a good beginning to understanding the logic behind the need for, where the opportunities exist, and the benefits to developing a Cohesive Global Fire Management Strategy.

In the Foresight Report, Spring/Summer 2015, “A World on Fire,” the authors Robert L. Olson and David N. Bengston, discuss how the futurists panel warned that, “current wildland fire management planning fails to account for the high levels of uncertainty surround the conditions and context in which future wildfire management will need to operate.”⁷⁷ Olson and Bengston use the example that planners typically assume the economic system will fully recover from problems and remain dynamic, that there will be abundant energy supplies – regardless of the cost, and that the federal government will make laws and will assure the laws are carried out. The problem with this type of planning is that we assume the governments will have the resources to manage growing fire risks. Not all panelists agreed; some envisioned dramatic progress in innovative biology and techniques that could lead to new approaches to wildland fire management that is not even on the radar today. Agreed upon was that business as usual is not sustainable. Taken as a whole, in the developed world, we need a paradigm shift involving fundamental change.

Wildfire as a natural process influenced by citizens

A step forward is to recognize and appreciate wildfire as a necessary natural process. Across the country and the world, we face ecological instability. Putting out every fire, every time is not the answer; but neither is abandoning efforts to influence natural processes. Whether we understand it or not, we must “live with fire.” A deeper understanding has begun for a fuller appreciation of wildfire as a natural and necessary process, but we will have a long way to go. Across the globe, most ecosystems, especially those in any area where rainfall is intermittent, have evolved in the presence of fire. They have become part of the process of fire itself; they have become what we call fire-adapted. Fire-adapted landscapes require wildfire to maintain their resiliency and health. By releasing nutrients into the soil, wildfire increases plant and animal diversity and causes a flush of new plant growth providing food and nutrients to animals. Without the presence of fire within some ecosystems, the landscapes become unhealthy and choked by underbrush and exacerbating fire when it occurs.

If we do not recognize the need for change, our “natural” systems will remind us! Certain ecosystems will “erupt” with cataclysmic ferocity when they reach a point of unsustainable ecological instability. Those large eruptions, changes, conflagrations, in renewing ecologic stability cause an equally massive and notable reaction in our societies because we, as citizens and fire are not connected. We need to put aside a “war on fire,” mentality as our only mindset and deal with the unhealthy landscapes that have resulted from years of managing as we thought best, together, return fire to our natural landscapes, and learn to live with fire when it happens.

⁷⁷ A World on Fire, by Robert L. Olson and David N. Bengston, Foresight Report, Spring/Summer 2015

America's National Cohesive Wildland Fire Management Strategy

Last year, many local, state, and federal groups in the United States of America finalized the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy). This Cohesive Strategy took an “all-hands, across all-lands” approach from the inception. America’s fire management experts understood one agency could not solve all the issues facing America alone. Together, however, we could certainly do more; so therefore, we joined forces and identified the common principles, common issues, and a set of goals that if accomplished would make the biggest difference for the nation.

Together with our partners, we identified three goals for the National Cohesive Wildland Fire Management Strategy – to restore our landscapes to a healthy state and maintain their fire resiliency; for communities to become fire-adaptive by preparing for and living with wildfire; and to safely and effectively respond to wildfires when they happen. This third component (response) springs from the notion that the intersection of landscapes and communities bring goals, objectives, and conditions, which need met. The way to meet those objectives is to develop an intervention methodology.

The success of the Strategy relies on more than us managing the landscapes appropriately and safely and effectively responding to wildfires when they occur, it depends on the ability of communities to prepare for and withstand the effects of fire. It depends on changing attitudes so that communities recognize and accept their role becoming fire resilient, with or without assistance – a different approach than today’s, where people expect to be protected by fire-suppression efforts with no understanding of the consequences which derive from the sole focus on fire suppression.

On-the-ground evidence after the fire has shown that the nature of the home’s surroundings determines the likelihood of a home burning in a wildfire. Frequently, after the fire, we see the sole home that remains when the homeowners did the work to prepare – cleared its perimeter 100 to 200 feet and/or used fire resistant building materials, while others who did not prepare suffered severe damage or a complete loss. Ideally, communities and local governments would pass building codes, protection zone requirements, standards for subdivision design, and land use standards to mitigate building in highly dangerous locations, such as the top of steep ridges. Until communities make themselves fire resilient, embrace fire for the natural force can be and are able to withstand a fire without the loss of life or property, the costs associated with wildland fire management, across several realms, will continue to increase.

Change isn’t easy; but it’s inevitable

Although this all makes sense, although we have been talking about it for years, there are barriers at every level of a fire-resilient approach. At the national level, when fires happen in the backyards of our citizens, there is pressure to put the fire out quickly; and within the federal and state agency at home, and I am pretty sure across the globe, firefighters train to put the fire out and get rewarded for doing so. There are times and places and situations where we need the fire out as quickly as possible, but not every time, not all the time. Changing that mentality is hard, but it is inevitable that we do so.

Although land and fire managers agree, to make a difference we must make landscape-scale changes to create healthier landscapes – fire-resilient landscapes, funding levels for fuels treatment work never rise to the level where we can make a difference. The change will happen in different ways, depending on different future conditions.

The Quadrennial Fire Review – A look into the future

Recently, the United States’ wildland fire and land management organizations released their third Quadrennial Fire Review (QFR). The QFR is not a policy document, but rather, a long-term, futuristic document that looks at fire management into the future 10 to 20 years out. In essence, the QFR is like a “peak behind the curtain” at what wildland fire management might look like in the year of 2023 or so.

The QFR and the Cohesive Strategy exist for different, but complementary purposes. The Cohesive Strategy took a holistic view of current wildland fire management issues and developed a strategic approach to coordinating multiple agency and homeowner efforts toward achieving a shared vision and goals for the immediate future.

The 2014 QFR reaffirms the Cohesive Strategy vision, to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a nation, live with wildland

fire. However, the QFR takes a long-range look “over the horizon,” mindful of the Cohesive Strategy's three primary goals. The Cohesive Strategy assesses our ability to achieve a shared vision and goals within the constraints of current and projected policy and capabilities, amidst emerging trends specific to, and beyond wildland fire (for example, demographics).

The 2014 QFR provides a framework to consider how current and emerging trends may interact over 10 to 20 years and the plausible alternative futures within which fire managers may find themselves in 2034. The 2014 report is the first to offer a set of distinct, but plausible alternative futures for wildland fire using a formalized process known as Strategic Foresight. While the other elements of the process are important, and rightfully informed the final report's conclusions and actions for consideration, the review's "futuring" components reflect its true purpose -provoking conversation, and ultimately innovation, to help wildland fire managers in the U.S. make better-informed decisions as we implement the Cohesive Strategy across a variety of potential future conditions. We intend to use the QFR's alternative futures in ongoing planning, to "keep us on our toes" and help focus our organizations' efforts in areas that present the highest potential return on investment (ROI) for the wildland fire management community at large.

This QFR poses four distinct futures. These futures range across multiple spectrum – scorched to resilient landscapes, near vs. long-term risk, significant versus insignificant federal involvement in wildland fire management, less fire to more fire, and good versus bad fire. Some of the futures, particularly those entitled "Hot, Dry, and Out Of Control" and "Suppression Centric," reflect significantly increased risk. In the former, the risk is nearer term, in the latter it is over the horizon, but likely amplified. "Hot, Dry, and Out of Control" features more fire on a landscape that is not ready for it, whereas "Resilient Landscapes" represents progress toward a situation where fire plays a more natural role. All these futures are plausible, and we acknowledge, as does the QFR, that the community may move through iterations of them over the next 10 to 20 years.

While stakeholders across the wildland fire management community in the U.S. may have differing perspectives as to whether the specific futures in the 2014 QFR represent positive outcomes, the QFR is not about setting a vision – the Cohesive Strategy did that – nor is it about predicting the future. Rather, the QFR helps ensure that we as a community can be proactive in detecting potential impediments to achieving the goals of the Cohesive Strategy, or "weak signals" of opportunity where we can focus or invest to accelerate progress. For example, what might be the impacts of legal restrictions that limit our ability to use air dropped retardant? What actions should we take if energy prices rise dramatically, bioenergy becomes a commercially viable industry, and the public subsequently expresses widespread support for commercial harvesting of forest products? Similarly important is being able to discern whether events such as the tragic Yarnell Hill Fire of 2013, where 19 wildland firefighters lost their lives, are outliers or indicators of broader change on the horizon. Advance understanding of factors such as these is critical to enabling our organizational agility and continued effectiveness.

We will explore options to continue the futuring conducted during this QFR, which may include the institutionalization of environmental scanning, alternative futures analysis, and scenario-based planning within the federal wildland fire agencies. We will also seek opportunities to regularly update these futures and gather input about additional trends or barriers, which the QFR may have not have fully addressed. We are making progress in America, little by little, one-step at a time. Just as the wildland fire management issues faced by land and fire management organizations across America did not belong to one organization to fix, so is true for the issues experience across the world. Certain systems, when reaching a point of ecological instability “erupt” or in our case explode in order to reset themselves. Given the linkage we have today in our very populated, very connected world, when ecosystems explode in flame, they cause political instability as well. Moreover, when that ecologically induced political instability combines with forces outside the natural resource arena, the resulting change could be dramatic. The type of political reaction would induce stability in the political system, but would be disastrous for the ecological component of our world.

Moving Toward a Cohesive Global Fire Management Strategy

So, how do we move “toward a Cohesive Global Fire Management Strategy?” I would suggest the first step would be world leaders in wildland fire management need to work toward alignment, worldwide, around Cohesive Strategy type goals and behaviors. This is where we each step up and when we begin the process of moving toward a cohesive global fire management strategy.



2015 세계산불총회

INTERNATIONAL **WILDLAND FIRE** CONFERENCE

PYEONGCHANG, KOREA, 12-16 October 2015 www.wildfire2015.kr

6th International Wildland Fire Conference

Pyeongchang Declaration “Fire Management and Sustainable Development”

Pyeongchang, Republic of Korea, 16 October 2015

The 6th International Wildland Fire Conference, which was held under the auspices of the United Nations International Strategy for Disaster Reduction (UNISDR) and the Food and Agriculture Organization of the United Nations (FAO) in Gangwon Province, Republic of Korea, 12 to 16 October 2015, was attended by government officials, scientists, professionals from civil society from 73 countries, and by UN agencies and other international organizations. The conference evaluated global wildland fires of the past, the status and achievements of contemporary fire science and fire management, and looked into the future of a changing world and changing fire regimes. Conference participants discussed how science and management could address the challenges ahead, to contribute to the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030, to assist countries to achieve the Sustainable Development Goal 15 and to deliver inputs to the 21st Conference of the Parties of the UN Framework Convention for Climate Change (COP 21) (December 2015).

The conference participants expressed strong concerns over the impacts of climate on fire regimes, the contribution of vegetation fire emissions to climate change, the application of fire in land-use change, the accumulating effects of global change on fire regimes, and increasing impacts of fire on society, notably on human health and security. Looking forward, participants suggested increasing international cooperation and response mechanisms, exchange of information and technical and scientific expertise. Based on inputs from the conference participants through regional and thematic statements, a Conference Statement summarized the concerns, the need for action and an envisaged scenario of implementation (Annex to the Declaration). In summary, and in the collective international interest, the conference appeals to the international community to consider two tiers of response:

- **International policies and concerted action:** Collective international efforts are needed to address impacts of vegetation fires that are of transboundary nature and currently affecting at an unacceptable level common global assets such as atmosphere and climate, natural and cultural heritage, and human health and security. Systematic application of principles of Integrated Fire Management (IFM), based on the wealth of traditional expertise and advanced fire science, contributes to sustainable land management, ecosystem stability and productivity, maintenance and increase of terrestrial carbon stocks, and reduction of unnecessary emissions of pollutants that affect human health and contribute to climate change. The COP 21 is encouraged to acknowledge the role and endorse the support of IFM as an accountable contribution to reduce greenhouse gas emissions, maintain or increase terrestrial carbon pools in all vegetation types and ensure ecosystem functioning.
- **Capacitation of nations to address the challenges in fire management:** In order to implement IFM there is a demand for capacity building, investments and outreach work at global level. Since traditional and advanced knowledge of IFM principles is available for all vegetation types, the systematic application of IFM, notably community-based fire management approaches, could be promoted by exchange of expertise between countries. The development of regional programmes and / or resource centres for capacity building including training in fire management should be supported by countries and international organizations. Bilateral agreements and multilateral voluntary exchange instruments should also be supported.

The conference participants thanked the Republic of Korea for hosting the conference and congratulated the Korea Forest Service for supporting a wildland fire management training programme in the Asian region. The global wildland fire community welcomed the offer of Brazil to host the 7th International Wildland Fire Conference in 2019.



2015 세계산불총회

INTERNATIONAL **WILDLAND FIRE** CONFERENCE

PYEONGCHANG, KOREA, 12-16 October 2015 www.wildfire2015.kr

6th International Wildland Fire Conference

Conference Statement – Annex to the Conference Declaration

Pyeongchang, Republic of Korea, 16 October 2015

The 6th International Wildland Fire Conference was held in Pyeongchang, Republic of Korea, 12 to 16 October 2015. The conference, held for the first time in Asia, was hosted by the Korea Forest Service and Gangwon Province, and held under the auspices of the United Nations International Strategy for Disaster Reduction (UNISDR) and the United Nations Food and Agriculture Organization (FAO). The Minister of Korea Forest Service, Prof. Dr. Shin Won Sop, and the Governor of Gangwon Province, Mr. Choi Moon-Soon, warmly welcomed the conference participants. In a video message the United Nations Secretary General Ban Ki-moon emphasized a “critical need to integrate fire management into natural resource management strategies at the global level” in the context of a planet continuing “to experience the cumulative impacts of global warming and urban sprawl.” Furthermore, the Secretary General recognized the important role fire management plays in achieving the new 17 Sustainable Development Goals, with particular emphasis in realizing Goal 15 aiming to protect ecosystems, manage forests, combat desertification, reverse land degradation and halting biodiversity loss. The head of the UNISDR Office for Northeast Asia, Mr. Sanjaya Bhatia, on behalf of Undersecretary General Ms. Margareta Wahlström, welcomed over 3500 delegates from 73 countries represented by government officials, representatives of twelve regions of the Global Wildland Fire Network, international organizations, as well as by professionals from civil society. The Undersecretary General highlighted the emerging importance of vegetation fires globally, particularly in the context of climate change. She stressed the importance of the work of wildland fire scientists and practitioners for international risk and disaster reduction concerns and efforts – a contribution to meet the challenges of the Sendai Framework for Disaster Risk Reduction 2015-2030. The Global Fire Monitoring Center (GFMC) welcomed the inputs of the Global Wildland Fire Network members to the conference and conveyed welcome remarks of the Council of Europe, EUR-OPA Major Hazards Agreement, and the Organization for Security and Cooperation in Europe (OSCE).⁷⁸

Conference participants, while acknowledging some strides in international cooperation and fire management activities since the previous 5th International Wildland Fire Conference in 2011, continued to express strong concerns for a number of larger issues. Some of the most widely shared concerns were the impacts of climate and global change, the application of fire in land-use change, increasing impacts of fire in the wildland urban interface and of smoke on human health and security. Looking forward, participants expressed common hopes for increased international cooperation and response mechanisms, exchange of information and technical and scientific expertise, increased data collection and application of monitoring and early warning measures, and for strengthening (local) education efforts, capacity building in Integrated Fire Management (IFM) and rural participatory, community-based initiatives.

The wildland fire management and scientific community shared reports with the conference participants regarding the progresses made since the last conference in 2011. Within the regions and at global level, major advancements have been noted in fostering capacity building at national level and by enhancing cross-boundary cooperation in fire management. Many of the initiatives, however, were borne and realized as voluntary commitments and activities with limited financial support.

Participants therefore stressed the need for more financial support and governmental commitments for national and regional fire management efforts, international policy mechanisms, and especially for greater application of community based fire management practices.

⁷⁸ The Statements of the Regional Wildland Fire Networks, Thematic Sessions and International Organizations are provided on a dedicated website of the GFMC: <https://gfmc.online/iwfc/korea-2015.html>

Common Concerns

During the conference, the wildland fire community explored challenges relating to a number of general topic areas, notably including: international and regional cooperation, local and national fire management, regional and global climate change, socio-economic changes, capacity building, science and technology, politics, and general operational fire management limitations. Identified within these categories, the conference participants hereby highlight the following common concerns:

- Increasing impacts of climate change on climate variability, weather patterns, fuels and fire behaviour, particularly the lengthening of fire seasons, the size in area burned, and the extremity and frequency of fire occurrences
- Insufficient political commitment and support for fire management and development of fire management policies
- Impacts of smoke on human health and air quality as well as fire-induced professional and civilian injuries and fatalities
- Impacts of fires from land-use change and agricultural/industrial clearing
- Increasing impacts of wildfires at the interface with rural settlements and urban fringes
- Impacts of socio-economic and demographic changes, including consequences of human migration, on fire regimes
- Insufficient fire management capacities – in terms of human, technical and financial resources
- Insufficient use of fire as a positive force to address landscape-level fire fuel build up and bush encroachment

Areas of Special Concerns

While most participants held common concerns and goals moving forward, some regions are experiencing unique and critical challenges that should receive special attention. These concerns include:

- Increasing occurrence of fire in ecologically and especially carbon-rich environments such as in tropical rainforests, peatlands, and in the arctic tundra; development of positive feedback loops leading to accelerated disturbances of the global system is of particular concern
- Challenges associated with collateral damages due to armed conflicts
- The resulting contaminated ground and unexploded ordnance which endanger fire management activities in these areas
- Occurrences of fire on otherwise contaminated ground such as from radioactivity
- Instances of frequent fatalities due to fire and also fire-smoke pollution
- Lack of sufficient protective equipment, training, and response capabilities in some regions resulting in unnecessary risks and damages from fire
- Lack of viable alternatives to fire as an agricultural and land-use change tool in some regions
- Bush encroachment / ecological succession on former intensively cultivated or otherwise managed lands throughout the world and the resulting increased wildfire hazard

Identified Courses of Action

In recognizing the concerns raised by the conference participants the following courses of action were identified:

- Increase the application of existing international fire management and incident preparedness mechanisms
- Utilize existing and further develop interoperability mechanisms, Standard Operating Procedures (SOPs), and protocols, e.g. the voluntary Fire Aviation Guidelines
- Broaden the application of the Incident Command System (ICS) for application in bi- and multilateral cross-border responses to wildfire emergencies
- Enhance integrated fire management; promote multi-sectoral communication between related and relevant agencies, regionally and nationally
- Strengthen legal and enforcement mechanisms to combat the illegal application of fire in land use and land-use change

- Integrate fire management into initiatives like the Reducing Emissions from Deforestation and Degradation (REDD+) and use opportunities offered by the Global Environment Facility (GEF) and Green Climate Fund (GCF)
- Strengthen institutional and governmental capacity in fire management
- Develop or make available alternatives for fire as a land-use change tool
- Establish or improve vegetation fire monitoring data collection, analysis and early warning mechanisms
- Develop fire management strategies for protected / sensitive areas and contaminated areas
- Increase efficiency and effectiveness of transboundary cooperation, and preparedness and response mechanisms in fire management
- Establish regional programs and / or resource centers for fire management where none currently exist
- Take measures to reduce fire-induced greenhouse gas emissions
- Develop measures for resilience and adaption in the face of a changing vegetation fire climate, including measures to respond to secondary disasters resulting from fire
- Heighten the international exchange of information and cooperation
- Promote the development and application of more science and technology, with emphasis to strengthen the link between fire management and science
- Focus on prevention over suppression; increase the application of prescribed burning
- Continue to place emphasis on community-based fire management practices by education campaigns and capacity building efforts in participatory fire management at local level to successfully reduce wildfire hazards, and enhance productivity and stability of land and the environment by
 - Creation of operational environments where community decision-making and implementation balance traditional and contemporary fire management requirements
 - Management of fire for its benefits, through controlled burning, to improve livelihoods and health of local populations, and reduce greenhouse gases
 - Promoting the establishment of volunteer groups to assist state authorities in rural fire management

Envisioned Implementation Goals

In addressing these areas of concern and the priority actions, four implementation goals are envisioned, three representing fire management regimes in vulnerable, transitioning, and advanced settings, and a final goal to commonly prioritize addressing urgent global challenges.

Goal 1. In developing fire management the global fire management community is encouraged to help the most vulnerable members to address fundamental threats posed by fires on human health and security; to lend support in the form of financial, technical, or operational measures; and to offer basic training and expertise for strengthening local education efforts, capacity building and rural community-based initiatives. This Goal acknowledges that local communities are the most vulnerable to the effects of a warming climate and of changing fire regimes.

Goal 2. In transitioning fire management settings where basic needs are met or institutional capacity are established, the fire management community is encouraged to continue supporting efforts recognized under Goal 1; establish regional programs and / or resource centers where needed; advance technical efforts such as fire detection, early warning and monitoring; enhance cross-border cooperation; further apply practical measures like standard operating procedures, the Incident Command System (ICS) for use in bilateral and multilateral wildfire emergency response; and to strengthen participatory fire management approaches (community-based fire management, involvement of volunteers).

Goal 3. In advanced fire management settings, efforts under Goals 1 and 2 shall be continually evaluated and improved as appropriate; emphasis shall be placed on further developing legal frameworks where desired; enhancing bi- and multi-lateral mechanisms for fire management expertise and resource sharing; share and advance science and technology; and when in the position, lend any and all forms of support to vulnerable and transitioning fire management communities.

Goal 4. The global fire management community explicitly recognizes the need to address several challenges which include the role of vegetation fires on

- Climate change
- Positive feedback loops of disturbances in the Global System
- Ecologically sensitive and carbon-rich environments like tropical rainforests, peatlands, and arctic tundra
- Agricultural systems and beyond (transboundary impact of agricultural fires such as long-range transport of Black Carbon)
- Environment and humans, stemming from armed conflicts (collateral damages)
- Contaminated terrain (industrial, unexploded ordnance and radioactivity)
- Human health and pre-mature mortality through fire-smoke pollution

Recommendations

Looking to the coming years, the conference participants emphasize the importance of and mutual gains to be achieved by supporting and participating in current, emerging, and planned initiatives in fostering the application of principles of Integrated Fire Management. These initiatives will contribute to realizing Sustainable Development Goal 15 (SDG 15) and meet the challenges of the Sendai Framework for Disaster Risk Reduction (SFDRR). These initiatives should receive immediate attention over the next years and their progress should be reported at the 7th IWFC in 2019. Two major recommendations are directed to the international community and included in the Pyeongchang Declaration.

The conference participants thanked the Conference Organizing Committee of the Republic of Korea, the Korea Forest Service and the Gangwon Province for organizing and hosting the conference. The global wildland fire community welcomed the offer of Brazil to host the 7th International Wildland Fire Conference in 2019.

6th International Wildland Fire Conference
Regional Statements and Session Reports

Regional Session I – Australasia and North America

Pyeongchang, Republic of Korea, 13 October 2015

Regional Statement of the North American Region

General Fire Assessment

Fire and land management is being increasingly challenged around the world by a changing wildland fire environment. The reasons for this include increasing wildland fuel loads under the previous fire exclusion policy, expanding wildland-urban interface, increasing human-caused fires as population increases with greater access to wilderness areas, and climate change-altered fire regimes that are characterized by longer fire seasons, higher fire intensities, greater severity of fire impacts, and increased lightning fires. Additionally, all of this is occurring at a time of rapidly increasing fire management costs, and aging equipment and infrastructure.

The international fire community recognizes that a key fire management strategy in addressing the increased difficulty for managing fire is by enhancing international cooperation. Due to the similarity in wildland fire problems and evolving fire management programs within the Americas, the relative proximity of American countries in a global context, and fire season differences between northern and southern hemispheres, there is a collective advantage to sharing fire knowledge, expertise, information/intelligence, and resources between countries and regions within the American continents. Developing a strategy based on these factors to increase international fire management cooperation between North America, Central America and the Caribbean, and South America will benefit all participating countries.

Since the 5th IWFC, the North American Forest Commission-Fire Management Working Group (NAFC-FMWG) has held annual meetings in Los Angeles (USA), Valle de Bravo (Mexico), and Halifax (Canada) to discuss current North American fire issues, research and technology transfer activities, fire management cooperation, and further opportunities for international collaboration. Representatives from the Central American and Australasian regions also participated in these meetings.

In 2012, the Forest Fire Management Group (FFMG) of Australia and New Zealand participated in a study tour of North American fire management and research agencies. More recently, the NAFC-FMWG participated in a study tour of Australia and New Zealand. On May 1-2, 2014 an International Symposium on bushfire management was held in Canberra, Australia to facilitate participation by the study tour members. The FFMG convened the symposium bringing together senior bushfire managers and researchers from the USA, Canada, Mexico, New Zealand and Australia. The symposium focused on the current state of knowledge, both scientifically and operationally, the identification of emerging issues in bushfire management, as well as ensuring the development of bushfire management networks on a global basis, and to identify areas for improvement and collaborative research and development interests.

The North America study tour group recommended such symposiums continue in a similar format in the future. They offer opportunities to focus efforts globally as practitioners from the participating agencies work together to lead our wildland fire community into the future. The FMWG believes that increased engagement between operational fire experts and scientists globally, would be most beneficial for all parties concerned.

The North American Forest Commission-Fire Management Working Group has recently developed a draft International Fire Strategy to promote increased international fire management cooperation and technology transfer in the Americas and globally. The objective is to support enhanced international cooperation in training, information and resource-sharing, and science and technology; and to build high-level support by senior decision-makers through fire management strategy and policy development to maintain long-term program continuity. The NAFC-FMWG will further develop the International Fire Strategy with representatives from Central and South American regions during the next annual meeting (November 2015, Phoenix, Arizona, USA).

Conclusions

Increased international collaboration within North America continues to be the priority of the NAFC-FMWG, as well as increased international cooperation within the Americas and globally. Both of these priorities will be supported through development of the new NAFC-FMWG International Fire Strategy, resulting in greater collaboration in training, science and technology exchange, and information and resource-sharing.

Recommendations

It is recommended that the NAFC-FMWG and FFMG of Australia and New Zealand continue its close cooperation and communication through study tours and participation at annual meetings. We further recommend a 2nd International Symposium be sponsored by FMWG during the 2016 Australia/New Zealand study tour of North America. The NAFC-FMWG also recommends continued expansion and coordination of international training, exchange of fire management expertise, and science and technology.

Regional Statement of the Australasia Region

General Fire Assessment

Australia's most active connections to the international wildland fire world are organised through the Forest Fire Management Group. The Forest Fire Management Group (FFMG) works bi- and multi-laterally with New Zealand, the United States, Canada, Mexico and France toward an improved understanding of wildland fire management. The rich history of knowledge exchange and study tours can be credited with the development of the highly functional operational agreements.

The operational cooperation of Australian fire management agencies with international partners is guided primarily by the Australian National Bushfire Management Policy Statement – authored by the Forest Fire Management Group (FFMG) and last published in 2014 for the audience of the Council of Australian Governments (COAG). This simply states that Australia will continue to maintain and improve its status as a leader and cooperative partner. It specifically mentions the bilateral agreements with New Zealand, Canada and the United States, as well as support for the International Wildland Fire Conferences and cooperation with the UN Food and Agriculture Organisation (FAO). Unfortunately contributions to the Wildland Fire Advisory Group (WFAG) are not mentioned.

Australia remains active in bushfire research through the Bushfire and Natural Hazards Cooperative Research Program, an eight year program in cooperation with over 10 Australian universities with specific research projects around fire monitoring and prediction, prescribed burning and next generation fire modelling. Through a partnership of FFMG and the Australasian Fire and Emergency Services Authorities Council (AFAC), a national multi-faceted project to document Australian prescribed burning best practices and fuel classifications, is currently being progressed (completion planned for 2017) and will provide a suite of doctrine that is likely to have international application in eucalypt forests.

The New South Wales Rural Fire Service is completing a three year 'Australia Africa Partnership Facility' funded by AusAID assisting the Botswana government to establish a safe and effective fire regime.

FFMG is active in advocating for a better understanding of the threat posed by vegetation fires at the global scale. An example of this can be found in the paper presented to the FAO Asia Pacific Forestry Commission (APFC) and the FAO Committee on Forestry (COFO) which advocates an internationally coherent approach to assessing risk and for countries to integrate fire risk concepts and risk reduction activities (including prescribed fire) into rural land and forest management legislation. The intended result of this would be to manage fire from the perspective of responsible land management rather than simply from the perspective of an unforeseeable natural disaster.

Most recently the FFMG in 2014, organised the inaugural International Bushfire Symposium on the back of a study tour organised for the North American Fire Management Working Group (FMWG), including Canadian, US American and Mexican fire managers. The inclusion of representatives from

the French risk management agency *Pole Risques* broadens the circle in which Australian fire managers are working, and again there is substantial overlap with the goals and activities of the WFAG.

Conclusions

The FFMG advocates continued international collaboration and cooperation with its counterparts in North America and increasingly with other European agencies. We commend and support the development of an International Fire Strategy, which will facilitate greater collaboration in training, science and technology exchanges, and information and resource-sharing.

Recommendations

We strongly support the NAFC-FMWG recommendation that FFMG of Australia and New Zealand continue its close cooperation and communication through study tours and reciprocal participation at annual meetings. We also support FMWG hosting the 2nd International Symposium during the 2016 Australia/New Zealand study tour of North America and strongly recommend attendance by other countries and agencies.

Regional Session I Report

General Fire Assessment

Fire and land management is being increasingly challenged around the world by a changing wildland fire environment. The reasons for this include increasing wildland fuel loads under previous fire exclusion policy, expanding wildland-urban interface, increasing human-caused fires as population increases with greater access to wilderness areas, and climate change-altered fire regimes that are characterized by longer fire seasons, higher fire intensities, greater severity of fire impacts, and increased lightning fires. Additionally, all of this is occurring at a time period of rapidly increasing fire management costs, and aging equipment and infrastructure.

The international fire community recognizes that a key fire management strategy to addressing the increased difficulty in managing fire is by enhancing international cooperation. This theme was emphasized throughout the regional session with presentations focused on sharing international firefighting resources through bilateral agreements, on continued cooperation of the international symposiums and by discussing new initiatives like the International Fire Strategy in North America.

Proposals

In 2012, the Forest Fire Management Group (FFMG) of Australia and New Zealand participated in a study tour of North American fire management and research agencies. More recently, the North American Forest Commission-Fire Management Working Group (NAFC-FMWG) participated in a study tour of Australia and New Zealand. On May 1-2, 2014 an International Symposium on Bushfire Management was held in Canberra, Australia to facilitate participation by the study tour members. The FFMG convened the symposium bringing together senior bushfire managers and researchers from the USA, Canada, Mexico, New Zealand and Australia. The symposium focused on the current state of knowledge, both scientifically and operationally, the identification of emerging issues in bushfire management, as well as ensuring the development of bushfire management networks on a global basis, and to identify areas for improvement and collaborative research and development interests.

The North America study tour group recommended such symposiums continue in a similar format in the future. They offer opportunities to focus efforts globally as practitioners from the participating agencies work together to lead our wildland fire community into the future. Increased engagement between operational fire experts and scientists globally would benefit all parties concerned.

Due to the similarity in wildland fire problems and evolving fire management programs within the Americas, the relative proximity of American countries in a global context, and fire season differences between northern and southern hemispheres, there is a collective advantage to sharing fire knowledge, expertise, information/intelligence, and resources between countries and regions within the American continents. The NAFC-FMWG has recently developed a draft International Fire Strategy to promote increased international fire management cooperation and technology transfer in the

Americas and globally. The objective is to support enhanced international cooperation in training, information and resource-sharing, and science and technology; and to build high-level support by senior decision-makers through fire management strategy and policy development to maintain long-term program continuity.

Increased international collaboration within North America continues to be the priority of the NAFC-FMWG, as well as increased international cooperation within the Americas and globally. Both of these priorities will be supported through development of the new NAFC-FMWG International Fire Strategy, resulting in greater collaboration in training, science and technology exchange, and information and resource-sharing.

Recommendations

1. It is recommended that fires be managed from the perspective of responsible land management rather than simply from the perspective of an unforeseeable natural disaster.
2. It is recommended that the FFMG and the NAFC-FMWG continue its close cooperation and communication through study tours and participation at annual meetings.
3. It is recommended to continue the expansion and coordination of international training, and exchange of fire management expertise, and science and technology.
4. It is recommended Australasia and North America maintains their current international bilateral agreements and pursue opportunities to increase bilateral agreements with additional nations.
5. It is recommended the NAFC-FMWG sponsor a 2nd International Symposium during the 2016 Australia/New Zealand study tour of North America.
6. It is recommended to continue development of the NAFC-FMWG International Fire Strategy.

6th International Wildland Fire Conference
Regional Statements and Session Reports

Regional Session II – South America and Mesoamerica

Pyeongchang, Republic of Korea, 13 October 2015

Regional Statement of the South America Region

General Fire Assessment

South America has a land area of 17.8 million km², which are equivalent to 12% of the Earth's surface. It is home to an extraordinary diversity of ecosystems, climates and topography, including the largest area of tropical rainforest (885 million ha in the Amazon basin and 85 million ha in the basins of Orinoco and Paraná rivers), representing 95% of the forest area of the continent. Around a quarter of the tropical forests of the planet is located in the region and protected under different conservation schemes. Natural and planted temperate forests along with the Andes mountain range are also important landscapes of South America.

Wildfires represent a severe problem in South America, because of their serious consequences and hazards to renewable natural resources and their economic, social and environmental impacts. The frequency, severity and magnitude of wildfires have increased due to climate, land-use and global changes. The causes of wildfires in the region vary from country to country due to diverse climatic conditions, vegetation, topographical features, land use and management, cultural conditions and behavior of human populations.

The increase of interface and cross-boundary fires, wildfires affecting protected areas, smoke problems and their impacts on human health and safety, severe and extended damages to the local communities and their properties has become one of the main concerns and challenges of most countries in the region.

Between 2005 and 2014, the total amount of active fires depicted by spaceborne sensors, i.e. high-temperature events detected by the reference satellites (NOAA 12 until August, 2007, and Aqua MT since then) reached more than 2.8 million. Of these, ca. 60% were detected in Brazil, 10% in Argentina, 10% in Bolivia and 20% in the other nine countries. As the land areas of the countries are highly diverse, an analysis of satellite data related to the land area of each country shows another distribution in the continent, 28.9% in Paraguay, 17.1% in Bolivia and 13.7% in Brazil.

Brazil, in face of huge wildfire challenges, is developing an approach of integrated fire management (IFM) considering community/indigenous people involvement, prescribed burning of low intensity for conservation of protected areas, and addressing prevention of wildfires and decreasing greenhouse gas (GHG) emissions. A National Policy on IFM is being developed as a Federal Decree. The achievements of Brazil are being shared with other countries and it is expected that they will permeate all regional cooperation. The methods and effectiveness of fire management also vary greatly among South American countries. The different views and political determinations, linked to the economic capabilities of each country, lead to diverse needs to develop fire management programs and their respective implementations.

In the last years, many cooperative actions have been developed in order to improve the capability of South American countries in dealing with wildfires:

- **Program for Reduction of Wildfires and Promotion of Alternatives to Fire-Use in the Amazon:** this project started as a bilateral agreement between Italy and Brazil (1999 to 2008). In 2010, it became a trilateral agreement among Italy, Brazil and Bolivia. This year the Program is extended to Ecuador.
- **2nd. Meeting of the Regional Wildland Fire Networks of South America, Caribbean and Central America:** Brasília, Brazil, in 2012 hosted this meeting that aimed to exchange information, evaluate cooperative actions and strengthen cooperation among the countries of Latin America and the Caribbean.

- **Cross-boundary assistance (I):** Torres del Paine National Park fire emergency. From 27 December 2011 to 23 February 2012, firefighters from Argentina, Brazil and Uruguay supported Chile in the suppression of the wildfires that affected various provinces of the country. As a result of this operational action, Chile organized the International workshop for the regional assistance reinforcement in forest fires, Santiago, Chile, in May of 2013.
- **Cross-boundary assistance (II):** Loja and Cuenca Fire Emergency. From 26 September to mid October of 2012, a Chilean CONAF Fire Response Strike Team supported Ecuador in wildfire suppression.
- **Cross-boundary assistance (III):** Brazilian Air Force – C-130 aircraft equipped with a Modular Airborne Fire Fighting System (MAFFS) supported wildfire suppression activities in Ecuador (2012) and Chile (2014).
- **Cross-boundary assistance (IV):** 2014: In April Argentina assisted with Single Engine Air Tankers (SEAT) and fire crews to the Chilean Forest Service and the National Emergency Office (ONEMI) to control the Valparaiso interface fire, the most devastating fire emergency to ever occur in the country. More than 950 ha burned and 2,900 homes, structures and other facilities were lost and 16 people were killed.
- **Cross-boundary assistance (V):** 2015: Extended air and ground support from Argentina with Single Engine Air Tankers (SEAT), engines and fire crews helped the Chilean Forest Service to control various wildfires and interface fires which threatened many cities in the country. This task force, reinforced with crews of *Bomberos* from Uruguay, is becoming an important means of international cooperation in the Region.
- **Cooperation among the eight countries of the Amazon Basin:** Under the auspices of the Amazon Cooperation Treaty Organization (*Organización del Tratado de Cooperación Amazónica* – OTCA), a framework agreement was developed in 2013 and 2014. It includes Operating Regulations and a Glossary. It was also developed as a Memorandum of Understanding. However, these cooperation agreements remain to be confirmed at Ministerial level.
- **Fire Management Cooperation Agreement:** A long-term cooperation in the Andes Community was initiated between CONAF (Chile) and the City Fire Department of *Distrito Metropolitano de Quito* (Ecuador).
- **International meetings:** The South American network was represented in three international meetings since the last International Wildland Fire Conference in South Africa:
 - **UNISDR Global Wildland Fire Network / Wildland Fire Advisory Group**, Global Fire Monitoring Center (GFMC) (June/July 2012)
 - **UNECE / FAO Regional Forum on Cross-boundary Fire Management**, United Nations, Geneva, Palais des Nations (November 2013)
 - **UNISDR Global Wildland Fire Network / Wildland Fire Advisory Group**, Global Fire Monitoring Center (GFMC) (June 2014)
- **Community Adapted to Wildfires Project, a bilateral agreement between California State-USA and CONAF-Chile in 2015**, aimed at enhancing local activities to fight wildland-urban interface fires.
- **Development of a project between Mexico and Chile:** “Strengthening technical capacities of forest fire protection” (2015)
- **Cooperation Agreement** between the Pau Costa Foundation (Spain) and CONAF (Chile).
- **RedLaTIF – The Remote Sensing and Forest Fires Network of Latin America** was established in 2002 as a participant of the GTOS panel of GOFCC-GOLD.⁷⁹ The main current activities include a website to assist users in their access to different international sources of

⁷⁹ <http://www.redlatif.org>

near-real time satellite fire monitoring data, with a unique regional option to define customized products and reports operationally provided by the “*Queimadas*” program of the Brazilian Space Research Institute (INPE).⁸⁰

- **Support of National and Regional Competency in Integrated Fire Management to Secure Sustainable Forest Management in Uruguay and through Cross-border Cooperation with Brazil, Chile and other Neighboring countries of South America:** This project is an initiative of GFMC in partnership with Uruguay, Brazil and Chile and in synergy with the GIZ-supported project “Prevention, Control and Monitoring of Fires in the Cerrado” in Brazil. It aims at taking advantage of expertise of the South American and German partners in developing systematic approaches in integrated fire management at the landscape level, including capacity building, institutional strengthening and the development of policies through the application of international training standards, voluntary guidelines for aerial firefighting operations, exchange of expertise and streamlined transboundary cooperation.

Conclusions

- In spite of the advances achieved in cross-boundary cooperation, bilateral and multilateral agreements, as well as at national level in the last years, there still remain some areas to be improved.
- Reliable statistics and cartographic data are not available for all countries and many times are not easily accessible; there is not a database for the region;
- The issues of GhG emissions and food and water security, which are threatened by wildfires, are not generally considered in fire management strategies;
- The lack of a more formalized approach for the Network weakens its activities, since the participation of the focal points is voluntary in the region;
- At the last meeting of the South American Network, the importance of a review to the Cooperation Strategy (not finalized) and the internal strategy of each country was pointed out;
- Most parts of the countries do not have a national policy/program for fire management;
- A few countries still remain without a focal point in the Network;
- Common standards for joint cross-boundary wildfire emergency response operations in the Region do not yet exist.

Recommendations

- Establishment of a Regional Center for compilation, distribution and housing of information and data of all the countries of the Regional South America Wildland Fire Network, and to serve as the secretariat / coordinator of the network;
- Standardization of protocols for all activities and development of common procedures and language to enhance interoperability and efficiency of South American countries to cooperate in fire management;⁸¹
- Application of the Incident Command System (ICS) as the common approach in South America for the command, control, and coordination of bilateral or multilateral emergency responses to wildfires;
- Scientific research should be encouraged in the region and the countries must try to seek funding and projects to be developed in cooperation.

Regional Statement of the Mesoamerica Region

General Fire Assessment

The Mesoamerican region between 2005 and 2014, registered more than 81,500 wildland fires, affecting an area of 2.1 million hectares, with many of the fires being recurrent. Based on the information supplied by the countries, most wildland fires in the Mesoamerican region are caused by

⁸⁰ <http://www.redlatif.org/pt/datos>

⁸¹ See also voluntary training standards and guidelines for creating interoperability by utilizing products available on the platform of the International Wildfire Preparedness Mechanism (IWPM) – an outcome of the UNECE/FAO Regional Forum on Cross-boundary Fire Management (2013): <https://gfmc.online/iwpm/index-7.html>

humans. The primary causes are intentional burning of agricultural lands, grasslands, debris and trash burning. Arson, fires set for game hunting, burning of forest residues, fires used by beekeepers and campfires are significant, too.

At the national level the following could be observed:

- National Fire Management Strategies are available. The Fire Management Programs in each of the countries have based their actions mainly in forest fire prevention and control within their common – and at the same time – differentiated responsibilities because of the different levels of advancement of each country
- Training processes have continued, oriented to society where its incorporation has been extremely important in Government-driven fire management action
- Internal strategic alliances for Forest Fires Commissions have continued with each country, conformed by different Governmental institutions of the region, that support the processes of the responsible institutions of the fire management actions
- New technologies and tools / equipment have been supplied by the countries for enhancing efficiency of responding to wildfire emergencies
- Countries have legislation in place to regulate fire management, including controlled agricultural burning
- Research has been carried out in the environmental, social and economic fields and their relation with the theme of wildland fires

At the level of international cooperation, fire management strategic alliances between countries have been strengthened for the training and specialization of the personnel responsible for fire management in each country. Countries of the region had access to resources and support from more advanced countries and other international cooperation organisms to carry out fire management actions.

The following activities in fostering regional / international cooperation in fire management have been implemented since the 5th International Wildland Fire Conference:

- Experience exchange in fire management between SINAC-CONIFOR of Costa Rica and Instituto de Conservación Forestal de Honduras (Tegucigalpa, Honduras 2011)
- Joint work in fire management in the area of Trifinio between Guatemala, Honduras and El Salvador, with support of the German Technical Cooperation (since 2011)
- Integrated Fire Management project in Panama, supported by the ITTO (since 2011)
- Joint work and experience exchange with the Fire Management Working Group of North America (joint meeting in Canada 2011 and 2014)
- Joint work and experience exchange with the Caribbean and South American networks in an IBAMA supported event (Brazil 2012)
- *Foro Latinoamericano de Manejo Integral del Fuego*, organized by USAID/OFDA-LAC (Colombia 2013)
- UNECE/FAO Regional Forum on Cross-boundary Fire Management (UN, 2013)
- *Primer Ejercicio Centroamericano de Movilización de Brigadas Forestales*, with the participation of 19 brigades of four Mesoamerican countries and two from Colombia plus observers from five Latin American and Caribbean countries (Costa Rica, 2013)
- *Taller Planificación para la Prevención de Incendios Forestales*, sponsored by the *Estrategia Mesoamericana de Sustentabilidad Ambiental* (EMSA) (Colombia, 2014)
- Participation in the Global Wildland Fire Network meetings (GFMC, 2012, 2014)
- Training course for personnel from Guatemala and Honduras taught by the U.S Forest Service and Comisión Nacional Forestal (CONAFOR) of Mexico (2014- 2015)
- Trilateral cooperation between Germany, Morocco and Costa Rica for the establishment of a Fire Risk Cartographic System Costa Rica (2014-2015)

Considering the currently valid Mesoamerican Fire Management Strategy 2005-2015, the *Comisión Centroamericana de Ambiente y Desarrollo* (CCAD) in 2014, initiated a review of the Mesoamerica Fire Management Strategy 2005-2015. Between October 2014 and January 2015, four regional workshops were organized in San Salvador (El Salvador) for the establishment of the new Regional Fire Management proposal, planned for a period of 10 years with a review every five years. This strategy includes a Regional Action Plan and is based on eight strategic lines:

- Regional and national management
- Cooperation

- Social management
- Knowledge management
- Risk management
- Operations
- Areas rehabilitation
- Information management

The objective of the new strategy of the CCAD is the regional coordination of fire management along with other mechanisms stated in the *Plan Ambiental de la Región Centroamericana* (PARCA), *Programa Estratégico Regional para el Manejo de los Ecosistemas Forestales* (PERFOR), *Estrategias Regional de Cambio Climático* (ERCC), *Estrategia Regional para la conservación y uso sostenible de la Biodiversidad en Mesoamérica* (ERB), *Estrategia Regional Agroambiental de Salud* (ESRAS) and the *Estrategia Plan para la Gestión Integrada de Recursos Hídricos en Centroamérica* (ECAGIRH).

Conclusions and Recommendations

Governments of the Mesoamerica Region in general recognize the increasing wildfire problem in the region and the importance of wildfire prevention, preparedness and control. However, due to the limitations of the public sector, many initiatives do not achieve concrete results or are not sustainable. Governments still focus in wildfire response or suppression rather than prevention and the search of alternatives through integrated fire management. The consequences of climate change and human activities that are leading to the deterioration of the environment, e.g. use of fire in agricultural and grasslands, slash-and-burn agriculture or accidental fires, have contributed to an increasing occurrence of wildfires across the region, affecting natural ecosystems, human populations and national economies.

Recommendations for enhancing national and regional cooperative fire management capacities in Mesoamerica include:

- The enactment of the new Regional Fire Management Strategy 2015-2025 by the *Consejo de Ministros de la Comisión Centroamericana de Ambiente y Desarrollo* (CCAD) is pending. It should come with financial support to implement regional actions described in this Regional Statement.
- The region disposes of trained and equipped human resources, along with the tools for control of wildfires. However, improvement is still required, particularly with regards to the development of protocols and procedures to ensure interoperability between countries in emergency situations of large or transboundary fires.
- Despite the advancements achieved in previous years in the consolidation and development of the fire management programs of the countries of the region, more political commitment and financial resources are required to enhance the overall national and regional cooperative fire management capacities.
- Technology is required to increase and adapt the training in fire management in each country to improve planning, institutional organization and systems for rapid detection, early warning systems and risk indexes for every country and at regional level.
- It is still necessary to strengthen and decentralize the fire management activities at the levels and responsibilities of local communities, municipalities and civil society organizations.
- Fire-management related technical-scientific research must be strengthened.
- Legal and technical solutions addressing agricultural and grassland burning needs to be developed in order to minimize the negative effects of these fires on the sustainability and stability of land-use, to reduce the spread of these fires to vulnerable ecosystems and to reduce the effects of excessive burning emissions on human health.
- The consequences of climate change are already impacting the Mesoamerica region resulting in increasing occurrence and severity of wildfires – with the assumption that in the coming years the problem will continue to increase.
- It is recommended that the countries would cooperate through National Centers and create a Regional Fire Management Resource Center, which would serve as Center of Excellence for fire (and related) data repository, information exchange, monitoring, early warning and facilitation of cross-boundary response to wildfire emergencies.

Regional Session II Report

The regional session of South America and Mesoamerica provided an opportunity to discuss the work of the countries internally and in cooperation with others. Based on the discussions some conclusions were drawn and recommendations given for the future Regional Networks activities:

Conclusions

- Some countries of the Region do not have a national policy/program for fire management; existing regional and national fire management strategies need to be revised and updated.
- There is a lack of common standards for joint cross-boundary wildfire emergency response operations in the Region;
- At a regional level the budgets to further develop and strengthen fire management capabilities are scarce and financial support through international cooperation agencies insufficient;
- Reliable and compatible statistics and cartographic data are not available for all countries; there is not a database for the region;
- Wildfires produce greenhouse gas emissions and threaten food and water security. However, these issues are generally not considered in the fire management strategies;
- The lack of a more formalized approach for the Network (in the case of South America network) weakens its activities since the participation of the focal points is voluntary.

Recommendations

- Promote within the countries the application of principles of Integrated Fire Management process involving community participation to achieve the objectives;
- Incorporate the private sector along other actors in the financial mechanisms to strengthen fire management capabilities; approach international donors to co-finance development of fire management capacities in the region;
- Continue to strengthen the cooperation, knowledge and resource exchange between the countries with the participation of the national and local governments, NGOs, communities, civil society, cooperation agencies and academic institutions for effective and efficient fire management;
- Standardize protocols for all activities and develop common procedures and language to enhance interoperability, efficiency of cross-boundary wildfire emergency response operations, and cooperation in fire management between the countries of Latin America and the Caribbean.
- Promote the development and application of mechanisms, protocols and proceedings between the countries of the region for mutual support and technical assistance in fire management;
- Promote the revision of the existing mechanisms of data collection and establish standard formats for transnational comparability;
- Ratify official / authorized fire management focal points in each country of the region;
- Consider the particular situation of operative management and coordination and integrate the current Mesoamerica Wildland Fire Network and the Caribbean Wildland Fire Network in one single joint Regional Network;
- Promote the visibility of the importance of fire management actions and include them in the agendas of the main international processes related to environmental issues, sustainable development, humanitarian and politically / legally binding issues;
- Establish a Regional Center for compilation, distribution and housing of information and data, for providing advisory services and facilitation of cross-boundary cooperation and capacity building of all the countries of the Regional South America Wildland Fire Network.

6th International Wildland Fire Conference
Regional Statements and Session Reports

**Regional Session III – Pan-Asia Network Cluster – Northeast Asia, Southeast Asia
and South Asia**

Pyeongchang, Republic of Korea, 13 October 2015

Regional Statement of the Northeast Asia Region

General Fire Assessment

In Northeast Asia, some forest ecosystems are becoming increasingly vulnerable to fire as a consequence of regional climate change, careless fire use and reduced institutional capacities to manage fires. These include mixed forests of the Far East of Russia, which are not fire-adapted but during the last decade have been subject to large wildfires. The same refers to the Northeast of China where wildfires often burn at large scales involving high losses of valuable forests and humanitarian problems such as air pollution, injuries and fatalities of wildland firefighters.

Transboundary fires are noted between neighboring countries which are sharing a land- border, e.g. between China and Russia, or between South and North Korea. Cross-boundary transport of smoke and regional smoke pollution has become a regular phenomenon. The last fire and smoke pollution period in the Northeast Asia Region occurred in April 2015, resulting from wildfires in the Transbaikial Region of the Russian Federation, resulting in long-range transport of smoke pollutants to the Korean Peninsula and stretching as far as the West Coast of North America (Canada, U.S.A.).⁸² Such large-scale events require coordinated transboundary actions. As part of such actions, the Pan-Asia Wildland Fire Network Cluster was established after the 5th International Wildland Fire Conference in order to synergize with the Regional Wildland Fire Networks covering the vast territories of Asia. In addition, in order to enhance regional fire preparedness and response, the Asia Wildland Fire Training Program was initiated.

Conclusions

The work of the Northeast Asia Wildland Fire Network is embedded in the cooperative work of the Pan-Asia Wildland Fire Network Cluster. The initial participation of wildland fire scientists and state authorities of some countries has revealed a high interest in sharing information and resources for capacity building and joint fire management in the region. The active participation, including provision of finances, by national authorities and international organizations, however, should be increased. In order to realize this, a strategic plan including a timetable of concrete actions in fostering international cooperation must be developed. One of the important steps is the organization of the follow-up work at national level in each country. The major steps in cooperation must be carried out at the national level, including annual meetings of the Regional Wildland Fire Networks and the biennial participation of the meetings of the UNISDR Wildland Fire Advisory Group (WFAG), and joint projects of implementation. Being aware that in most countries the problems associated with excessive application of fire in land use and socio-cultural activities, the humanitarian and security consequences of fires and fire emissions are not yet solved. The participants of the Northeast Asian region recommend to the authorities at all levels and international organizations:

Recommendations

1. To support the Pan-Asia Wildland Fire Network through developing cooperative cross-boundary regional fire management capacity and enhancing international cooperation as a hub of wildfire information exchange, education, training and international cooperation;
2. To support the operation of the Asia Wildland Fire Training Program in Korea, a follow-up project of the 6th IWFC initiated by the Korean government. In this regard, the government of Korea seeks cooperation from countries around the world on the establishment of the Program; and

⁸² <http://gfmcc.org/GlobalNetworks/CentralAsia/MongoliaFireManagementWeek2015.html>

3. To support the Pan-Asia Wildland Fire Conference (second conference to be held in Indonesia in 2017), which will be held every four years at half intervals between the International Wildland Fire Conferences.

Regional Statement of the South Asia Region

General Fire Assessment

In the South Asia region almost all fires are human-induced, some of which are linked with livelihoods of the people. Wildfires, among other natural disasters, have been emerging as a significant threat during the last decade, adversely impacting socio-economy and environment in the region.

Recently, the South Asia region has experienced a number of increasing incidence of unprecedented large and disastrous wildfires affecting forests and other natural vegetation, and an increasing vulnerability to communities and secondary effects of fire; e.g. accelerating sediment-related disasters (e.g. soil erosion, landslides, floods etc.) and impacts of fire and smoke pollution on human health and security. Particularly, the forests of the Hindu Kush-Himalaya region are more vulnerable to wildfire due to increasing human interventions in the fragile mountain ecosystems. In addition, wildfire incident management is extremely difficult due to steep mountain landscapes that are difficult to access, have scarce water sources; poor communication and a lack of infrastructure is a challenge. This is further aggravated by the lack of national capacity and resources to assist in fire response in remote communities and in large fire situations. With the consequences of climate change, notably the dwindling mountain ice and snow cover and thus decreasing water supply, the overall development is entering a vicious cycle in the region, resulting in serious threats to human lives and property, the destruction and degradation of valuable forest ecosystems and natural and cultural heritage sites each year. The combination of wildland (vegetation) fire emissions, including agricultural burnings, with industrial emissions generate the "Asian Brown Cloud", a major regional environmental pollution phenomenon.

Most of the countries lack fire management capabilities, including early detection, monitoring, early warning, response, impact assessment, and agreements for cross-border cooperation in fire management. Moreover, transboundary fires and smoke pollution are evident and call for enhanced international cooperation in sharing of technological and financial resources for capacity building in wildland fire management.

In many instances, wildfire prevention and mitigation activities are only indicative at the level of implementation. Firefighting is entirely ground-based with limited availability of advanced technologies such as aerial firefighting assets. The key stakeholders, for instance government organizations, regional organizations / institutions, are often working in isolation and need to create synergies for collective actions aimed at increasing resilience of communities and nations to wildfire disasters and climate change adaptation.

In this scenario, the community-based fire management approach is strategically becoming accepted in the region. Experiences of participatory community fire management initiatives from Nepal can be an example for sharing with neighbours as was demonstrated in the "Regional Pan-Asia / Pacific Consultation on Building Advanced National and Regional Capacities in Integrated Fire Management based on Participatory Involvement of Local Communities" held in Lalitpur, Nepal, in November 2012. Both capacity building of local communities and international exchange of expertise in fire management, has been facilitated by the UNISDR Regional South Asia Wildland Fire Network in the spirit of the recommendations of the 4th and 5th International Wildland Fire Conferences of 2007 and 2011.

Conclusions

The increasing threats to ecosystems, economies and people in South Asia, require targeted responses by developing fire management policies and local to national fire management capabilities.

As the UNISDR Regional South Asia Wildland Fire Network is playing an increasing role in providing an informal but efficient platform for policy dialogue and communication, information sharing and technology transfer through project implementation in the region, the Network should be formally recognized as a key partner and be supported by the United Nations and other donors including international cooperation agencies working in developing countries.

It should also be noted that it is important to encourage the key stakeholders for cooperation and collaboration, for instance government organizations, international/regional organizations/ institutions (e.g. UNISDR, GFMC, FAO, ITTO, SAARC, ICIMOD, AFoCo, etc.) in the Asian region to get involved in and support the UNISDR- South Asia and Pan Asia Wildland Fire Networks. The International Wildfire Preparedness Mechanism (IWPM) offers an international platform for sharing expertise in fire management.

Recommendations

For the implementation wildland fire management activities in the South Asia region, it is recommended to:

1. Enhance existing national / regional capability in fire management, including early detection, monitoring, early warning, fire response and impact assessment;
2. Enhance cooperation among countries within the region and at inter-regional levels, aimed at sharing technology, expertise and data exchange in fire management; the activation of the International Wildfire Preparedness Mechanism (IWPM) may offer an appropriate opportunity;
3. Integrate fire as a component of land use and forest management tool by giving emphasis on:
 - Improving participatory / community-based fire management approaches and institutional and technological capabilities at all levels;
 - Building capacity to 'wise-use-of-fires' for habitat management and biodiversity conservation;
 - Promoting education and awareness-raising programmes on wildland fires;
 - Supporting countries to conduct national fire and fire management assessments, formulate legal frameworks and strategies, build sustainable fire management capabilities and institutions, develop fire management plans and human resources;
 - Developing policies, strategies and action plans aimed at building capacities in local, national and transboundary forest fire management.
4. Implement the mandates and objectives of the UN-ISDR Wildland Fire Advisory Group / Global Wildland Fire Network and Global Fire Monitoring Center (GFMC) and to support implementation of building fire management capability at both local and national levels, as well as through bilateral and multilateral cooperation agreements;
5. Share the learnings from Southeast Europe, Eastern Europe and Central Asia and establish a Regional South Asia Fire Management Resource Center, which will serve as a regional center of excellence for capacity building and a facilitator of cross-boundary cooperation in fire management, operating as a decentralized regional center of the GFMC within the Global Wildland Fire Network;
6. Create an enabling environment from all possible donors including national, international, bilateral, multi-lateral and private foundations for financial, technical and other resource support for wildland fire management; and
7. Call for North-South, South-South regional cooperation in fire management to support fire management without borders in emergencies: Development of global principles for collective action.

Regional Statement of the Southeast Asia Region

General Fire Assessment

Most of the vegetation fires occurring in the member countries of the Association of Southeast Asian Nations (ASEAN) are due to human interventions, notably by local communities and industrial corporations. Similar to traditional shifting cultivation, which is not very common anymore, fire is still used for removing native vegetation, accumulated plant biomass, to prepare land for planting agricultural crops, or to establish plantations. Apart of fires set for land clearing, recurrent fires are common in seasonally dry forests, notably in dry dipterocarp forests in mainland Southeast Asia and on degraded lands occupied by grass cover (notably *Imperata cylindrica*). Observations by satellite remote sensing reveal the extent and patterns of fire used for land clearing, and that these practices continue to be a major regional phenomenon.

This issue remains controversial in the ASEAN member countries, as in 2014, all countries ratified the ASEAN Agreement on Transboundary Haze Pollution, which was previously signed in 2002 in Kuala Lumpur, Malaysia. The overall goal of the agreement is to reduce fire use and thus the negative consequences of fire and fire-generated smoke pollution on the environment and on society. Ministerial meetings at the regional level, under the coordination of the ASEAN secretariat, are regularly conducted with the aim to find solutions to reduce and combat fires and transboundary haze pollution, e.g. by working with local communities with the main objective to minimize fire use and uncontrolled spread of wildfires in the region. Unfortunately, the reality in the field shows that there are no significance changes in the fire activities in the ASEAN member countries. Thus, the efforts to reduce greenhouse gas (GHG) emissions and the negative effects of fire smoke pollution on human health and security are in vain. The regional level solution is calling for intensive cooperation and joint action not only by government authorities but also by scientists and civil society, notably at the level of local communities.

Experience has shown that the problem of excessive use of fire cannot be solved only by a policy that has been developed by bureaucrats who are unfamiliar with the realities and the needs and constraints of the natural and socio-economic environment in which fire is used. Policies can be of limited use if there are no clear and realistic guidelines, concrete involvement of local communities and also strict law enforcement.

There is also the trend to focus on fire management solutions that are not really addressing the root problems. Investments in using aircraft for firefighting or production of artificial rain have often a limited efficiency and are costly. Financial resources should better be used to educate and train local communities in alternatives to fire use, wildfire prevention and self-defense of local assets by villagers, volunteers and local fire units.

Conclusions

It is recognized that since the 5th International Wildland Fire Conference (2011), the application of fire in land use and land-use change, the occurrence of wildfires and the negative impacts of fires on the environment and society of Southeast Asia have not changed and the overall situation has not improved.

Successful solutions for these problems at the regional level not only depend on the bilateral or regional collaboration like with ASEAN, but most importantly depend on the governance and capacity how each country manages its own problems. Advanced technology is often considered the best solution to solve the problem. However, unfortunately it can work only if the entire chain of prerequisite conditions is available, efficiently coordinated and functioning.

By end of 2014, the ASEAN Agreement on Transboundary Haze Pollution has been ratified by all Member States and appropriate actions are due. International attention is increasing on curbing deforestation, biodiversity loss and GhG emissions by reducing unnecessary application of fire. Thus, it is assumed that in the near future more attention will be given to fire management solutions based on best science and having realistic outreach to society. The Regional Southeast Asia Wildland Fire Network offers a platform for an informed dialogue among ASEAN member countries concerning the development of fire management policies and pragmatic approaches in capacity building at all levels. Since the 5th International Wildland Fire Conference in 2011, the Regional Network has contributed to a number of national, regional and international initiatives in cross-boundary cooperation in fire

research and fire management. However, the network requires continued support by national agencies, NGOs and international organizations.

Recommendations

Considering the unchanged situation of fire in land use and land-use change, the following recommendations, which were made at the 5th International Wildland Fire Conference (South Africa, 2011) remain unchanged:

1. To strengthen forest fire research, especially on peat fires and forest ecosystems;
2. To continue and intensify inter-regional cooperation in wildfire disaster reduction through ASEAN, GOFCC/GOLD Regional Networks, UN-ISDR Wildland Fire Advisory Group / Global Wildland Fire Network and Global Fire Monitoring Center (GFMC) and other international agencies.
3. The activities of the Pan-Asia Wildland Fire Network Cluster, notably the training activities under the AFoCo programme, should be financially supported;
4. To continue integrating fire management in climate-change projects such as REDD++, transboundary haze and smoke pollutions;
5. To develop mitigation and adaptation strategies to be prepared for the anticipated change of fire regimes in the region in a future climate change scenario;
6. To encourage and support organizing forest fire management at the community level.
7. To share successful experiences of community-based fire management throughout the region and beyond;
8. To develop rehabilitation and restoration techniques in degraded burned peat swamp forest and other forest ecosystems.

6th International Wildland Fire Conference
Regional Statements and Session Reports

Regional Session IV – Mediterranean and Near East

Pyeongchang, Republic of Korea, 13 October 2015

Regional Statement of the Mediterranean Region

Introduction

Wildfires are not only just one of the main causes of biodiversity loss, but they are also a big issue in terms of social and economic consequences. They affect population, and they require important investments both of effort (people) and money; they impact the environment globally, contributing to CO₂ emissions and climate change.

In the Mediterranean region, wildfire destroys the protective and productive roles of forests and forested areas, generating soil erosion and desertification problems and reduces water retention, which are both very important functions needed to preserve Mediterranean ecosystems. In the Mediterranean Basin, there are still significant populations linked to rural and forested areas. These people need the forests to develop their economic activities and their lives depend on forest ecosystems.

Armed conflicts recently started or increased in the Mediterranean, mainly in the Near East and North Africa, affecting countries such as Syria and Libya. They are raising new challenges related to wildfire management and control. The use of fire as part of conflict strategies affects valuable Mediterranean forests and forestry lands as well as populations and refugees. Border areas are the most vulnerable and affected. Post-conflict situations where many forest surfaces have been affected also need to be taken into consideration.

In the last years, since the last International Wildland Fire Conference (South Africa, 2011), many events and initiatives have taken place which have highlighted the relevance of wildfire issues internationally and particularly in the Mediterranean Region. Some of these events have included:⁸³

- Climate Change & Forest Fires in the Mediterranean Basin: Risk Reduction & Management (24-26 January 2012, Nir Etzion, Israel)
- International Workshop on Multi-Sensor Systems and Networks for Fire Detection and Management (8-9 November 2012, Antalya, Turkey)
- IV International Conference. Strategies on Forest Fire Prevention in Southern European Forests (7-9 January 2013, Bordeaux, France)
- Aerial Firefighting Europe (10-11 April 2013, Aix-en-Provence, France)
- International Conference on forest fire risk modelling and mapping - "Vulnerability to forest fire at wildland-urban interfaces" (30 September-2 October 2013, Aix en Provence, France)
- Regional Fire Management Training for the South Caucasus, Western Balkans and Eastern Europe / Central Asia (15-17 October 2014, Fire Management Training Center, Antalya, Turkey)
- Forest Fires Meeting, Edition 2013 - Agreement for the Mediterranean Forest (17-18 October, Valabre, Aix-en-Provence, France)
- Euromediterranean Conferences on Wildfires (18 - 20 November 2013, Barcelona, Spain).
- UNECE/FAO Regional Forum on Cross-boundary Fire Management (27-29 November 2013, United Nations, Geneva)
- International Forest Fire Conference in the Black Sea Region (6-8 November 2014, Kastamonu, Turkey)
- VII International Conference on Forest Fire Research (17-20 November 2014, Coimbra, Portugal)
- Aerial Fire Fighting Conference (29-30 April 2015, Zadar, Croatia)

⁸³ Note: Details about these conference activities are archived on the special web page on wildland fire science and management conferences of the Global Fire Monitoring Center (GFMC): <https://gfmc.online/course/meeting-3.html>

- International Workshop on Large Forest Fires and Field Exercise (19-21 May, 2015, Olympia, Greece)
- II International Conference on Fire Behaviour and Risk (26-29 May 2015, Alghero, Sardinia, Italy)

The objectives of the Regional Session of the 6th IWFC are to discuss main aspects related to wildfire prevention, suppression and awareness and identify transboundary collaborative initiatives to be taken in order to improve Mediterranean region capacity building.

Key factors

The main determining factors and global issues related to wildfires in the Mediterranean, their consequences and causes have been highlighted in the documents resulting from the previously mentioned events and are stressed here in order to take them into consideration to encourage a stronger regional management of wildfires:

SOCIOECONOMIC FACTORS

- Abandonment of rural lands and rural activities, aging of rural population
- Increase of wildland rural and urban interfaces, increase of tourism populations
- Increase of severe wildfires requiring the activation of civil protection mechanisms
- Low economic value and profitability of forests
- Economic crises and reduction of fire management budgets
- Escalating suppression costs vs prevention investments
- Lack of integral social awareness and education programs
- Armed conflicts and refugees

ENVIRONMENTAL FACTORS

- Global and climate change influence on and by wildfires
- Increase of critical weather events of heat waves and droughts
- Increase of fuel load and untreated fuels
- Fire dependent ecosystems
- Need of maintaining ecosystems services (carbon, water, biodiversity...)

SCIENTIFIC FACTORS

- Lack of coordination and communication between research and management
- Lack of dissemination and implementation of results
- Lack of standards for wildland fire-related data collection and knowledge systems

POLITICAL FACTORS

- Poor understanding of the complexity of the vegetation fire problem and the need for an integrated approach
- Lack of long term approach for politics
- Lack of awareness of the value of prevention vs suppression and the need for an integrated long term effort
- Lack of long term evaluation of fire management in order to identify opportunities for improvement
- Poor coordination between decision makers, managers and users/stakeholders
- Lack of coordination of wildfire, environmental, urban and rural policies
- Need to improve transparency on investments data
- Lack of awareness regarding the need for civilian education programs
- Media influence in political decisions

International cooperation

Wildfires do not respect political borders; this is the reason why the planning and prevention on wildfires should be addressed from a regional and collaborative perspective. A platform to share and

disseminate knowledge, best practices and experiences could be a way to increase international cooperation in the Mediterranean region.

All efforts should be combined in order to take advantage of all possible synergies. Exchange of expertise, experts and resources, mainly during exercises, simulations and training will help improve our capacity as a Region.

Existing initiatives, such as the European Forest Fire Information System (EFFIS), the European Commission Civil Protection Mechanism (EUCPM) and the International Wildfire Preparedness Mechanism (IWPM) should work together in order to develop standard protocols, procedures and training as references for the countries. The Incident Command System (ICS) should be adapted and adopted by all countries as the recommended organizational tool.

A large-scale arrangement for resource sharing is needed within the region. The European Commission Civil Protection Mechanism (EUCPM) is an important step in this direction, along with the International Wildfire Preparedness Mechanism (IWPM) and the currently emerging voluntary Fire Aviation Guidelines, depending on the Wildfire Advisory Group of the Global Wildland Fire Network (UNISDR). In all cases emphasis should be put on increasing the effectiveness of the help provided.

A special effort should be made regarding those countries affected, both directly and indirectly, by armed conflicts. These situations should be addressed with specific approaches developed by the international community with diplomatic efforts.

Conclusions and Recommendations

FIRE PREVENTION AND SUPPRESSION

- Prevention of wildfires caused by socio-economic changes in the land use, traditional practices of burning for agricultural and farming purposes and wildland-urban/rural interface fires need to be addressed as a priority.
- Investments on prevention, training and awareness cannot be reduced in favor of suppression budget. Prevention is the key and is a multifaceted and long term effort and politicians need to address its importance.
- Local populations are primary players in prevention efforts. Civilian participation in the design and implementation of vegetation fire prevention policies is a key factor. Countries are encouraged to adapt the "Guidelines for the Defense of Rural Populations, Settlements and other Assets against Wildfires and Smoke Pollution" developed for the pilot region Greece / Western Balkans.
- Wildfire prevention strategies should be integrated in national and regional sustainable environmental policies. Forest policies should pursue optimizing social welfare including payment for ecosystems services.
- Coordination between urban, rural and environmental policies is a must. A landscape and land-use approach should be integrated in these policies.
- Prevention measures comprise a wide range of management activities such as fuel treatment, silvicultural measures and prescribed burning planning. All possible measures should be considered and adapted to local needs.
- Wildfire prevention in WUI /RUI areas can only be effective if efforts are supported by compatible legislation and planning (for example urban, environmental and civil protection regulations).
- Appropriate knowledge and implementation of fire risk and strategic planning of fuel treatment are key factors to decreasing the impacts of wildfires.
- Consideration of constraints related to armed conflicts will serve to adapt prevention strategies in countries affected.
- Effective initial attack is the best way to suppress wildfires and avoid its spread under uncontrolled conditions.
- Suppression strategies should consider several scenarios and factors: balancing economic efficiency of suppression tactics, ecosystem values, other land management objectives and firefighter safety. The principles of total fire extinguishment should be questioned in specific cases. A special effort to educate politicians and the public regarding these wildfire strategies should be made.
- Countries are encouraged to adopt the emerging Fire Aviation Guidelines as well as the Incident Command System (ICS) for wildfire suppression.

RESEARCH AND INFORMATION SYSTEMS

- Research community needs a better link to operational and the decision making community.
- Synergies on wildfire research have to be considered before starting new researches. A database in which all projects related to wildfire R+D+i can be consulted would be a really useful tool to avoid investing more money in same type of studies.
- The European Forest Fire Information System (EFFIS) represents a reliable source from which to develop guidelines and reference material regarding forest fire risk and management in the Mediterranean Region.
- Continue the work on harmonization of data and information, as well as the extension of EFFIS to all countries in the Region.
- Enhance Information on prevention and suppression investments to be incorporated in EFFIS; data are needed for the assessment of their efficiency.
- Operational warning systems for wildfires should be further developed at regional level and linked to the EFFIS Forest Fire Warning System and the Global Wildland Fire Early Warning System.

FIRE MANAGEMENT

- Wildfire management needs to be addressed and clearly considered as a long-term policy by decision makers
- Promote the payment for forest goods and environmental services, making forests profitable.
- Education and awareness on wildfire management has to be integrated in educational programs.
- Wildland-urban/rural interface fires require specific measures and specific legislation at the local level. Monitoring and control systems should be implemented to guarantee the effectiveness of these actions.
- Countries are encouraged to adopt the Voluntary Guidelines for Fire Management (FAO)
- Specific management strategies should be studied and developed for those countries suffering from armed conflicts, in order to reduce the negative effects on the environment and population.

INTERNATIONAL COOPERATION

- Exchange of knowledge and experiences is the most effective way to increase capacity building and replicate the best practices in wildfire management. Promoting international exchanges between fire professionals of all levels is also needed.
- Developing voluntary guidelines on prevention, considering common issues such as risk assessment or risk cartography, with an adequate spatial and temporal resolution, will increase coordination within the Region.
- Mutual assistance on suppression operations requires protocols and operational procedures based on technical criteria, standardization and harmonization of terminology and training. Enhancement of joint activities supports cross-border cooperation between countries.
- Networks working at international level should combine and coordinate efforts to prevent and fight wildfires using synergies between them. Joint activities should be supported by bilateral and multilateral cooperation agreements.
- Countries are encouraged to adopt the Voluntary Guidelines for Fire Management (FAO), the emerging Fire Aviation Guidelines as well as the Incident Command System (ICS) to assure a safe and efficient exchange of resources.
- Focal points of Member Countries of the Fire Management Working Group of Silva Mediterranea and the Regional Near East Wildland Fire Network should be more actively involved in regional conferences, regional cooperative fire management training and exercises.
- Special efforts have to be made regarding situations related to armed conflicts by finding ways to support these countries in managing wildfires under such extraordinary circumstances.

Regional Session IV Report

The Mediterranean and Near East Wildland Fire Networks met in order to share and discuss some of the relevant initiatives taken place in the Region and with the aim of identifying those key points in

which as a network we can move forward and improve the wildfire situation within the countries and beyond state boundaries.

At the meeting there were representatives of five countries (Israel, Greece, Italy, Portugal and Spain). Despite this and since last Wildfire Conference, many international activities have been developed within the Region in many countries (Israel, Turkey, Croatia, Greece, Italy, France, Spain, Portugal and Algeria, among others). In addition, many meetings and actions were developed under the European Commission umbrella (European Forest Fire Information System and European Civil Protection Mechanism), the UNISDR coordinated by the Global Fire Monitoring Center (GFMC), and the UN Food and Agriculture Organization (FAO).

An overview of the Regional Statement was presented as one of the main topics of the discussion at the session. Several regional experts showed their initiatives regarding wildfires. Representatives from Italy, speaking on behalf of Lebanon on a project in which both countries were involved; from Greece, highlighting how to deal with wildfires in economic crisis situation, and from Spain, showing how important is to know about fire history in order to plan and manage in the present and future, shared their expertise.

Regional Statement Discussion

Several key factors identified in the Regional Statement were presented and discussed in order to take them into consideration to encourage a stronger regional management of wildfires. Socio-economic, environmental, scientific and political factors were agreed as the major areas of concern.

A special mention was given to international cooperation enhancement as it plays an important role in strengthening the networks. When countries are facing difficult situations with several and complicated large fires, the Mediterranean wildland fire community can provide the support needed. But there is a need to improve exchange mechanisms and to develop standard protocols and procedures among countries. Bilateral and multilateral agreements are strongly recommended to be put in place. Capacity building is also built on the basis of experts and expertise exchanges, before the disasters, as preparedness mechanisms, and when disasters occur as well.

On the other hand, special references were made to those countries affected, both directly and indirectly, by armed conflicts. These situations should be addressed with specific approaches developed by the international community with diplomatic efforts. Use of arson as a terrorism tool should also be considered as a major threat in this respect.

Some of the participants highlighted the following aspects:

- Prevention investments have been reduced much more over the last years than suppression budgets, which in many countries have not suffered any cuts at all. This wrong tendency needs to be corrected.
- Wildfires are clearly a social problem in the Mediterranean, where most of wildfires are caused by human activities. However, social work lines such as education and awareness campaigns addressed to specific groups of population are not as important as they should be.
- Wildland urban and rural interfaces are under many different regulations. There is a need of an integrated and compatible legislation approach.
- Research and operational management need to better communicate. There are many research projects going on but there is no database where results and synergies could be consulted.
- Initial attack is decisive for successful suppression of wildfires. The developments of early warning systems and effective first response modules have to be taken into consideration.
- Countries which had suffered armed conflicts in the past should be considered as well as those suffering conflicts currently. Post-war fire management issues are a great challenge too.

Conclusions

The meeting ended with the ratification of the Mediterranean as a high wildfire-proneregion, which needs more integrated efforts from countries, stakeholders and international organizations. Population involvement and preventive approaches are identified as transversal key work lines to address wildfire management in our region.

Funding support is needed, in order to generate the exchange of knowledge and experience arena in which all member countries could participate, taking into consideration the economic situation of many countries, mainly those in the southern Mediterranean.

Other Mediterranean regions in the world should be considered to be involved in this regional network, such as California, Chile or Australia.

Real and effective network coordination of the region between two countries, one from East Mediterranean and one from West Mediterranean would certainly help improve dynamism and collaboration within the region.

6th International Wildland Fire Conference
Regional Statements and Session Reports

**Regional Session V – Eurasia, Southeast Europe / Caucasus, Euro-Alpine
and Central Asia**

Pyeongchang, Republic of Korea, 13 October 2015

Regional Statement of the Eurasia Network Region

Explanatory Note

The UNISDR Regional Eurasia Wildland Fire Network is one of seven Regional / Subregional Wildland Fire Networks of the Global Wildland Fire Network, which includes the Member States of the United Nations Economic Commission for Europe (UNECE).⁸⁴ The Eurasia Wildland Fire Network emerged from the core region of engagement of the UNECE/FAO Team of Specialists on Forest Fire. Under the lead of the Global Fire Monitoring Center (GFMC), between 1993 and 2014 the Team and the Regional Network were primarily active in the temperate-boreal region of Central, Southeast and East Europe (including the Russian Federation), the Caucasus and Central Asia. Main inter-regional cooperation has been accomplished between the Regional Networks of Eurasia, Southeast Europe / Caucasus, Central Asia and the Euro-Alpine Subregional Wildland Fire Network – the reason for forming the Euro-Siberian Cluster within the Global Wildland Fire Network.

General Fire Assessment

During recent decades, the UNECE region has experienced unprecedented, large and disastrous wildfires as consequence of socio-economic, land-use and climate changes. Some recent wildfire episodes have revealed an increasing vulnerability of society to the direct and secondary effects of fire. Wildfires are burning at the interface or even within residential, urban and industrial areas. Wildfires are occurring as consequences or collateral damages of armed conflicts, and fires burning in terrain contaminated by radioactivity, industrial deposits and remnants of armed conflicts, are perceived as new, unprecedented threats – although they have been around for some time, albeit largely unnoticed. While there have been advances in fire management in some countries, there are still barriers preventing the sharing of scientific and technical knowledge and good practice between wildfire agencies in different States. These barriers have resulted in some wildfire agencies being unintentionally left in ignorance of the technical information and advancements that they could utilize to develop greater national resilience and preparedness for large wildfire incidents.

Given the cross-boundary consequences of wildfires, e.g. transboundary spreading of wildfire smoke pollutants, border-crossing wildfires and wildfire threats to common global assets such as biodiversity, terrestrial carbon pools, atmosphere and climate, the main goal of the Regional Eurasia Wildland Fire Network is to promote sharing of expertise and resources in fire management. This should be achieved through the development of voluntary principles and efficient procedures on cross-border cooperation fire management and thus enhance economics, inter-operability and effectiveness in fire management between nations and regions. Some countries already possess advanced wildfire knowledge, and have the technologies and expertise to manage wildfire risk effectively. The priority of future international cooperation should be to establish a mechanism that encourages this understanding to be shared between territories, enabling all countries to develop effective wildfire reduction strategies and provide the structure for more effective preparedness and eventually collaborative efforts to meet the challenges of wildfire emergency situations. The necessity of transboundary cooperation in fire management has been revealed by recent events, e.g. extremely large wildfires crossing the borders between Russia, Mongolia and China in April 2015, or fires occurring in terrain contaminated by radioactivity in the border regions of Ukraine, Belarus and Russia in April, June and August 2015.

⁸⁴ The Eurasian part of the UNECE region is covered by the following networks: (1) Eurasia; (2) Mediterranean; (3) Euro-Alpine; (4) Southeast Europe / Caucasus; (5) Central Asia, and (6) Northeast Asia. The North American Member States of the UNECE are organized through the Fire Management Working Group, North American Forestry Commission – see: <http://gfmcc.org/GlobalNetworks/globalNet.html>

Action taken between the 5th and 6th International Wildland Fire Conferences

In following up the recommendations of the 4th and the 5th International Wildland Fire Conferences (IWFC), the GFMC between 2010 and 2012, initiated the preparation of a project entitled "Safeguarding Sustainable Forest Management in the UNECE Region through International Cooperation in Fire Management". An administrative arrangement was signed in March 2013 between the UNECE and the financial sponsor, the Federal Republic of Germany, which entrusted the GFMC with the implementation of the project. The project was an unprecedented effort at the regional level of the UNECE, with participation of other regional organizations or representation outside the UNECE, including several UN agencies and secretariats, to highlight the current and future problems of wildfires affecting forests and other vegetation types or ecosystems, and to elaborate proposals for addressing the increasing threats of wildfires as a consequence of global change by international collaboration.

Its core activity was the organization of the *UNECE/FAO Regional Forum on Cross-boundary Fire Management*.⁸⁵ The preparation of the Forum included:

- Study of the Contemporary and Expected Future Wildland Fire Problems in the UNECE Region⁸⁶
- Proposal: Building Resilience of Nations and Communities within the UNECE Region to Wildfire Emergencies and Disasters⁸⁷
- Adoption of Voluntary Guidelines for Fire Aviation⁸⁸
- Circulation and Evaluation of a preparatory enquiry / questionnaire on the status of fire management in UNECE Member States⁸⁹
- **A White Paper on „Fire Management Policies and International Cooperation in Fire Management in the UNECE Region“⁹⁰**
- A White Paper "Vegetation Fires and Global Change. Challenges for Concerted International Action. A White Paper directed to the United Nations and International Organizations"⁹¹

In preparation of the Forum, a precursor event was organized – the international congress "*Forest Fire and Climate Change: Challenges for Fire Management in Natural and Cultural Landscapes of Eurasia*". Among other, the congress resolution included recommendations, which were relevant for the rationale and outcomes of the Regional Forum.⁹²

The *Regional Forum on Cross-boundary Fire Management* was held on 28-29 November 2013 at the United Nations in Geneva. The Forum was attended by 49 representatives from 22 UNECE Member States, from other regions, non-government organizations, regional and international organizations (ASEAN Secretariat, SADC Secretariat, Council of Europe, OSCE), and the following United Nations organisations and secretariats: UNECE / FAO Forestry and Timber Section; FAO; UN Office for Disaster Risk Reduction / UNISDR; OCHA Environmental Emergencies Section, Joint UNEP/OCHA Environment Unit, Emergency Services Branch; Secretariat of the UNECE Convention on Long-Range Transboundary Air Pollution. Among other the recommendations of the Forum addressed:⁹³

- Need to promote the understanding of and the response to the transboundary effects of fire;
- Need to expand the scope of and strengthen international cooperation in fire management;
- Application of a holistic approach to wildland fire management at a landscape level;
- Adoption and continued development of the International Wildfire Support Mechanism (IWSM) and the voluntary International Fire Aviation Guidelines;⁹⁴
- Need to explore options for the transition from voluntary rules to a more formalized regulatory framework, including the "exploration of options for establishing a UN Secretariat mandated with the implementation of a global fire management programme that should have a key role in facilitating the free and open global transfer of knowledge".

⁸⁵ Draft Forum Outline and Agenda: <http://gfmcc.org/intro/UNECE-Fire-Forum-2013-Draft-Outline.pdf>

⁸⁶ <http://gfmcc.org/iwpm/UNECE-FAO-Crossboundary-Fire-Forum-Report-1.pdf>

⁸⁷ <http://gfmcc.org/iwpm/UNECE-FAO-Crossboundary-Fire-Forum-Report-2.pdf>

⁸⁸ <https://gfmcc.org/iwpm/ifawg.html>

⁸⁹ <http://gfmcc.org/iwpm/UNECE-FAO-Crossboundary-Fire-Forum-Report-5.pdf>

⁹⁰ <http://gfmcc.org/iwpm/UNECE-FAO-Crossboundary-Fire-Forum-Report-6.pdf>

⁹¹ <http://gfmcc.org/latestnews/Vegetation-Fires-Global-Change-UN-White-Paper-GFMC-2013.pdf>

⁹² <http://gfmcc.org/GlobalNetworks/BalticRegion/NovosibirskCongress.html>

⁹³ <https://gfmcc.org/iwpm/background.html>

⁹⁴ Note: After the Forum the IWSM was re-oriented and designated as International Wildfire Preparedness Mechanism (IWPM): <https://gfmcc.org/iwpm/index-7.html>

- Suggestion to seek the interest of UN Organizations to become involved.

Following the final meeting with members of the ToS on Forest Fire in June 2014 at the GFMC, in conjunction with the Joint Meetings of the Global Wildland Fire Network and the UNISDR Wildland Fire Advisory Group, the "*International Fire Aviation Guidelines*" and the proposed concept of the "*International Wildfire Preparedness Mechanism*" (IWPM) were finalized and published on the website of the IWPM.⁹⁵ Additional documents were prepared during the Forum project (quoted above), and are available on the IWPM website.

Engagement of the Council of Europe (CoE)

The Council of Europe through its European and Mediterranean Major Hazards Agreement (European Open Partial Agreement – EUR-OPA) continued to support the Regional Network by sponsoring key facilities and outreach work.⁹⁶ After providing financial support for the establishment of the Regional South East Asia / Caucasus Fire Monitoring Center in 2010⁹⁷ and preceding activities to address the problem of fire management in territories contaminated by radioactivity, unexploded ordnance and land mines⁹⁸, the CoE financed the establishment of the Regional Eastern European Fire Monitoring Center in Kiev, Ukraine, in 2013.⁹⁹ Major investments in thematic outreach work included the development of the Guidelines "*Defence of Villages, Farms and Other Rural Assets against Wildfires: Guidelines for Rural Populations, Local Communities and Municipality Leaders in the Balkan Region*"¹⁰⁰ and the analysis of the state of fire management and wildfire threats in protected / conservation areas registered under the UNESCO World Heritage Properties.¹⁰¹

Past and Future Activities of Organization for Security and Cooperation in Europe (OSCE)

In following up the Concluding Meeting of the 22nd OSCE Economic and Environmental Forum "*Responding to Environmental Challenges with a View to Promoting Cooperation and Security in the OSCE Area*", at which the GMFC presented the experiences and visions for enhancing fire management in the EECCA region and addressing the opportunities to follow-up the work of the UNECE/FAO Team of Specialists on Forest Fire¹⁰², the 2014 OSCE Ministerial Council Decision 6/2014 "*Enhancing Disaster Risk Reduction*" tasked the OSCE executive structures and the OSCE Office of Economic and Environmental Activities (OCEEA) of DRR, with emphasis on exchange of knowledge and experience in fire management (Item 6 of the decision). This high-level decision of 57 OSCE Participating States reveals the commitment of the organization to continue focusing the outreach work in wildfire disaster risk reduction in the follow-up of the work of the former UNECE/FAO Team of Specialists on Forest Fire.¹⁰³

Messages to UNFCCC COP 20 (Lima, Peru, December 2014) and to the Third World Conference on Disaster Reduction (Sendai, Japan, 13-18 March 2015)

Initiated by the UNECE/FAO Forestry and Timber Section, the GFMC submitted a contribution to the UNFCCC COP 20 (Lima, December 2014), which followed the conclusions of the meeting of the 72nd Session of the UNECE Committee on Forest and the Forest Industry (Kazan, Republic of Tatarstan, Russian Federation, 18-22 November 2014). In the message to COP 20 entitled "*Vegetation fires increasingly dangerous in an insecure climate*" the GFMC stressed the increasing threats posed by destructive wildfires at a global level. Governments within and outside the UNECE region have been alerted and warned by both the scientific community and the professional fire management community

⁹⁵ Additionally other documents that have been prepared during the Forum project (and quoted above) are available on the IWPM website: <https://gfmcc.org/online/iwpm/index-7.html>

⁹⁶ <https://europa-projects.ext.coe.int/en/centre/18-global-fire-monitoring-center.html>

⁹⁷ <http://www.rfmc.mk/>

⁹⁸ <http://gfmcc.org/online/globalnetworks/seeurope/Chernobyl-Resolution-Wildfires-Human-Security.pdf>

⁹⁹ <http://nubip.edu.ua/en/reefmc>

¹⁰⁰ http://gfmcc.org/online/Manag/CBFiM_11.html

¹⁰¹ Pre-publication information: http://gfmcc.org/online/Manag/CBFiM_12.html, see also UNESCO presentation at IWFC-6

¹⁰² The cooperative work between the UNECE/FAO Team of Specialists on Forest Fire and the GFMC respectively with the OSCE dates back to 2006 and is documented on a dedicated website of the GFMC: http://gfmcc.org/online/GlobalNetworks/SEEurope/SEEurope_8.html

¹⁰³ Publication of the Ministerial Council decision at: <https://www.osce.org/files/f/documents/8/6/130406.pdf>, <https://www.osce.org/oceea/disaster-risk-reduction> and mirrored at GFMC: <http://gfmcc.org/online/intro/OSCE-Ministerial-Council-2014-Decision-6-Enhancing-DRR.pdf>

that the threat from wildfires will become increasingly dangerous in the coming years due to climate change and socio-economic changes. Wildfires may become the most important driver of global degradation and destruction of vegetation. To counter this risk, voluntary rules and cooperation mechanisms have been created, such as the “International Wildfire Preparedness Mechanism” (IWPM) and the “International Fire Aviation Guidelines”. However, given the seriousness and cross-country nature of wildfires, voluntary agreements should transit to more formal rules under the UN conventions and, perhaps, towards legally binding instrument on forests.¹⁰⁴

The GFMC as Secretariat of the Global Wildland Fire Network and the Wildland Fire Advisory Group of the United Nations International Strategy for Disaster Reduction (UNISDR), are serving as a Thematic Platform under the UNISDR, which transited to the Science & Technology Partnership¹⁰⁵, and has prepared several contributions for the UNISDR Science and Technical Advisory Group (STAG) and the 2015 Third World Conference on Disaster Reduction (WCDRR).¹⁰⁶ Among other a so-called “Voluntary Commitment” was submitted by offering:

“The International Wildfire Preparedness Mechanism (IWPM) complements and builds upon international agreements in disaster management and, in particular, it coordinates activities that align with the priority areas identified within the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters, and aims to contribute to the post-2015 HFA”.

The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Sendai World Conference on 18 March 2015.¹⁰⁷ The GFMC, through the International Wildfire Preparedness Mechanism (IWPM) constitutes a Sendai Voluntary Commitment for the period 2014-2030.¹⁰⁸

Conclusions and Recommendations

By referring, among other, to the outcomes of the Geneva Forum and the predecessor congress in Novosibirsk, the Regional Eurasia Wildland Fire Network concludes and recommends:

- Governments of the region and globally are alerted and warned by the scientific and the professional fire management community that the threat from wildfires in the region will become increasingly dangerous in the coming years as a consequence of climate change and socio-economic and demographic changes;
- Governments of the region and globally are urged to take all necessary measures to develop integrated fire management concepts and put in place capabilities to manage fire at landscape level by considering the potential contributions of vegetation fires to climate change, or the potential for mitigation climate change consequences; a reduction of unnecessary application of fire in land use and land-use change, and the state-of-the-art application of prescribed fire where appropriate should be considered;
- Consequently, in complying with the Gothenburg Protocol to the UNECE Convention on Long-Range Transboundary Air Pollution (LRTAP), the extent of unnecessary burning of agricultural, pasture and steppe ecosystems must be halted; appropriate measures would include:
 - Review and further development of the legislation, law enforcement and management responsibilities of authorities concerning the use of fire on agricultural and pasture lands, as well as on abandoned agricultural lands;
 - Review and promotion of alternatives to agricultural burning by rural extension services;
 - Introduction of subsidies for supporting the agricultural sector to apply alternative technologies, following the examples of subsidies in the European Union.
- Rural communities must be supported in the self-defense of rural assets (farms, villages, recreational sites, infrastructures) against wildfires by the;
 - Establishment of structures for homeland defense against wildfires;
 - Provision of appropriate training, equipment and insurance of volunteers active in rural wildfire defense
- Fire management plans for protected areas, which consider the vulnerability of some

¹⁰⁴ <http://gfmcc.online/intro/UNFCCC-COP-20-Outreach-Message-Day-3-Vegetation-Fires.pdf> (extract)

¹⁰⁵ <https://cc.preventionweb.net/science-tech-partners>

¹⁰⁶ <http://www.wcdrr.org/>

¹⁰⁷ http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf

¹⁰⁸ https://sendaicommitments.undrr.org/commitments/20190222_001

ecosystems, and the fire tolerance or fire dependence of other ecosystems, must be developed;

- Special attention must be given to develop capacities to manage wildfires occurring on vegetated lands that are contaminated by radioactivity, chemical and other industrial deposits or threatened by military assets including unexploded ordnance stemming from armed conflicts or military training;
- Urban and rural areas must be prepared to protect populations against the adverse effects of wildfire smoke pollution; and publish transparent and open data about people affected by smoke pollution (hospital admissions, premature deaths);
- A dialogue must be established at regional level between relevant agencies that encourages participatory approaches by inviting representatives of civil society to define fire management solutions at landscape levels (including forests, agricultural lands, abandoned agricultural lands, conservation / protected areas, and other lands);
- Consequently, national fire management policies or doctrines must be developed that take these recommendations into consideration, notably the needs for integrating the function of natural and management-set prescribed fires in stabilization and regeneration of fire-dependent and -tolerant forests and taking into consideration the needs for reducing unnecessary emissions and stabilizing or increasing terrestrial carbon;
- Fire Management Resource Centers must be established at a regional level which will train professionals and volunteers in fire management, disseminate information to the public on early warning and real-time information for ongoing wildfires, and facilitate mutual support between neighbouring regions in wildfire emergency situations;
- Countries are encouraged to test and use the International Wildfire Preparedness Mechanism (IWPM) and the voluntary International Fire Aviation Guidelines.

Regional Statement of Southeast Europe / Caucasus

General Fire Assessment

Within the last five years, wildland fires in the region of Southeast Europe/Caucasus have had a significant influence on the environment and the economy. This has been especially true within the Balkan region during the 2012 fire season. Around 16,000 wildland fires occurred and burned around 232,000 ha of forest and other land. Cases of wildfire-caused fatalities were experienced in North Macedonia (4) and Serbia (12) and large numbers of people (civilians and firefighters) have been injured, as well. A large number of private and public properties were destroyed, as well.

The main reasons for wildland fires in the region are agricultural burning, negligence and in some countries arson. Arson is mainly motivated by illegal logging and the low price of timber harvested after the fires; political discontent is also a motivation for arson. Natural caused fires (lightning) are less than 3% of the total number of wildland fires in the Region of Southeastern Europe/Caucasus. A special issue in the region is fire management on terrains contaminated by land mines and unexploded ordinance-UXO.

In the period between the 5th and the 6th International Wildland Fire Conferences, many activities in the region of Southeast Europe and the South Caucasus were organized, especially in line with the recommendations of the 5th IWFC – notably:

- **Recommendation** *“Development of capacities in rural fire management to address possible vacuums concerning the responsibility and capabilities for fire management in the agricultural / rural domain”*

A key effort to meet this recommendation was the development of “Guidelines for the Defense of Rural Populations, Settlements and other Assets against Wildfires and Smoke Pollution”. The Guidelines are tailored for the use of local authorities (Part 1) and local populations living in villages and otherwise across the landscape (Part 2). The project was funded by the Council of Europe and the European and Mediterranean Major Hazards Agreement (EUR-OPA) and implemented by the Global Fire Monitoring Center (GFMC), Freiburg, Germany, and the Regional Fire Monitoring Centre (RFMC), Skopje, North Macedonia.¹⁰⁹

¹⁰⁹ http://gfmc.online/Manag/CBFiM_11.html

- **Recommendation** “*UNECE member states and representatives actively participate in the preparation of the UNECE/FAO Regional Forum on Cross-boundary Fire Management aimed at developing a proposal for a regional agreement on cooperation in wildland fire management*”

The Forum was held in November 2013 in Geneva, Switzerland and the region was represented by representatives of eight countries of the SE Europe / Caucasus Region.¹¹⁰ Since 2014, the RFMC actively contributes to the International Wildfire Preparedness Mechanism (IWPM), which is serving nations in capacity building in fire management by exchange and training of human resources.

- **Recommendation** “*Support and use the Fire Management Training Center in Antalya, Turkey for the regional training activities*”

In continuation of the implementation of the project “Enhancing National Capacity on fire Management and Risk Reduction in the South Caucasus”, a project under the aegis of the Environment and Security (ENVSEC) Initiative, the Organization for Security and Cooperation in Europe (OSCE) and the GFMC (initiated in 2009) a number of national training courses were conducted in Armenia, Azerbaijan and Georgia. In 2014 the Second Regional Advanced Seminar/Training in Wildland Fire Management was held in Antalya, Turkey with participation of representatives from Albania, Armenia, Azerbaijan, Bulgaria, Bosnia and Herzegovina, Georgia, Kosovo, North Macedonia, Montenegro, Serbia, Russian Federation and Turkey. The aim of the regional training was to demonstrate the EuroFire multi-lingual competency-based fire management training standards¹¹¹ and to ensure interoperability between nations when working together in wildfire emergency situations.¹¹²

Taking into consideration that Iran borders the South Caucasus countries, and that many wildland fire problems are held in common, the RFMC and GFMC suggested at the First International Conference on Wildfire in Natural Resources Lands, hosted by academic and government institutions in Gorgan, Iran, October 2011, to invite Iran to join the Southeast Europe/Caucasus Wildland Fire Regional Network.

Between 2011 and 2015, the RFMC and members of the Regional Network contributed to an inter-regional dialogue and cooperation in fire management within the greater Asian region and globally:

- Biennial meetings of the UNISDR Wildland Fire Advisory Group (WFAG) (at GFMC, 2012 and 2014)
- Regional policy dialogue meetings in Belgrade, Serbia (2012 and 2015)
- International Symposium on Strategy Development of Advanced Forest Fire Policy and Organization (Seoul, South Korea, 2013)
- International Congress and Trade Fair “Forest Fire and Climate Change: Challenges for Fire Management in Natural and Cultural Landscapes of Eurasia” (Novosibirsk, Russian Federation, 2013)
- Aerial Fire Fighting Conferences Europe 2013 (Aix-en-Provence, France) and 2015 (Zadar, Croatia)
- Regional meetings of the Environment and Security (ENVSEC) Initiative (Podgorica, Montenegro, 2014)

The achievements of the RFMC and the Regional Southeast Europe / Caucasus Wildland Fire Network in fostering efficient regional cooperation in fire management were recognized by the 2013 Green Star Award – a joint award by the UN Office for the Coordination of Humanitarian Affairs (OCHA), Green Cross International and the UN Environment Programme (UNEP). The Award was also given to the coordinators of the UNISDR Regional South Asia Wildland Fire Network (Kathmandu, Nepal) and the Head of the Regional Eastern European Fire Monitoring Center (Kiev, Ukraine).¹¹³

¹¹⁰ <http://gfmco.org/intro/team.html>

¹¹¹ In order to ensure harmonized training in fire management in the region by 2015, the EuroFire Competency standards and Training Materials have been translated and tested for regional use and exchange between Armenia, Azerbaijan, Georgia, Greece, North Macedonia, Serbia and Ukraine: <https://gfmco.org/eurofire/index-11.html>

¹¹² <http://gfmco.org/GlobalNetworks/SEEurope/Antalya-2014.html>

¹¹³ <http://www.unocha.org/top-stories/all-stories/green-star-awards-environmental-emergency-%E2%80%9Cheroes%E2%80%9D-honoured> and <http://www.gcint.org/green-star-awards-2013-joint-winners-nikola-nikolov-sundar-prasad-sharma-sergiy-zibstev/>

Conclusions

- With the establishment and expansion of the Regional Fire Monitoring Center (RFMC) in Skopje, North Macedonia, the regional network was strengthened and the number of activities and projects were increased
- However, there is still a lack of regional projects, especially in terms of cross institutional collaboration at the international level and scientifically oriented, as well.

Recommendations

- The financial support of the RFMC, which was initially funded by the Council of Europe and the European and Mediterranean Major Hazards Agreement (EUR-OPA) and technically supported by the Global Fire Monitoring Center (GFMC), is intermittent and irregular. International organizations and participating governments are requested to assist in financing the RFMC on a sustainable basis in order to ensure the continuation of its functioning;
- The development of national Wildland Fire Early Warning Systems, which are in place only in a few countries, and a joint Regional System for the Western Balkans, needs to be supported;
- Development of technically feasible and safe solutions for fire management on terrain contaminated by landmines and UXO must be prioritized;
- Regional scientific projects addressing the consequences of land-use change, climate change on fire regimes and fire management solutions, should be initiated and supported.

Regional Statement of the Euro-Alpine Region

General Fire Assessment

The partners of the Euro-Alpine Region were able to stimulate research and collaboration regarding the role of forest fires as natural hazard for the Alpine environment as a follow up of the European project ALP FFIRS that ended 2012. The ambitious goal of ALP FFIRS was to set up a framework for a common warning system for forest fire danger for the whole Alpine region, taking into account weather conditions and vegetation patterns.¹¹⁴ The tool consists of a daily fire danger level assessment and forecast in order to identify critical periods of forest fire danger in advance. Through the cooperation within and between the partner countries in Switzerland, Austria, Italy, Slovenia, France and Germany, it was possible to develop a tool aimed at improving wildfire prevention under a changing climate in the Alpine Space.

- Different methodological approaches have been used to identify the most appropriate fire weather index for alpine conditions (Eastaugh et al. 2012¹¹⁵, Arpaci et al. 2013¹¹⁶), which allowed us to critically evaluate existing systems;
- We managed to achieve several methodological advances in developing danger rating systems fitting for Alpine conditions (de Angelis et al. 2015¹¹⁷, Arpaci et al. 2014¹¹⁸), which allowed us to adapt existing danger rating approaches to regional Alpine conditions;
- A methodological approach for the definition of the wildland-urban interface (WUI) in the Alpine context, by combining the three WUI components: human infrastructures, burnable vegetation and the interaction area between the two, was developed (Conedera et al. 2015¹¹⁹);
- We reconstructed the fire history and related landscape evolution that occurred in the Alps during the Holocene in order to derive negative and positive impacts of current fire regimes on

¹¹⁴ <https://gfmco.online/globalnetworks/EuroAlpine/EuroAlpine.html>

¹¹⁵ Eastaugh C. S., Arpaci A., Vacik H. (2012) A cautionary note regarding comparisons of fire danger indices Nat. Hazards Earth Syst. Sci., 12, 927–934, doi:10.5194/nhess-12-927-2012

¹¹⁶ Arpaci A., Eastaugh C.S., Vacik H. (2013) Selecting the best performing fire weather indices for Austrian ecoregions, Theoretical and Applied Climatology, 114 (2013), pp. 393–406

¹¹⁷ De Angelis A., Ricotta C., Conedera M., Pezzatti G.B. (2015) Modelling the Meteorological Forest Fire Niche in Heterogeneous Pyrologic Conditions. PLoS ONE 10(2): e0116875. doi:10.1371/journal.pone.0116875

¹¹⁸ Arpaci A., Malowerschnig B., Sass O., Vacik H. (2014), Using multi variate data mining techniques for estimating fire susceptibility of Tyrolean forests, Applied Geography, 53, 258-270, <http://dx.doi.org/10.1016/j.apgeog.2014.05.015>.

¹¹⁹ Conedera M., Tonini M., Oleggini L., Orozco C.V., Leuenberger M., Pezzatti G.B. (2015), Geospatial approach for defining the Wildland-Urban Interface in the Alpine environment, Computers, Environment and Urban Systems, 52, 10-20, <http://dx.doi.org/10.1016/j.compenvurbsys.2015.02.003>.

the value of ecosystem services in the Alps, as well as the incidence of human fire uses and fire suppression policies (Valese et al. 2014¹²⁰);

- In recent years, the Alpine region has experienced highly variable forest fire activity with new record values regarding the number of fires and sizes of burned areas. Higher temperatures in combination with local dry weather conditions are often hypothesized as reasons for the observed anomalies (Müller et al. 2015¹²¹);
- Furthermore, a projection of the fire ecology of beech forests in the Alps was made in order to assess the future potential of forest fires in these ecosystems (Ascoli et al. 2013¹²², 2015¹²³).

Conclusions

- Fire has always been a driver of landscape evolution and a mirror of human activities in the Alpine region. The unevenness of human population density in the Alpine region is a key issue in defining ad-hoc management strategies. Land abandonment of marginal areas, alongside climate anomalies, is leading to a new generation of unmanageable large fires, where lack of accessibility and fuels build-up are the main constraints. Separately, new civil protection challenges are arising in localized areas and during periods of the year, from an increasing pressure brought by mountain tourism.
- Preparedness is becoming a core issue where the WUI is being expanded, and new strategies have to be considered. The proposed scientific findings allows for drastically reducing the forested area to be considered (20–50%) when planning a detailed analysis in terms of fire ignition risk and fuel measures. Thus, a WUI definition in the Alpine region should be understood as a first step toward fire prevention through forestry or technical measures. Considering limited financial and human resources to suppress fires in the Alpine region, the concentration on very susceptible areas could be a way to counter these challenges.
- Mixed severity fires are an important ecological factor for the natural regeneration of beech forests. Research in beech disturbance ecology can help to improve silviculture and post-fire restoration of Alpine forests.
- Several studies have effectively demonstrated that fire occurrence is related to weather, fuel and human infrastructure parameters. The main governing parameters of fire distribution in the Alpine region seem to be climate and population density. Therefore, higher fire susceptibility around densely populated valleys and in the drier areas of these valleys can be identified. The use of different methodological approaches is appropriate in order to identify the main drivers for fire ignition and fire behavior.
- The application of regionally adapted early warning systems and daily fire danger bulletins can help to reduce the likelihood of human induced fire ignitions.

Regional Statement of the Central Asia Region

General Fire Assessment

Specific wildland fire problems of the region

Over the past few decades, the Central Asian countries have witnessed a growing number of average size wildfires in forest and non-forest ecosystems (steppe ecosystems), predominantly caused by people, but also by lightning in sparsely populated areas. In conjunction with unsustainable land-use practices, climatic extremes such as extended droughts (as a consequence of regional climate change) and exploitation of natural resources, these fires have caused considerable environmental and economic damages and some have had transboundary impacts, for example, through smoke pollution, loss of biodiversity or forest degradation at the landscape level. The interaction between anthropogenic environmental disturbances and wildland fire demonstrates a new dimension of fire

¹²⁰ Valese E., Conedera M., Held A.C., Ascoli D. (2014), Fire, humans and landscape in the European Alpine region during the Holocene. *Anthropocene* (2014), <http://dx.doi.org/10.1016/j.ancene.2014.06.006>

¹²¹ Müller M.M., Vacik H., Valese E. (2015) Anomalies of the Austrian Forest Fire Regime in Comparison with Other Alpine Countries: A Research Note *Forests*, 6, 903-913; doi:10.3390/f6040903

¹²² Ascoli D., Castagneri D., Valsecchi C., Conedera M., Bovio G. (2013), Post-fire restoration of beech stands in the Southern Alps by natural regeneration, *Ecological Engineering*, Volume 54: 210-217, <http://dx.doi.org/10.1016/j.ecoleng.2013.01.032>.

¹²³ Ascoli D., Vacchiano G., Maringer J., Bovio G., Conedera M. (2015) The synchronicity of masting and intermediate severity fire effects favors beech recruitment. *Forest Ecol. Manage.* (2015), <http://dx.doi.org/10.1016/j.foreco.2015.05.031>

problems that may become of increasing importance with the expanding population and shrinking natural resources – a challenge to environmental management and particularly to wildland fire management.

Wildfires if not well managed might pose immediate risk to the sustainability of forest and non-forest ecosystems, threaten biodiversity and the recreational, scenic, environmental and cultural value of forests. Populations of surrounding areas are becoming seriously affected by injuries, death, and losses in properties. Fire smoke pollution has repeatedly affected the health of urban and rural populations. Post-fire secondary disasters such as water regime changes, landslides, mudflows or floods are additional threats to human populations, especially in mountainous terrain.

Main advances achieved since the last International Wildland Fire Conference (reference to the recommendations of the 5th IWFC and the results of activities between the 5th and the 6th IWFCs (i.e., between 2011 and 2015).

First steps to enhance fire management capacities of Mongolia and Central Asian countries have been initiated by the Global Fire Monitoring Center (GFMC) in 2004. In 2004, the first international conference "*Forest Fire Management and International Cooperation in Fire Emergencies in the Eastern Mediterranean, Balkans and Adjoining Regions of the Near East and Central Asia*" was held in Turkey¹²⁴, followed by the "*Regional Central Asian Forest Congress: "Forest Policy: Problems and Solutions"*" in Kyrgyzstan in the same year.¹²⁵ In the resolution of the Congress, the forest services of Kyrgyzstan, Uzbekistan, Tajikistan and Kazakhstan endorsed the participation in the Global Wildland Fire Network and the development of an international wildland fire accord. Subsequently, the **Regional Central Asia Wildland Fire Network**¹²⁶ was established as one of the 14 regional networks within the Global Wildland Fire Network.¹²⁷ Since then, a number of activities have been done in the region:

- The *First International Central Asian Wildland Fire Conference "Wildland Fires in Natural Ecosystems of the Central Asian Region: Ecology and Management Implications"*¹²⁸ was organized with the support of the Global Fire Monitoring Center (GFMC) on 2-6 June 2008 in Mongolia and addressed the most pressing issues in Mongolia and neighbouring countries. The Conference also enabled consultation among the agencies and other stakeholders involved in fire management, and a demonstration of advanced techniques in fire management.
- In 2010, Mongolia attended the "*International Conference on Cross-Border Forest Fires and Cooperation in their Suppression*" which was hosted by the government of the Russian Federation with support by the GFMC in Irkutsk, Russian Federation, in which principles of transboundary cooperation in fire management in the Eurasian region were agreed upon.¹²⁹
- In 2012 and 2013, representatives of the Central Asian states attended the First and Second "*International Fire Management Week*", in Krasnoyarsk Krai¹³⁰ and also in November 2013 the "*International Congress and Trade Fair on Forest Fire and Climate Change: Challenges for Fire Management in Natural and Cultural Landscapes of Eurasia*" in Novosibirsk, Russian Federation.¹³¹
- In October 2013, the "*UNISDR Pan-Asia Wildland Fire Network Secretariat Foundation Meeting*" was held in Seoul, Korea, in which participants from the four Regional Wildland Fire Networks of the Asian region discussed ways to enhance international cooperation in fire management in the Asian countries.
- Participation of the Central Asian fire management delegations in the "*UNECE/FAO Regional Forum on Cross-boundary Fire Management*" (United Nations, Geneva, Switzerland, September 2013), was an important step to learn / share experiences on cooperation of transboundary fire management activities from the other regions.

¹²⁴ <http://gfmcc.online/globalnetworks/centralasia/Antalya-Declaration.pdf>

¹²⁵ In the resolution of the congress the forest services of Kyrgyzstan, Uzbekistan, Tajikistan and Kazakhstan endorsed the participation in the Global Wildland Fire Network and the development of an international wildland fire accord: <https://gfmcc.online/wp-content/uploads/Resolution-Central-Asia-Eng-GFMC-final.pdf>

¹²⁶ <http://gfmcc.online/GlobalNetworks/CentralAsia/CentralAsia.html>

¹²⁷ <http://gfmcc.online/GlobalNetworks/globalNet.html>

¹²⁸ http://gfmcc.online/GlobalNetworks/CentralAsia/CentralAsia_3.html

¹²⁹ http://gfmcc.online/GlobalNetworks/CentralAsia/CentralAsia_6.html

¹³⁰ <http://gfmcc.online/GlobalNetworks/BalticRegion/KrasnoyarskFireManagementWeek.html>

¹³¹ <http://gfmcc.online/GlobalNetworks/BalticRegion/NovosibirskCongress.html>

- In March 2014, a new and detailed glossary “*English-Mongolian-Russian Fire Management Terminology*”¹³² has been produced by the Global Fire Monitoring Center (GFMC) together with fire specialists of the National Emergency Management Agency and the University of Law Enforcement of Mongolia, and Russian fire specialists.
- In September 2014, the Mongolian-Russian Government “*Agreement on Transboundary Fire Management Cooperation*” was signed during the official visit of the Russian delegation to Mongolia headed by the President of Russia Vladimir Putin. This event was followed by a cross-boundary firefighting exercise in the summer of 2014 with a follow-up bilateral consultation in Ulan-Ude in spring 2015.

After the conference, the “*Meeting on Forest and Steppe Fires in Mongolia: An Inter-Agency Meeting to Define the Way Ahead*”¹³³ was organized in Ulaanbaatar on 11 September 2008; the Round Table meetings were held (2009, 2014, 2015¹³⁴) with the participation of all stakeholders in fire management in Mongolia and discussed current wildland fire situations and future steps. As it stated in the 5th International Wildland Fire Conference held in 2011 in South Africa,¹³⁵ fire management is complex and requires coordination of participating agencies and other stakeholders. To overcome these issues an establishment of a unit of competence in fire research and management in Mongolia was identified as an urgent issue, therefore, the Regional Central Asia Fire Management Resource Center (RCAFMRC) was established with the long-standing support of the GFMC and financial support of the Swiss Agency for Development and Cooperation (SDC) through the Organization for Security and Co-operation in Europe (OSCE). The RCAFMRC is functioning as the Coordinator of Regional Central Asia Wildland Fire Network and Secretariat of the National Committee on Forest and Steppe Fire Protection of Mongolia. The RCAFMRC has been mandated by the Government of Mongolia to serve as secretariat of the National Coordination Committee on Forest and Steppe Fire Protection (NCCFSFP).

In September 2015, Regional Central Asia Fire Management training was organized by the GFMC and RCAFMRC through the OSCE with the financial support of the SDC. In this training fire managers and policy makers participated from Kazakhstan, Kyrgyzstan and Uzbekistan.

Gaps / shortcomings in wildland fire science, management and policies

Common challenges in wildland fire science, management and policies in Central Asia are, insufficient professional firefighting capacity, limited public initiatives, insufficient budgets, insufficient training and awareness activities, and limited bilateral or regional trainings on fire management.

Proposals for solutions / action to be taken

Financial resources for fire management are limited. Financial constraints and transboundary implications of destructive wildfires necessitate co-operation at all levels. This includes the sharing of scientific, technical and human resources at national and international levels, capacity building of personnel responsible for fire management at landscape level, entering into formal agreements within and between countries that share common natural resources and common wildfire risks, and the participation of civil society, notably local rural communities and dwellers.

Conclusions

Altogether, the problem of vegetation fires in Mongolia and in the Central Asian countries are complex and cannot be addressed on a single sectoral level. To overcome the limited capacity in fire management, there is a need to strengthen human and technical resources of agencies and local communities that deal with fire prevention and response. In order to increase the country’s fire management capability, a systematic and realistic approach to overcome the shortcomings is required.

¹³² https://gfmc.online/latestnews/recent_pub.html

¹³³ <http://gfmc.online/globalnetworks/centralasia/Mongolia-NEMA-MNE-Interagency-Fire-Meeting-11-September-2008.pdf>

¹³⁴ <http://gfmc.online/GlobalNetworks/CentralAsia/MongoliaFireManagementWeek2015.html>

¹³⁵ <https://gfmc.online/iwfc/southafrica-2011/03-Wildfire-2011-Recommendations-Regional-Session-III.pdf>

Recommendations

Enhance the cooperation of similar disaster prevention organizations of the region; introduce advanced approaches, techniques and equipment and nourish cooperation in the future.

Regional Session V Report

The meeting was attended by representatives from the Regional Wildland Fire Networks of Eurasia, Southeast Europe / Caucasus, Central Asia and the Euro-Alpine Sub-regional Wildland Fire Network and other conference participants. The presentations and discussions focused on the four Regional Statements. The countries that are actively participating in the four networks are Member States and / or Participating States of the UN Economic Commission for Europe (UNECE), the Council of Europe through its European and Mediterranean Major Hazards Agreement (European Open Partial Agreement – EUR-OPA) and the Organization for Security and Cooperation in Europe (OSCE) respectively. These countries attended the *UNECE/FAO Regional Forum on Cross-boundary Fire Management* (28-29 November 2013, United Nations in Geneva)¹³⁶ and the preceding International Congress “*Forest Fire and Climate Change: Challenges for Fire Management in Natural and Cultural Landscapes of Eurasia*” (Novosibirsk, Russia, 11-12 November 2013). Among other, the congress resolution included recommendations, which were relevant for the rationale and outcomes of the Regional Forum.¹³⁷

The recommendations of the Congress and the Forum and the follow-up implementation action were in the focus of the discussions. The detailed statements of the four participating Regional Wildland Fire Networks are available on the post-conference website.¹³⁸

Conclusions and Recommendations

By referring to the outcomes of the Geneva Forum, the predecessor congress in Novosibirsk and the Regional Wildland Fire Network Statements, the attendees of the Regional Session V conclude and recommend:

- Governments of the region and globally are alerted and warned by the scientific and the professional fire management community that the threat from wildfires in the region will become increasingly dangerous in the coming years as a consequence of climate change and socio-economic and demographic changes;
- Governments of the region and globally are urged to take all necessary measures to develop integrated fire management concepts and put in place capabilities to manage fire at landscape level by considering the potential contributions of vegetation fires to climate change, or the potential for mitigation climate change consequences; a reduction of unnecessary application of fire in land use and land-use change, and the state-of-the-art application of prescribed fire where appropriate should be considered;
- Consequently, in complying with the Gothenburg Protocol to the UNECE Convention on Long-Range Transboundary Air Pollution (LRTAP), the extent of unnecessary burning of agricultural, pasture and steppe ecosystems must be halted; appropriate measures would include:
 - Review and further development of the legislation, law enforcement and management responsibilities of authorities concerning the use of fire on agricultural and pasture lands, as well as on abandoned agricultural lands;
 - Review and promotion of alternatives to agricultural burning by rural extension services;
 - Introduction of subsidies for supporting the agricultural sector to apply alternative technologies, following the examples of subsidies in the European Union.
- Urban and rural areas must be prepared to protect populations against the adverse effects of wildfire smoke pollution; and publish transparent and open data about people affected by smoke pollution (hospital admissions, premature deaths);
- Rural communities must be supported in the self-defense of rural assets (farms, villages, recreational sites, infrastructures) against wildfires by the;
- Fire management plans for protected areas, which consider the vulnerability of some

¹³⁶ <https://gfmco.online/iwpm/index-7.html>

¹³⁷ <http://gfmco.online/GlobalNetworks/BalticRegion/NovosibirskCongress.html>

¹³⁸ <https://gfmco.online/iwfc/korea-2015.html>

ecosystems, and the fire tolerance or fire dependence of other ecosystems, must be developed;

- Special attention must be given to develop capacities to manage wildfires occurring on vegetated lands that are contaminated by radioactivity, chemical and other industrial deposits or threatened by military assets including unexploded ordnance stemming from armed conflicts or military training;
- A dialogue must be established at regional level between relevant agencies that encourages participatory approaches by inviting representatives of civil society to define fire management solutions at landscape levels (including forests, agricultural lands, abandoned agricultural lands, conservation / protected areas, and other lands);
- Consequently, national fire management policies or doctrines must be developed that take these recommendations into consideration, notably the needs for integrating the function of natural and management-set prescribed fires in stabilization and regeneration of fire-dependent and -tolerant forests and taking into consideration the needs for reducing unnecessary emissions and stabilizing or increasing terrestrial carbon;
- Fire Management Resource Centers must be established at a regional level which will train professionals and volunteers in fire management, disseminate information to the public on early warning and real-time information for ongoing wildfires, and facilitate mutual support between neighbouring regions in wildfire emergency situations; the existing Regional Fire Monitoring and Fire Management Resource Centers must be financially supported to meet their tasks of fostering regional capacity building and cooperation in fire management;
- Countries are encouraged to test and use the International Wildfire Preparedness Mechanism (IWPM) and the voluntary International Fire Aviation Guidelines as initial internationally concerted means for strengthening cross-border cooperation and developing interoperability in fire management

With regards to the follow-up of the UNECE/FAO Team of Specialists on Forest Fire, which phased out in 2014, the Session endorsed the recommendation of the UNECE that the scope of work of the Team should transit to and be addressed at global level. Within the UNECE region the active engagement of the Regional Wildland Fire Networks should continue under the auspice and support of the Council of Europe through its European and Mediterranean Major Hazards Agreement (European Open Partial Agreement – EUR-OPA) and the Organization for Security and Cooperation in Europe (OSCE), based on the 2014 OSCE Ministerial Council Decision 6/2014 “*Enhancing Disaster Risk Reduction*”, which tasked the OSCE executive structures and the OSCE Office of Economic and Environmental Activities (OCEEA) of DRR, with emphasis on exchange of knowledge and experience in fire management.

Furthermore the Session concluded that the Global Wildland Fire Network through the Regional Wildland Fire Networks should actively contribute to meet the challenges of the Sendai Framework for Disaster Risk Reduction 2015-2030.

In preparation of the Conference Statement the attendees suggested to formulate recommendations to be submitted to the upcoming 21th Conference of the Parties (COP 21) of the UNFCCC (Paris, December 2015) to address vegetation fires, including fires threatening or affecting the carbon pools of wetlands / peat lands, as source of greenhouse gases and to recognize fire management as a vital and accountable measure towards reducing the anthropogenic global warming.

6th International Wildland Fire Conference
Regional Statements and Session Reports

Regional Session VI – Sub Sahara Region

Pyeongchang, Republic of Korea, 13 October 2015

Regional Statement of the West Africa Sub-Region

Wildland Fire Problems of West Africa

Fire is a regular feature in the landscape of most West African countries especially in areas dominated by savanna and woodland vegetation. More recently wildfires have become annual events in the forest and forest transition zones of some countries (e.g. Ghana). The causes of fire occurrence are quite similar across most of the countries in the West African region. Fires occurring in these areas are mostly human-caused. Natural caused wildfires are very rare. In most cases fires are set deliberately to clean bushes surrounding villages, to prepare land for cultivation of crops, to enhance regrowth of new grass for cattle and wild herbivores as well as for cultural purposes. Most of these intentional fires get out of control and destroy large areas of vegetation and reduce the long-term capacity of the land to support agriculture. In spite of these negative impacts of wildfires, most countries lack a holistic and efficient system for preventing and controlling wildfires. Consequently the problem of wildfires continues to persist.

Main Advances Achieved since the last International Wildland Fire Conference

In some member countries (e.g. in Ghana, Burkina Faso and Côte d'Ivoire) systems to manage wildfires have been put in place mostly through donor-funded projects. Main achievements include the formulation of National Wildfire Policies (e.g. Ghana National Wildfire Policy) and National Strategies on fire management and associated action plans (e.g. Burkina Faso). Community-based fire management strategies have been implemented in some countries (e.g. Burkina Faso), which has resulted in a reduction of wildfire occurrence. However, in the countries where these fire management systems have been implemented, project activities were carried out specifically at project sites and not within the broader fire landscape of the various countries. There is the need to sustain and upscale these interventions across communities in the region.

Gaps / Shortcomings in Wildland Fire Science and Policies

There is generally inadequate expertise in member countries as well as inadequate government funding to deal with the problem of wildfire. Scientific knowledge on the impact of fires on forest regeneration, fire behavior and fire statistics as well as economic and environmental impact is insufficient. Additionally, there are no systematic efforts to collect weather data to assist in fire danger forecasting. Within most natural resource management institutions capacity for fire monitoring and damage assessment is low.

The majority of countries in the region lack a clear national policy (but see Ghana's National Wildfire Policy of 2006 and Burkina Faso's National Fire Management Strategy and related action plan) direction to enhance the development and implementation of effective fire management systems. In areas where wildfire policies exist, there is no effective legislation to back the policies. There is little or no integrated and coordinated effort towards fire monitoring, prevention, suppression and control among the stakeholders within countries. Across countries in the region there is no effective platform to exchange experiences, information and lessons identified and learnt in fire management among countries.

Conclusions

Wildfire continues to be a problem in the West African region though some gains have been made in reducing its occurrence and devastating effects on savanna and forest vegetation. The gains made by some countries need to be replicated in other member countries in the region. An important area of focus for all countries should be the formulation of National Wildfire Policy for fire management backed by legislation. Because local communities are both the cause of wildfire occurrence and immediate

beneficiaries of good fire management, community-based fire management practices should be the practical strategy applied across member countries.

Options for Solutions

A number of options for action are proposed that will contribute to enhance fire management capacities in West Africa:

- Establishment of a centre for coordinating information sharing and experiences in successful wildfire management in the region and also facilitate regional project development.
- Training and equipping of more local-level fire prevention and fighting volunteer squads and committees.
- Training personnel of government institutions whose operations are related to agriculture and forest and savanna resource management.
- Assess the potential for alternative funding sources for fire management activities not dependent on donors (e.g. facilitate the creation of a national wildfire management fund)
- Improve political support to mainstream wildfire management in government institutions by developing policy briefs on wildfire problems and success stories around the region.
- Community-based fire management should be adopted in all communities in the region.
- Institute a system to regulate and supervise prescribed burning for agriculture and pastoral activities and facilitate the development of improved farming systems.
- Encourage fire data documentation as part of operational activities of state institutions
- Study of cost-benefit analysis as a basis to influence politicians to commit to funding of fire management activities
- Provision of proper firefighting tools and protective clothing for local community groups in charge of fire management at community level.
- Continue research into fire damage and fire behavior.

Recommendations

- To sustain gains made in wildfire prevention and control through donor funded projects, efforts should be made to mobilize resources within countries to facilitate the prevention and control of wildfires (a study to identify such potential should be carried out).
- Success stories of efficient wildfire management and technologies developed in member countries should be shared and transferred to other member countries where these technologies or systems do not exist.
- Community-based forest management should be encouraged or developed in all countries in the region.
- A regional centre or a platform, possibly following the examples of the Regional Fire Management Resource Centers / Regional Fire Monitoring Centers operating under the Global Wildland Fire Network and the Global Fire Monitoring Center (GFMC) respectively, should be created to facilitate the sharing of information, expertise, training and human and technical resources for fire management among participating countries.

Regional Session VI Report

The regional session provided valuable insights into the activities of Regional Wildland fire Networks in Sub-Saharan African as well as country specific reports and success stories and perspectives' on wildland fire management. Overall, the presentations revealed that some networks are doing well whereas others are not. It was noted that though a lot was agreed on concerning the activities of the Southern Africa Network (AfriFireNet) in the past, member countries have not shown commitment. Consequently, implementations of agreed actions have stalled. From the discussions at the regional session, the revival of AfriFireNet was supported. The following suggestions were made to revive the network and move it forward. Some of these recommendations are also applicable to other Networks.

Way Forward for the Regional Network

- The running of the Network should be done by a steering committee and not just one person.
- County focal contact points from member countries and departments can be identified so that new contacts can be made.

- Tangible and specific objectives need to be outlined for the Network with activities planned to support the network.

Action points to revive the network were as follows:

- Send e-mail to get people to update their records.
- Put together a newsletter and inform members of the way forward from the conference statement.
- Need to continue to seek political support.
- Revisit MOUs signed to look at their implementation.
- Different organization would have to show personal commitment.

Integrated Fire management Concept

The definition of Integrated Fire Management (IFM) was revisited. The following were suggested to be included in the definition.

- The use of traditional knowledge
- IFM must be set within a legal framework
- Information sharing and communication

In line with the above suggestions the definition of IFM was modified to read:

“Integrated fire management is a series of actions, within a legal framework and respecting traditional knowledge, that includes fire awareness activities, fire prevention activities, prescribed burning, resource sharing, co-operation, co-ordination, fire detection, fire suppression and fire damage rehabilitation as well as research and training at local, provincial, national, and regional levels in order to create a sustainable and well balanced environment, reduce unwanted wildfire damage and promote the beneficial use of fire”

To ensure the effective implementation of IFM regionally, IFM should take place in an atmosphere that encourages information sharing and capacity –building amongst stakeholders. In order for this to take place there is a need for the establishment of a co-ordination Centre for the region.

The role of the Centre should be to encourage communication amongst stakeholders’ co-ordinate capacity building, training, share and disperse data and weather information and put in place mutual aid agreements for the sharing of resources.

Perspective of SAFNet on Network Activities

SAFNet will continue to function as a voluntary network with its members and funding from IGBP System for Analysis, Research and Training (START) for a meeting/workshop every two years, but recognizes that this is not the best model to ensure the networks sustainability in the future. SAFNet would therefore begin to lobby governments, industry and public and private partners for support of the network.

SAFNet have identified that the products that have been developed for Fire Management in the region is not being disseminated to the various "end users" of the data. Fire products are made available to countries but departments and agencies within the countries are not receiving the data to support their fire management activities. This is an issue that will be the key topic of discussion at the next SAFNet meeting in 2016.

SAFNet would continue to work with other networks in support of Fire Management in the Region.

Conclusions

The meeting ended with a decision to continue the network activities despite inadequate funding and the challenges. It was mentioned that political will and stakeholder participation and co-operation are needed to move the network activities forward. The various Networks will continue to work with the little resources available but will mobilize resources in member countries to support their activities.

6th International Wildland Fire Conference

Statement of the International Fire Aviation Working Group (IFAWG) – An Input Paper to the Conference Statement

Pyeongchang, Republic of Korea, 12 October 2015

Introduction

The effect of changing fire regimes, socio-economic developments, land-use changes, and climate change as drivers for improvement in fire and emergency management practices are well documented. Apparent and anticipated future changes to wildland fire regimes and wildfire risk at global level, along with the observed increasing vulnerability of ecosystems and society to wildfires, requires appropriate fire and land management solutions to reduce wildfire risk and impacts. In turn, there is a need to ensure that appropriate preparedness and response capacity exists domestically and at the global scale. Accordingly, there is a need for transboundary cooperation and for wildfire management agencies to share information and resources. This need is particularly compelling in the case of highly specialised capabilities such as fire aviation. The activities of groups such as the Wildland Fire Advisory Group (WFAG), the Global Wildland Fire Network (GWFN) and the UNECE / FAO Team of Specialists on Forest Fire confirm that global society is already willing to share expertise and resources in fire management, but that international cooperation needs to be streamlined and thus strengthened. This includes more systematic and formalised cooperation protocols.

The use of aerial means in fire and emergency management has expanded rapidly in recent decades. Aircraft now provide valuable support to fire management activities around the world. Many states make very effective use of aircraft in a wide range of roles. However there is evidence to suggest that these specialised, versatile and relatively costly resources could be utilised more effectively in many circumstances. There will be increased pressure to ensure that the use of aviation resources is safe and as efficient and effective as possible, particularly as the demand for aerial support grows with the anticipated changes in fire regimes, the increased wildland fire risk across the globe, and the increased expectations of communities regarding effective response.

Sharing of aviation resources between jurisdictions offers potential to generate considerable economic benefit and to improve the effectiveness and efficiency of fire prevention and response. There are current examples of highly effective protocols for cross-border sharing of fire aviation resources. In the past there have been many instances of effective international collaboration in fire aviation to support response to wildfire emergencies and wildfire disasters. However, it is also reasonable to say that there have been examples of ineffective and inappropriate sharing of aviation resources.

Cross-border sharing of aircraft is likely to be an increasing feature of wildland fire management. There are opportunities to significantly enhance resource sharing and to improve outcomes by establishing common operating procedures and standards and by embedding robust resource exchange procedures into pre-planned inter-jurisdictional agreements.

The International Fire Aviation Working Group (IFAWG) comprises an international group of aerial fire management specialists who lead and manage the use of aircraft for wildland fire management around the world. The genesis of the IFAWG harks back to the 4th International Wildland Fire Conference, hosted by Spain in 2007. During that conference a thematic Aviation Management workshop was held with the aim of identifying opportunities for multilateral cooperation to improve the safety, effectiveness and efficiency of aerial firefighting. The recommendations expressed a need to:

- continue to identify opportunities for sharing of information and resources;
- establish frameworks to properly evaluate the net benefit (including accounting for benefits of prevention of losses) of applying of aerial means;
- ensure that aerial operations are managed, supervised and supported to a high standard, and are properly integrated with other aspects of fire operations;
- establish a formal network to facilitate the continued sharing of information, with a priority on safety-related information;
- standardise approaches to integrated management of aerial means.

The IFAWG is made up of representatives from countries and jurisdictions who regularly utilize aerial means in managing landscape fire, including for firefighting. The IFAWG operates as a Working Group of the Wildland Fire Advisory Group (WFAG) of the United Nations International Strategy for Disaster Reduction (UNISDR). The group aims to improve the safety and effectiveness of aerial means by sharing information, experience and resources. IFAWG joined the preparation, organization and follow-up of the *UNECE/FAO Regional Forum on Cross-boundary Fire Management* (United Nations, Geneva, 2013) and contributed with the international consent-based, voluntary Fire Aviation Guidelines.

The Fire Aviation Guidelines are intended to assist communities across the globe to manage fire and to build resilience to the effects of wildfire by improving the effectiveness of a specialised support capability – fire aviation. The guidelines aim primarily to:

- Assist adopting states to develop and manage appropriate, effective, high-quality aviation capabilities by providing guidance in regard to recommended minimum standards and appropriate best-practices.
- Enhance the opportunities for transboundary cooperation through the sharing of aviation capabilities between states or jurisdictions by (a) developing common standards and common operating practices for fire aviation that will enhance inter-operability; and (b) providing recommended procedures and supporting information for effective sharing of fire aviation resources.

Part I of the Guidelines constitute the Framework Document, which has been subject to international discussion and inputs since 2014. Part II of the Guidelines provides the International Manual of Common Rules for Fire Aviation, which are now available for screening and comments.

Recommendations

Members of IFAWG encourage the participants of the conference to include the following recommendations in the Conference Statement:

The conference acknowledges the valuable supporting role played by aerial means in fire and forest management. The conference also acknowledges and supports the benefits of sharing aircraft and support resources between jurisdictions. The conference recommends:

- Agencies and groups continue to develop methodologies to ensure that aerial means are safely applied as part of an integrated approach to fire and forest management, and are deployed according to assessed risk and sound economic principles;
- Agencies continue to develop bi-lateral and multi-lateral agreements, where appropriate, that set out pre-planned arrangements and operating practices to facilitate safe and effective sharing of aerial means between jurisdictions;
- Agencies and groups work together to continue to support and develop the voluntary Fire Aviation Guidelines in order to promote best management practices and in order to support safe and effective sharing of aviation resources between jurisdictions;
- The conference supports the adoption of the Fire Aviation Guidelines for independent endorsement and application by individual operators and agencies, or within the framework of bi-lateral and multi-lateral agreements;
- The conference suggests that any wider agreements or initiatives on international cooperation reference or incorporate and promote the Fire Aviation Guidelines where appropriate.





**Organization for Security and Co-operation in Europe
The Secretariat**

**Written contribution for
the 6th International Wildland Fire Conference**

**Pyeongchang, the Republic of Korea
(12-16 October 2015)**

We congratulate the Republic of Korea for successfully hosting the **6th International Wildland Fire Conference**, which provides a platform for strengthening international co-operation in wildfire management.

The **Organization for Security and Co-operation in Europe (OSCE)** is the world's largest regional security organization. It embraces 57 countries with the total population of over a billion of people and spanning from Vancouver to Vladivostok.

Within its **comprehensive security mandate**, the OSCE addresses disaster risks from different perspectives and at different levels – from the regional to the national and community levels. There is a strong need of **incorporating a security perspective into disaster risk reduction discussions** and ample room for deepening the understanding of the complex linkages between security and disasters, including disasters prompted by climate change. This will also help address such challenges more effectively, both within countries and in a transboundary context.

It was a few months ago, in June; the Republic of Korea hosted in Seoul **the 2015 OSCE Asian Conference**, which addressed *“the changing global security environment and visions of multilateral security co-operation in Asia”*. Bringing together representatives of the OSCE participating States, Asian Partners for Co-operation, international organizations, think tanks, and non-governmental organizations, the Conference had a specific focus on disaster risk reduction.

In December 2014, under the Swiss 2014 OSCE Chairmanship, the OSCE Ministerial Council in Basel unanimously adopted a **Ministerial Council Decision on Enhancing Disaster Risk Reduction**. The most significant conclusions and commitments of this Ministerial Council Decision are as follows:

- The OSCE participating States acknowledged that environmental degradation, including disasters, could be a potential additional contributor to conflict and that conflicts, poor governance, mismanagement and degradation of natural resources as well as migratory pressures can affect the vulnerability of society to disasters.

- They emphasized the importance of co-operation among participating States in disaster risk management, including in order to build mutual confidence and promote good neighbourly relations.
- The Ministerial Council Decision also notes the exacerbating effect climate change may have on the frequency and magnitude of disasters, and therefore the importance of climate change mitigation and adaptation to effectively reducing disaster risk. The decision also notes the importance of the ongoing global negotiations on climate change in the context of the UNFCCC.

The Ministerial Decision also included a specific reference to **fire management** – an area in which the OSCE has been actively engaged since 2006, in close partnership with the **Global Fire Monitoring Center**.

OSCE's wildfire management programme emerged from two assessment missions in the South Caucasus: the 2006 *OSCE-led Environmental Assessment Mission to the fire-affected territories in and around the Nagorno-Karabakh region* and the 2008 *Joint OSCE/UNEP Environmental Assessment Mission to Georgia*. Implemented in a phased approach, this programme entails capacity building of the **South Caucasus** countries for preparedness, prevention and response to large wildfires; support for development of national wildfire management policies and strategies through multi-sectorial and multi-stakeholder approaches; and engaging local communities in wildfire management. Building on the achievements in the South Caucasus, we are currently exploring opportunities for intensifying the capacities of the Regional Wildland Fire Networks and the Regional Fire Monitoring Centers of **Eastern Europe** and **South Eastern Europe** as well.

Furthermore, we have recently expanded our wildfire management activities to **Mongolia** and the **Central Asia** region. The opening of the Regional Central Asian Fire Management Resource Center (RCAFMRC) on 21 September 2015 in Ulaanbaatar, Mongolia is a good example in this respect. Hosted by the National University of Mongolia, the Center will foster cross-boundary co-operation in fire management.

In close collaboration with the Global Fire Monitoring Center, the OSCE will continue its engagement in this field by, inter alia, making use of the **Environment and Security - ENVSEC - Initiative** where the OSCE effectively partners with the UN Environment Programme, the UN Development Programme, the UN Economic Commission for Europe, and the Regional Environmental Center for Central and Eastern Europe, and by working closely with the UN Office for Disaster Risk Reduction.

We believe our joint endeavours in this field will be an important contribution to the implementation of the **Sendai Framework for Disaster Risk Reduction** and the **2030 Agenda for Sustainable Development**.

Thank you.

6th International Wildland Fire Conference Posters of the Global Wildland Fire Network Posters

Note: High-resolution versions of the posters are available on the IWFC-6 Website: <https://gfmcc.online/iwfc/korea-2015.html>



The Global Wildland Fire Network
United Nations International Strategy for Disaster Reduction (UNISDR)



Regional Wildland Fire Networks: North America – Mesamerica – South America – Caribbean – Mediterranean – Southeast Europe / Caucasus – Euro-Alpine – Near East – Sub-Sahara Africa – South Asia – Southeast Asia – Australasia – Northeast Asia – Central Asia – Eurasia

The UNISDR Global Wildland Fire Network (GWFN) and the Wildland Fire Advisory Group (W FAG)

Trends of Changing Fire Regimes and Impacts: Rationale for Internationally Concerted Action

Since the 1980s:
Acceleration of large-scale land-use change involving burning of native vegetation in the tropics

Climate Variability – the El Niño of 1997-98:
Associated with excessive conversion burning and large-scale wildfires in SE Asia, Africa and the Americas

Northern Eurasia and Central Asia 2003 / 2015
Combined effects of Societies, economies in transition and regional climate change: Increase of vulnerability of humans and environment to wildfires

Expected consequences of climate change, land use and land-use change in the 21st Century:
Increasing occurrence of extreme droughts and fire severity

Consequences: Environmental degradation and secondary disasters.
Increasing vulnerability of human populations and the Earth System

Increasing occurrence of uncontrollable wildfires as a consequence of climate change and altered natural fire regimes ?

Fire emissions, atmosphere and climate:
Acceleration of destruction of vegetation cover and terrestrial carbon depletion, notably peat deposits

An International Platform facilitating International Cooperation in Wildland Fire Management

History
• 2001 – UN International Strategy for Disaster Reduction (UNISDR), Inter-Agency Task Force for Disaster Reduction, follows the proposal by the World Conservation Union (IUCN) and the Global Fire Monitoring Center (GFMC) to establish a Working Group on Wildland Fire
• Members of the Working Group: Core Group and Consultative Group – see graph
• December 2001: the Working Group decided to give priority to the establishment of the "Global Network of Regional Wildland Fire Networks" aimed at facilitating the functioning of a global fire management working programme or network

The Global Wildland Fire Network in the UN Setting
International Wildfire Preparedness Mechanism
International Fire Analysis and Support
International Network of Contact Points for Fire Analysis

History
• 2003 – The International Wildland Fire Summit (8 October 2003) was used as a platform to convene representatives from regional networks. The strategy agreed by the Summit ("Strategy for Future Development of International Cooperation in Wildland Fire Management") includes the following agreement:
"The Regional Wildland Fire Networks will be consolidated, developed and promoted through active networking in information sharing, capacity building, preparation of bilateral and multilateral agreements, etc. This process will be facilitated through regional Wildland Fire Conferences and Summits."

Geography of the Global Wildland Fire Network
By September 2015 fifteen Regional Wildland Fire Networks are in place with different histories and institutional or legal arrangements

2003 – UNISDR Inter-Agency Task Force for Disaster Reduction decides to transit the Working Group to the Wildland Fire Advisory Group (W FAG) under the auspices of the UNISDR, which is
• serving as an advisory body to the UN system to provide technical, scientific and policy-supporting advice to the United Nations
• acting as a liaison between the United Nations system, the Global Wildland Fire Network and its supporting partners

The Global Fire Monitoring Center (GFMC) is mandated to serve as convener and secretariat.

2001 – Geneva meeting of the Working Group on Wildland Fire – launch of the Global Wildland Fire Network

2004-2014 W FAG biennial meetings at GFMC

2005: Regional Wildland Fire Networks conduct the Fire Management Global Assessment for FAO

2007: GWFN serving as Thematic Platform of the newly established Global Platform for Disaster Risk Reduction under the auspices of UNISDR

2015: The 6th International Wildland Fire Conference hosted by the Republic of Korea

2019: The 7th International Wildland Fire Conference will be hosted by the Ministry for Environment / IBAMA / PREVFOGO Brazil: Wildland Fire and Climate Change

Global Fire Analysis
"Global Fire Analysis: Global Overview"

Global Fire Management Policy Dialogue
"UNEP Regional Forum on Cross-Boundary Fire Management" Geneva, 29-30 November 2013

International Fire Management Resources Exchange

UNISDR IWPM International Wildfire Preparedness Mechanism
Cross-boundary Cooperation in Fire Management: Exchange of Expertise and Resources

Photo / Graphics / Images Credits: Canadian Forest Service, M.O. Andraee, A.A. Hoffmann, G. Xanthopoulos, GFMC Archive, NASA, Chisholm Fire Documentation Team (Alberta, Canada)

Website of the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html>

© Global Fire Monitoring Center (GFMC) / UN-ISDR Wildland Fire Advisory Group





The Global Wildland Fire Network

United Nations International Strategy for Disaster Reduction (UNISDR)



Regional Wildland Fire Networks:
 North America – Mesoamerica – South America – Caribbean – Mediterranean – Southeast Europe / Caucasus – Euro-Alpine – Near East – Sub-Saharan Africa – South Asia – Southeast Asia – Australasia – Northeast Asia – Central Asia - Eurasia

UNISDR Regional Eurasia Wildland Fire Network

Major Wildland Fire Issues in Eurasia



In general, the fire services are not adequately trained and equipped for wildland fire situations – however, increasing recognition for the need of adequate training and equipment

Increasing recognition of fire as a natural and cultural factor contributing to high biodiversity

Increasing recognition and acceptance of the use of prescribed fire in nature conservation and landscape management

Domestic and transboundary air pollution by agricultural burning: Ukraine and Russia 2015

Fire management on conservation areas contaminated by unexploded ordnance stemming from armed conflicts

Wildfires in radioactively contaminated terrain in Belarus, Ukraine and Russia: Several major incidents in 2015

The Eurasian Regional Network (former "Baltic Network") – Coordinator of the Euro-Siberian Network Cluster – emerged as the Core Region of the work of the UNECE / FAO Team of Specialists on Forest Fire (1993-2014)



Major Networking achievements and ongoing Projects:
 Cooperation between the wildland fire science community, practitioners and policy makers

Network activities in the ECE region activated in 1981. One of the networking efforts: Documentation of national fire analyses in UNECE/FAO International Forest Fire News (IFFN) (1988-2014)

Introduction of advanced standards and competence-based wildland fire management training systems for European fire services since 2006:
 By 2015 the EuroFire Competency Standards are available in 14 languages for the use in Eurasia and Latin America



Establishment of the Global Fire Monitoring Center in 1998: Initiated in the Baltic Region

Recent Regional Activities Selected Examples

First International Fire Management Week (Krasnoyarsk Region, Russia, 2012)

Second International Fire Management Week (Krasnoyarsk Region, Russia, 2013)



International Congress and Trade Fair on Forest Fire and Climate Change: Challenges for Fire Management in Natural and Cultural Landscapes of Eurasia. Hosted by the Russian Federation in partnership with the GPMC (Novosibirsk, Russia, 2013)

UNECE/FAO Regional Forum on Cross-Boundary Fire Management United Nations, Geneva (2013)



Defence of Villages, Farms and Other Rural Assets against Wildfires Guidelines for Rural Populations, Local Communities and Municipality Leaders in the Balkan Region



Technology transfer: Introduction of the use of prescribed fire in agriculture, forestry and conservation in Georgia, Ukraine and Poland (2014/2015)



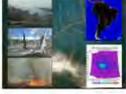
Facilitation of cross-boundary cooperation in fire management:

Publication of the updated Multilingual Wildland Fire Terminology (English-Russian-Mongolian) in 2014



Network Website and Link to the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/BalticRegion/BalticRegion.html>
 Website of the Eurasian Fire in Nature Conservation Network (EFNCN): <http://www.fire.uni-freiburg.de/programmes/natcon/natcon.htm>





Regional Wildland Fire Networks: North America – Mesoamerica – South America – Caribbean – Mediterranean – Southeast Europe / Caucasus – Euro-Alpine – Near East – Sub-Saharan Africa – South Asia – Southeast Asia – Australasia – Northeast Asia – Central Asia – Eurasia

The Regional Central Asia Wildland Fire Network Activities Since the 5th International Wildland Fire Conference (2011)

Regional Fire Management Cooperation

1st and 2nd International Fire Management Weeks and Forest Fire and Climate Change Conference in the Russian Federation



In 2012 and June 2013, representatives of the Central Asian states attended the First and Second "International Fire Management Week" in Krasnoyarsk Krai and also in November 2013 the "International Congress and Trade Fair on Forest Fire and Climate Change: Challenges for Fire Management in Natural and Cultural Landscapes of Eurasia" in Novosibirsk, Russian Federation.

UNISDR Pan-Asia Wildland Fire Network Secretariat Foundation Meeting and UNECE/FAO Regional Forum on Cross-boundary Fire Management



UNISDR IWPM
International Wildfire
Preparedness Mechanism



In October 2013, the "UNISDR Pan-Asia Wildland Fire Network Secretariat Foundation Meeting" was held in Seoul, Korea, in which participants from the four Regional Wildland Fire Networks of the Asian region were discussed ways to enhance international cooperation in fire management in the Asian countries. Participation of the Central Asian fire management delegations in the "UNECE/FAO Regional Forum on Cross-boundary Fire Management" (United Nations, Geneva, Switzerland, September 2013), was an important step to learn / share experiences on cooperation of the transboundary fire management activities from the other regions.

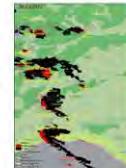
Transboundary Fire Management Cooperation

Mongolian-Russian Government Agreement on Transboundary Fire Management Cooperation



Consultation on Transboundary Fire Management in preparation of Mongolian-Russian Government Agreement on Transboundary Fire Management Cooperation was organized by the Ministry of Environment and Green Development, Mongolia, Ulaanbaatar, Mongolia, 09-10 June 2014. On 3 September 2014 the agreement was signed by the Minister of Natural Resources and Environmental Protection of the Russian Federation and the Minister of Environment and Green Development of Mongolia, during the official visit of the Russian delegation headed by the President of Russia Vladimir Putin to Mongolia.

Strengthening Inter-Agency Cooperation in Fire Management



In May 2015 the National Round Table "Strengthening Inter-Agency Cooperation in Fire Management" was held in Ulaanbaatar, Mongolia, followed by the preparation of setting up the Regional Central Asia Fire Management Resource Center (RCAFMRC) and a field assessment of the 2015 spring fires in Eastern Mongolia, including transboundary fire between Mongolia and the Russian Federation.

Establishment of the Regional Central Asia Fire Management Resource Center (RCAFMRC) and other activities



The Regional Central Asia Fire Management Resource Center (RCAFMRC) has been established in Ulaanbaatar, with the long standing support of the GFMC and financial support of the Swiss Agency for Development and Cooperation (SDC) through the Organization for Security and Co-operation in Europe (OSCE). Since then the First undergraduate training course on Fire Ecology and Management has been conducted for students of the National University of Mongolia (spring 2015), followed by the exercise of under canopy burning in larch (*Larix sibirica*) forests. Two Training Courses on Community-based Fire Management and the first Regional Central Asia Fire Management Training Course (20-25 September 2015) and were held in Mongolia.

Photo / Graphics / Images Credits: RCAFMRC, NEMA and Krasnoyarsk Joint Science Center for Satellite Remote Sensing

Network Website and Link to the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/CentralAsia/CentralAsia.html>



The Global Wildland Fire Network

United Nations International Strategy for Disaster Reduction (UNISDR)



Regional Wildland Fire Networks: North America – Mesamerica – South America – Caribbean – Mediterranean – Southeast Europe / Caucasus – Euro-Alpine – Near East – Sub-Sahara Africa – South Asia – Southeast Asia – Australasia – Northeast Asia – Central Asia – Eurasia



Regional Southeast Europe / Caucasus Wildland Fire Network

Between the 5th and the 6th International Wildland Fire Conferences the following activities have been accomplished:

1st International Conference on Wildfire in Natural Resources Lands

Islamic Republic of Iran, Gorgan, October 2011

The Conference was organized from 26 to 27 October 2011 in Gorgan, Iran, with participation of more than 200 participants from Iran and nine other countries. The Regional Southeast European/Caucasus Wildland Network and Regional Fire Monitoring Center (RFMC) was represented by Macedonia, Turkey and Greece.

Within the last five years wildland fires in the region of Southeast Europe/Caucasus have a significant influence to the environment and economy. Especially it is the case with the Balkan region in the fire season of 2012. Around 16,000 wildland fires occurred and burned around 232,000 ha of forest and other land. Cases of wildfire-caused fatalities were experienced in Macedonia (4) and Serbia (12) and large numbers of people (civilians and firefighters) have been injured, as well. Large number private and public properties were destroyed, as well.

The main reason for wildland fires in the region are agricultural burning, negligence and in some countries arson. Arson is mainly motivated by illegal logging and low price of timber harvested after the fires; political discontent is also a motivation for arson. Natural caused fires (lightning) are less than 3% from the total number of wildland fires in the Region of Southeastern Europe/Caucasus. A special issue in the region is fire management on terraces contaminated by land mines and unexploded ordinance-UXO.



Enhancing National Capacity on Fire Management and Wildfire Disaster Risk Reduction in the South Caucasus Azerbaijan

Forest Fire Management Training and Second National Round Table on Forest Fire Management Baku and Gabala, Azerbaijan, September 2012

In the frame of the project, GFMC in partnership with the Regional Fire Monitoring Center (RFMC) and experts from the UNISDR Regional SE Europe / Caucasus Wildland Fire Network a training courses was organized in Gabala, Azerbaijan, followed by a Local and the Second National Round Table on Fire Management.



International Symposium on Strategy Development of Advanced Forest International Symposium on Strategy Development of Advanced Forest Fire Policy and Organization

Seoul, Republic of Korea, January 2013

This symposium was hosted by the Korea Forest Research Institute (KFRI) and co-sponsored by the Korea Forest Service (KFS) and the Global Fire Monitoring Center (GFMC), with inputs of the UNECE/FAO Team of Specialists on Forest Fire and the UNISDR Regional Southeast Europe and Eurasia Wildland Fire Networks.



The GREEN STAR Awards 2013

Geneva, September 2013

A select group of outstanding individuals and organizations from around the world, who have confronted environmental emergencies ranging from the Fukushima nuclear disaster and Hurricane Sandy, to forest fires and climate change, were honoured on 2 September 2013 as recipients of the third Green Star Awards. The biennial Green Star Awards are a joint initiative between the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), Green Cross International and the UN Environment Programme (UNEP). Joint award for Wildfire Disaster Risk Reduction: Nikola Nikolov (Macedonia), Sunder P. Sharma (Nepal) and Sergiy Zlotsev (Ukraine)



International Congress on Forest Fire and Climate Change: Challenges for Fire Management in Natural and Cultural Landscapes of Eurasia

Novosibirsk, Russia, November 2013

and UNECE / FAO Forum on Cross-boundary Fire Management

United Nations, Geneva, November 2013



Project: Development of Guidelines for the Defense of Rural Populations, Settlements and other Assets Against Wildfires and Smoke Pollution – with the EuroFire Standards

2012-2013

Funded by the Council of Europe and the European and Mediterranean Major Hazards Agreement (EUR-OPA) in cooperation with the:

- European Centre on Forest Fires (ECFF), Athens, Greece
- Global Fire Monitoring Center (GFMC), Freiburg, Germany
- Regional SE Europe / Caucasus Fire Monitoring Center (RFMC), Skopje, Macedonia
- Regional Eastern European Fire Monitoring Center (REEFMC), Kiev, Ukraine



Regional Fire Management Training for South Caucasus and Western Balkans

Antalya, Turkey, October 2014

The training was held in the frame of the OSCE/ENSEC project "Enhancing National Capacity on Fire Management and Wildfire Disaster Risk Reduction in the South Caucasus" in the Fire Management Training Center, Antalya. The Regional Fire Monitoring Center (RFMC), through the Global Fire Monitoring Center (GFMC), was actively engaged in all phases of the organization of the training. About 60 participants were part of the training as representatives of 11 countries of the Regional Southeast European/Caucasus Wildland Fire Network (Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Macedonia, Montenegro, Serbia, Turkey, Ukraine and Kosovo) and OSCE. The host institution of the training was Turkish General Directorate of Forestry.



Photo / Graphics / Images Credits: RFMC and GFMC

Network Website and Link to the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/SEEurope/SEEurope.html> and <http://www.rfmc.mk>



The Global Wildland Fire Network

United Nations International Strategy for Disaster Reduction (UNISDR)



Regional Wildland Fire Networks: North America – Mesoamerica – South America – Caribbean – Mediterranean – Southeast Europe / Caucasus – Euro-Alpine – Near East – Sub-Saharan Africa – South Asia – Southeast Asia – Australasia – Northeast Asia – Central Asia – Eurasia

Regional Northeast Asia Wildland Fire Network

Network Origin

- ✓ The UNISDR Regional Northeast Asia Wildland Fire Network was established in 2004.
- ✓ The Foundation meeting of the Regional Northeast Asia Wildland Fire Network was held in Seoul, Republic of Korea, on 8 March 2004. It was hosted by the Global Fire Monitoring Center (GFMC) and the Korea Forest Research Institute (KFRI), and supported by the UN International Strategy for Disaster Reduction (UNISDR) and the Food and Agriculture Organization (FAO).
- ✓ Participating countries: Republic of Korea, China, Russia, and Japan, with Mongolia as a partner from the Central Asia Network. North Korea has been invited to join.

Mission Statement

- ✓ The Regional Northeast Asia Wildland Fire Network founded in 2004 by representatives of governments and civil society of China, Japan, the Republic of Korea and the Russian Federation, and organized under the umbrella of the UNISDR Global Wildland Fire Network, advocates the interests of its members and supporters towards reducing the negative impacts of wildland fires on the environment and on societies.
- ✓ The network aims at realizing these goals through enhanced international cooperation in wildland fire management research, development, capacity building, sharing of knowledge and resources, and mutual support. The cooperation is based on the principle of partnership between the participating countries and the international community.

Tasks of Members

1. Member countries should share the experience of fire management accumulated in the Northeast Asia states.
2. National and local fire management capacities need to be strengthened, notably through advanced training.
3. Northeast Asian countries should create a mechanism of cooperation in fire management and information exchange.
4. There is a need to standardize definitions and terms related to fire management, especially in the main regional languages (Chinese, Japanese, Korean, Mongolian, Russian).
5. It is expected that after the meetings and discussions participants will have a better understanding of fire situation in Northeast Asia.
6. Participants request assistance and further cooperation from GFMC, UNISDR, FAO and other international organizations and the donor community.



Network Website and Link to the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html>

- The directions of concrete cooperation:
- Transfer of knowledge, technology and expertise • Sharing research findings, lessons learned and best practices • Compatible information and forecast exchange on fire situation • Enhancing governance for fire risk reduction, for education, training and awareness-raising initiatives and for capacity building • Financial assistance to improve fire effectiveness of work of existing systems and achieve new levels of capacity building and international cooperation



2015 세계산불총회
INTERNATIONAL WILDLAND FIRE CONFERENCE
Pyeongchang, Korea, 12-16 October 2015
www.wildfire2015.kr



Korea Forest Research Institute
<http://www.kfri.go.kr>



Korea Forest Service
<http://www.forest.go.kr>



The Regional Northeast Asia Wildland Fire Network covers an area of 16.4 million km²

NEA Network Fire Situation



Network Meeting History

Series	Date	Venue	Major Issues Addressed	Participants
Proposal	2003. 10.	AUSTRALIA	✓ Proposed by the KFS & KFRI in the 3 rd IWFC	-
1 st	2004. 3.	KOREA	✓ Consensus built on establishment of NEA network and exchange of research data • Joint with international symposium of NEA Forest Fire Suppression Techniques	14 (FAO, GFMC, 5 countries)
2 nd	2005. 1.	JAPAN	✓ Discussion on creating NEA agenda • Joint with international symposium of view of NEA Forest Fire from Space.	8 (FAO, GFMC, 3 countries)
3 rd	2006. 9.	RUSSIA	✓ Approval of Mission statement of network • An import step to organize the national-level follow-up work in each country • Joint with international symposium of NEA forest fire situation & current research	31 (GFMC, 5 countries)
4 th	2007. 12.	CHINA	✓ Holding of the Pan-Asian fire network consultation & conference in Korea • Joint with international symposium of NEA forest fire situation & current research	16 (4 countries)
5 th	2008. 6.	MONGOLIA	✓ Adjustment of GFMC region Mongolia: member(CA), observer (NEA) ✓ Pan-Asian wildland fire conference in 2013 ✓ Book published on NEA wildland fire Co-authors: Kondrashev, Goldammer, Lee • Joint with international symposium of NEA forest fire situation & current research	24 (* Joint with 1 st Central Asia meeting)
6 th	2009. 2.	KOREA	✓ Regional/National impact of climate change on fire regimes ✓ Use of incident command systems in fire management ✓ Preparation for the 2013 Pan-Asia Wildland Fire Conference	250 (10 countries)
7 th	2011. 7.	KOREA	✓ To strengthen the UNISDR Pan-Asia Wildland Fire Network ✓ Preparation for 2013 Pan-Asia Forest Fire Conference ✓ Inter regional meeting among SA, SEA, NEA and Sub-Saharan Africa for sharing knowledge on Community-based Fire Management (CBFM) approach in 2012	230 (6 countries)
8 th	2013.10	KOREA	✓ Establishment of Pan-Asia Wildland Fire Network Secretariat in the Republic of Korea ✓ Conduct regional advanced fire management training course ✓ Establish Regional Fire Management Resource Center ✓ The 2 nd Pan-Asia Wildland Fire Conference (2017, Indonesia)	300 (7 countries)

Pan-Asia Wildland Fire Network Activities

International Symposium on Commemorating the Establishment of the Pan-Asia Wildland Fire Network



The 1st Asia Forest Fire Training Program





Regional Wildland Fire Networks:
 Eurasia – Central Asia – Southeast Asia – Australasia – North East Asia – South East Asia – South Asia – Sub-Saharan Africa – Near East – Euro-Alpine – Mediterranean – Caribbean – South America – Mesoamerica

The Regional South Asia Wildland Fire Network

Fire Situation, Fire Regimes and Impacts

Fire Situation:

- Almost all fires are human-induced
- Increased settlement-wildland interface problems
- Low fire management capabilities at local and national levels
- General perception of people in the region: Fire is the main cause of forest destruction and degradation
- High expectations from sustainable vegetation cover for livelihoods
- Large-scale land-use change involving burning of native vegetation in the tropics

Diverse ecosystems, socio-economic and cultural settings and forest types

Diverse fire regimes and vulnerabilities due to its geographical and climatic variability

Image Credit: NASA

Increasing occurrence of uncontrolled fires as a consequence of climate change and altered natural fire regimes

Photo Credit: INMIS

Increasing occurrence of extreme weather (droughts and precipitation) and fire severity

Increasing vulnerability to human populations, negative impacts in social, ecological systems and secondary disasters

Deterioration of watersheds in the Hindu Kush – Himalaya region and land-use patterns

- Key Issues:**
- Human resource development
 - Funding for fire management activities
 - Awareness raising
 - Fire and climate change interaction
 - Fire and REDD+ Mechanism
 - Fire management and livelihoods of local communities
- Photo Credit: P. J. J. J.

International / Regional Initiatives / Needs

Foundation of the UNISDR Regional South Asia Wildland Fire Network under the auspices of the Global Wildland Fire Network (GWFN), UN International Strategy for Disaster Reduction (UNISDR), the UNISDR Wildland Fire Advisory Group (WFAG) and its Secretariat, the Global Fire Monitoring Center (GFMC)



Objectives of the Network:

Enhance and strengthen cooperative resource mobilization in fire management for creating synergies and enabling environments, and sharing knowledge within a guiding framework by action on the ground – and mobilization of international awareness



Enhance existing national / regional capability in fire management, including early detection, monitoring, early warning, fire response and impact assessment with these partners:

UNISDR Global Wildland Fire Network, GFMC, FAO, ITTO, SAARC, ICMOD, WWF, UNOPLNEP, Global Observation of Forest and Land Cover Dynamics (GOF/GOLD) and AFOCo



Enhance cooperation among countries within the region and at inter-regional levels, aimed at sharing technology, expertise and data exchange in fire management: Activation of the International Wildfire Preparedness Mechanism (IWPM)

UNISDR IWPM
International Wildfire Preparedness Mechanism

Integrate fire as a component of land use and forest management tool by giving emphasis on:

- Improvement of participatory / community-based fire management approaches and institutional and technological capabilities at all levels
- Building capacity to 'Wise Use of Fires' for habitat management and biodiversity conservation; and fuel management
- Promotion of education and awareness-raising programmes on wildland fires
- Support of countries to conduct national fire and fire management assessments, formulate legal frameworks and strategies, build sustainable fire management capabilities and institutions, develop fire management plans and human resources
- Development of policies, strategies and action plans aimed at building capacities in local, national and transboundary forest fire management





Regional Wildland Fire Networks:
North America – Mesoamerica – South America – Caribbean – Mediterranean – Southeast Europe / Caucasus – Near East – Sub-Sahara Africa – South Asia – Southeast Asia – Australasia – Northeast Asia – Central Asia – Eurasia

THE REGIONAL SOUTHEAST ASIA WILDLANDFIRE NETWORK

Fire Management and Fire Problems in South East Asian Countries

Fire prevention through prescribed burning



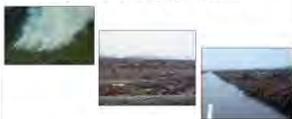
Community-based fire management through biogas production



GHG emission reduction through establishment of electric power plants using logs and burnt logs



Land preparation using fire for oil palm, sago and forestry plantations



Fire in national parks and natural reserves



Transboundary haze pollution due to forest and land fire



Fire prevention through law enforcement



Photo / Graphics / Images Credits: Archive, Regional SE Asia Wildland Fire Network Secretariat

Forest Fire Laboratory, Division of Forest Protection, Department of Silviculture, Faculty of Forestry, Bogor Agricultural University (IPB), Kampus IPB Darmaga, Bogor 16680, West Java, Indonesia, Tel: +62-251-8626806, Fax: +62-251-8626886, e-mail: bnherosaharjo@gmail.com

ASEAN AGREEMENT ON TRANSBOUNDARY HAZE POLLUTION, Signed in June 2002, Kuala Lumpur, Malaysia, came into force in November 2003. Indonesia the last country ratified the agreement in 2014.

Article 3, Principles

1. The Parties have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment and harm to human health of other States or of areas beyond the limits of national jurisdiction.

3. The Parties should take precautionary measures to anticipate, prevent and monitor transboundary haze pollution as a result of land and/or forest fires which should be mitigated, to minimize its adverse effects. Where there are threats of serious or irreversible damage from transboundary haze pollution, even without full scientific certainty, precautionary measures shall be taken by Parties concerned.

Law enforcement

Director of the Indonesian palm oil company PT Kallista Alam, Subianto, has been found guilty of illegally clearing peat forest in Aceh, Sumatra, and has been sentenced to eight months in jail. The judges also fined him 150 million rupiah (about 13,000 US\$), and said he would be imprisoned for a further three months if the fine was not paid. This follows on from a court ruling in a civil case in January in which Kallista Alam was ordered to pay 114.3 billion rupiah (about 9.7 million US\$) in compensation and 251.7 billion rupiah (close to 21 million US\$) to restore the 1,000 hectares of the Tripa peat forest, which lies within Sumatra's Leuser Ecosystem – the only place on earth where tigers, elephants, rhinos, and orangutans can be found living together in the wild. That case was brought against Kallista Alam by the Indonesian environment ministry (Source: Changing Time, 2014).

A Malaysian manager at plantation firm PT ADEI Plantation and Industry, a unit of Malaysia's Kuala Lumpur Kepong Berhad, was found guilty on Tuesday of causing forest fires in Riau last year that led to haze choking neighboring Singapore and Malaysia. The Pelalawan District Court in Riau sentenced ADEI general manager to a year in prison and the option of paying Rp 2 billion (US\$168,800) or serving an additional two months in jail for violating Article 99 (1) of the 2009 Environmental Protection and Management Law (Source: Jakarta Post, 2014)

Accumulation of active fire data detected in ASEAN member estates ASEAN (ASMC, 2015)

ASEAN member estate	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cambodia	6650	10526	13885	12911	14701	14270	14992	19033	17349
Laos	8566	16580	14139	15327	22819	12707	17679	15770	11540
Indonesia	29059	15141	14982	25792	8180	22386	27667	15613	24898
Sumatra	12014	7017	8349	10297	4147	10320	14032	8398	9728
Kalimantan	17045	8124	6633	15495	4033	12066	13635	7215	15170
Malaysia									
Peninsular	299	587	632	858	939	862	1236	1418	2608
Sabah& Serawak	1147	1798	1523	2467	1577	1468	2401	1549	1719
Filipine	1606	2322	1311	1357	2894	952	1167	1462	1946
Myanmar	18751	33468	27740	34871	38359	27976	52033	44397	37926
Vietnam	5193	8394	8947	9897	12537	9448	13981	12442	13225
Thailand	8578	14696	13654	14314	18503	13920	27033	22817	19120

Indonesia Emission Reduction Targets – 2020

Sector	Emission Reduction Plan (Gigatons CO ₂)		Action Plan	Agency
	26%	41%		
Forestry and Peatland	0.672	1.039	Controlling forest fire and peat fire, Water resource management, Forest and land rehabilitation, HTI, HR, Reducing illegal logging, avoiding deforestation, community engagement.	Ministry of Forestry, Ministry of Environment, Ministry of Public Work, Ministry of Agriculture
Waste	0.048	0.078	Building Landfill, wasting management based on "3R" (recycle, reuse and reduce) and integrated water waste management in urban area	Ministry of Public Work, Ministry of Environment
Agriculture	0.008	0.011	Introduction low emission rice, water irrigation efficiency, applying organic fertilizer	Ministry of Agriculture, Ministry of Environment, Ministry of Industry
Industry	0.001	0.005	Energy efficiency, applying renewable energy	Ministry of Transportation,
Energy and transportation	0.038	0.056	Applying bio fuel, engine efficiency	Ministry of Energy, Ministry of Public Work
	0.767	1.189		

Network Website and Link to the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html>



Regional Wildland Fire Networks:
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Australasian Wildland Fire Network

The Australasian region is one of the most fire-prone environments in the world due to a unique combination of vegetation, climate and landscape. Fire is a part of the region's history and its future, while much of the vegetation is dependent upon regular fire.

The Australasian Wildland Fire Network is working to balance the role of fire as a necessary part of the environment with the need to keep communities in Australia, New Zealand and the Pacific Islands safe and resilient.



The Australasian Fire and Emergency Service Authorities Council (AFAC) is the national council and peak body for public sector fire, land management and emergency service organisations in Australia and New Zealand. It is the trusted source of incident management expertise, information and advice and actively engages with its members and the industry. On behalf of the industry, AFAC set the Strategic Directions to ensure the principles of Primary of Life, Trust, Interoperability and Accountability. The directions are:

- Supporting resilient communities through risk reduction
- Providing trusted response
- The source of credible and timely information
- Effective governance and resource management
- Informed by research

www.afac.com.au



The Bushfire and Natural Hazards Cooperative Research Centre draws together all of Australia and New Zealand's fire and emergency service authorities with the leading experts across a range of scientific fields to explore the causes, consequences and mitigation of natural disasters. The CRC was launched on 10 December 2013 and acknowledges the ongoing impacts of natural hazards upon communities, emergency service providers, governments, agriculture and other industries. The decision to fund the CRC followed several years of discussion on a successor to the Bushfire CRC, which ended in June 2014. The new centre builds on the work of the Bushfire CRC and expand the research into natural hazards. The Bushfire and Natural Hazards CRC is funded for eight years with \$47 million from the Australian Government's Cooperative Research Centres Program. The remainder funds 'call and in-kind' - comes from partner agencies, government organisations and research institutions from all states and territories and New Zealand. The purpose of the Bushfire and Natural Hazards CRC is to conduct end-user inspired applied research to:

- Reduce the risks from bushfire and natural hazards
- Reduce the social, economic and environmental costs of disasters
- Contribute to the national disaster resilience agenda
- Build internationally renowned Australian research capacity and capability
- Enable Australian small to medium enterprises to be innovative in natural hazard products and services



The National Aerial Firefighting Centre (NAFC) was formed by the Australian States and Territories in July 2003 to provide a cooperative national arrangement for combating bushfires. It achieves this by facilitating the coordination and procurement of a fleet of highly specialised firefighting aircraft that are readily available for use by State and Territory emergency service and land management agencies across Australia. This national aircraft fleet complements aerial firefighting resources that are arranged directly by the States and Territories. The National Fleet receives funding support from the State and Territory Governments as well as the Australian Government. NAFC also plays a key role in ensuring the sharing of aerial firefighting resources between emergency service and land management agencies throughout Australia, and in the development of national protocols and systems for aerial firefighting. During 2013/14 it coordinated 77 aircraft that flew 6,036 missions, including 36,000 firefighting drops that delivered 86 million litres of retardant. It was also national initiatives to track aircraft and manage aircraft data and safety.



The Forest Fire Management Group (FFMGC) is a committee of Australian and New Zealand land management agencies plus representatives from research, education and the forest industry. FFMGC aims to provide a forum and centre of expertise on forest fire management and control, and particularly to provide a high level of technical and policy advice on fire control matters, and to assist interstate and international liaison and consultation. FFMGC prepared and released the National Bushfire Management Policy Statement for Forest and Rangelands for the Council of Australian Governments. It sets principles and National Goals to:

- Effectively Managing the Land with Fire
- Involved and Capable Communities
- Strong Land, Fire and Emergency Partnerships and Capability
- Actively and Adaptively Managing Risk

FFMGC is supporting the National Burning Project that will deliver improved national outcomes for the use of prescribed burning. The Project is an end to end review of all national principles for the design and delivery of prescribed burning programs.

Pacific Islands Fire & Emergency Service Association
 PIFESA (formerly known as PIFSA) is a fire and emergency service network established by its members to provide a forum for strengthening the capability and capacity of fire services throughout the Pacific Islands and to promote and advance all aspects of fire protection and community safety. PIFESA was changed to PIFESA to include the 'emergency' element amongst the Fire Services. The current membership of PIFESA comprises: Cook Islands, Nauru, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu. Since then, and under the guidance of its Executive, PIFESA has established a Memorandum of Understanding with the AFAC and with support Pacific Islands Applied Geoscience Commission (SOPAC), the Association has also established a Charter, Strategic Plan and Constitution. PIFESA supports collaboration and coordination between national fire and emergency services and facilitates the support through developing or adopting models and guidelines of best practice for key areas of service delivery. PIFESA member countries enjoy long standing partnership with many Australian and New Zealand fire and emergency services.

Photo / Graphics / Images Credits: AFAC & BNHCRC & NAFC.

The Regional network works across all agencies to contribute to safer and more resilient communities.



Network Website and Link to the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html>



The Global Wildland Fire Network

United Nations International Strategy for Disaster Reduction (UNISDR)



Regional Wildland Fire Networks: North America - Mesoamerica - South America - Caribbean - Mediterranean - Southeast Europe / Caucasus - Euro-Alpine - Near East - Sub Sahara Africa - South Asia - Southeast Asia - Australasia - Northeast Asia - Central Asia - Eurasia



Regional North American Wildland Fire Network North American Forest Commission Fire Management Working Group

History

In 1960, the United Nations Food and Agriculture Organization established the North American Forest Commission with Canada, Mexico, and the United States as members.

The purpose of the Commission is to advise on the formulation of forest policies and to review and coordinate its implementation of the regional plan; to exchange information; and to recommend appropriate solutions to technical problems.

The Fire Management Working Group was established in 1962. Annual meetings have rotated among the member countries since inception.

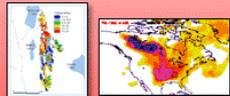
NAFC-FMWG Objectives

- To exchange experiences and technological advances regarding prevention, wildland fire management, and fire use.
- To provide mutual aid and technical exchanges between Canada, Mexico and the United States in the development of strategy and appropriate actions to resolve North American fire problems.
- To actively support and participate in international fire management programs with fire management agencies throughout the world by developing and promoting activities that support international cooperation and development.

Exchanging Science & Technology



Interagency training, science, technology and fire operations



Information & Resource Sharing



Suppressing fires in the Wildland Urban Interface



North American interagency resource sharing



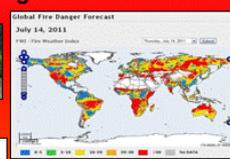
Implementing the Incident Command System



Supporting International Fire Management



International technology transfer and training in fire management.



Development of a global early warning system for wildland fire



Fire research: International Crown Fire Modeling Experiment (Northwest Territories, Canada)



International resource sharing





The Global Wildland Fire Network

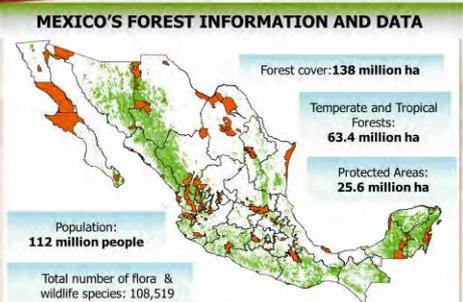
United Nations International Strategy for Disaster Reduction (UNISDR)



Regional Wildland Fire Networks: North America – Mesoamerica – South America – Caribbean – Mediterranean – Southeast Europe / Caucasus – Euro-Alpine – Near East – Sub-Saharan Africa – South Asia – Southeast Asia – Australasia – Northeast Asia – Central Asia – Eurasia



Mexico's Wildland Fire Management Policy



SCIENCE & TECHNOLOGY

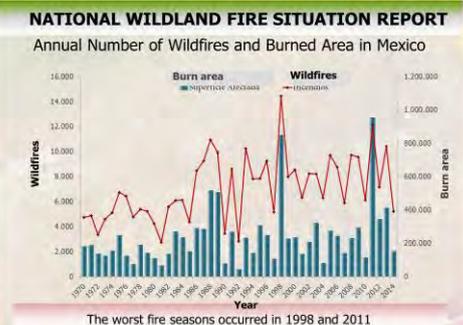
Research and Innovation

National Universities and Scientific Cooperation

National Research Centers and International Partners Collaboration

Wildland Urban-Interface

- Fuel models /fuel beds
- Fire danger rating system
- Fire effects
- Ecosystems fire regime assessment



ICS TRAINING HISTORY IN MEXICO

USFS Support

- 1998**: USFS ICS 100-200 version
- 2003/2004**: ICS 300
- 2007/2008**: ICS 400 and ICS402
- 2009**: ICS Terminology
- 2012**: ICS 100 and ICS200, FEMA Version On-field training National Incident Management Team
- 2013**: ICS 300 and ICS 400
- 2014**: Design State and regional Incident Management Teams course, Incident Management Teams Strategy



INTERNATIONAL COOPERATION

Current Agreements

- Chile
- U.S.A
- Guatemala
- Canada

- Research
- Technical exchanges
- Incident Command System / IMTs
- Support in Areas of Mutual Assistance and national disasters

CHANGES IN OUR WILDLAND FIRE POLICY

Before 2012	2013- 2018
*Focus on Wildfire suppression	*Fuel management increased.
*Contracting Aerial equipment.	*Budget in Equipment and Infrastructure was increased.
*Weak Interagency coordination.	*Strengthen Interagency Federal & State Coordination.
*Weak State wildland fire plans.	*Strengthen State & local wildland fire programs.
	*Strengthen community-based fire plans

CHALLENGES

- Social participation and interagency coordination
- Incident Qualification System
- Political support until 2018 and beyond (national, state & local)
- New alternatives must be implemented
 - ✓ Fuel management strategy
 - ✓ Agriculture alternatives



Regional Wildland Fire Networks: North America – Mesoamerica – South America – Caribbean – Mediterranean – Southeast Europe / Caucasus – Euro-Alpine – Near East – Sub-Sahara Africa – South Asia – Southeast Asia – Australasia – Northeast Asia – Central Asia – Eurasia

Regional Mesoamerica Wildland Fire Network



Biophysical Features of Mesoamerica

The Mesoamerica Isthmus with its 533,000 km² is covered by ca. 21.63 million ha of forests, equivalent to 42% of the Mesoamerica territory.

The region has unique natural and physical characteristics with a high biologic and climatic diversity that are of global significance. This diversity is shaped by

The characteristics of the Mesoamerica region are determined by the shape of the Isthmus, climate variability and its location in the neotropical zone. The combination of these conditions have resulted in the development high biological diversity. The region constitutes a geographic, biological and cultural bridge between the Americas.



Wildland Fire Problems

The main causes of the wildfires in the Mesoamerican region are human activities. Burning of agricultural lands, grasslands, stubble and trash burning are the most important cause, followed by arson and other intentionally set fires. Other causes include forest residue burning, fires used by beekeepers and bonfires.



During the last years several fires have been started by natural causes (lightnings) specially during the transitory period of dry season (May-June).

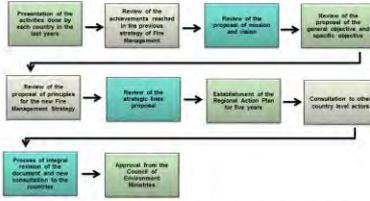
Fire affected area by forest fires by country (ha)

País	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	TOTAL
Belize	196,400,000	40,600,000	64,500,000	74,000,000	55,900,000						362,000,000
Guatemala	94,441,000	15,054,000	55,846,000	28,838,000	19,424,000	9,681,000	21,717,000	7,075,000	11,372,000	7,000,000	276,546,000
El Salvador	4,803,000	5,878,000	4,257,000	733,000	2,726,000	1,693,000	863,000	3,058,000	7,460,000	1,589,000	32,829,000
Honduras	153,847,000	58,389,000	63,348,000	65,487,000	48,475,000	37,047,000	60,586,000	27,378,000	18,113,000	12,738,400	604,158,700
Nicaragua	180,554,000	107,718,000	57,823,000	46,471,000	28,125,000	16,406,000	27,459,000	4,531,000	25,545,000	18,825,000	499,891,000
Costa Rica	14,822,241	15,151,000	32,421,000	23,416,000	13,765,000	18,085,000	9,488,700	34,715,500	55,610,100	30,440,000	348,956,541
Panamá	5,889,700	7,897,777	9,014,533	3,628,111	4,827,511	2,302,533	2,023,700	2,995,900	5,108,140	3,798,773	46,365,844
TOTAL	966,967,841	263,250,779	308,648,230	245,192,221	185,261,881	85,813,888	146,128,997	74,841,771	162,890,721	141,578,981	2,143,632,281

Process of revision and update of the Estrategia Centroamericana de Manejo del Fuego

In 2014-15 four workshops were held in San Salvador, El Salvador, with the participation of the country focal points and other key actors.

- 27-29 October 2014
- 25-27 November 2014
- 10-12 December 2014
- 13-15 January 2015



- Principles of the current Strategy
- Commitment
 - Planning
 - Strengthening
 - Equity
 - Responsibility
 - Biodiversity
 - Protection
 - Cooperation

- Strategic Lines of the current Strategy
- National and regional management
 - Cooperation
 - Social management
 - Knowledge management
 - Risk management
 - Operations
 - Area rehabilitation
 - Information management



Activities 2012 - 2015 organized or with the participation of the Grupo Centroamericano de Manejo del Fuego



Second meeting of the Regional Wildland Fire Networks of South America, Mesoamerica and the Caribbean Brasilia, Brazil (2012)



Course and workshop for the formation of Instructors "Effective Use of Water" Guanacaste, Costa Rica (2013)



First Latin American Forum Integrated Fire Management Call, Colombia (2013)



First Central American Exercise Mobilization of Forest Fire Brigades Cartago, Costa Rica (2013)



Workshop "Forest Fire Prevention Planning" (EMSA) Bogotá, Colombia (2014)



48th Annual Meeting of the Fire Management Working Group, North American Forestry Commission (NAFC) Halifax, Canada (2014)



Third Latin American Forum Experience in the Use of the Incident Command System Salinas, El Salvador (2015)



Workshop "Public Forest Fire Policies in Mexico and Central America" (EMSA) Jalisco, Mexico (March 2015)

Note: EMSA – Estrategia Mesoamericana de Sustentabilidad Ambiental = Mesoamerican Strategy for Environmental Sustainability

Photo / Graphics / Images Credits: Luciano Capelli, Luis Diego Román, Lara Steil, CONAFOR, Mexico

Network Website and Link to the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html>



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The Regional South Asia Wildland Fire Network

Fire Situation, Fire Regimes and Impacts

Fire Situation:

- Almost all fires are human-induced
- Increased settlement-wildland interface problems
- Low fire management capabilities at local and national levels
- General perception of people in the region: Fire is the main cause of forest destruction and degradation
- High expectations from sustainable vegetation cover for livelihoods
- Large-scale land-use change involving burning of native vegetation in the tropics

Diverse ecosystems, socio-economic and cultural settings and forest types

Diverse fire regimes and vulnerabilities due to its geographical and climatic variability

Image Credit: NASA

Increasing occurrence of uncontrolled fires as a consequence of climate change and altered natural fire regimes

Photo Credit: INFRG

Increasing occurrence of extreme weather (droughts and precipitation) and fire severity

Increasing vulnerability to human populations, negative impacts in social, ecological systems and secondary disasters

Deterioration of watersheds in the Hindu Kush – Himalaya region and land-use patterns

Key Issues:

- Human resource development
- Funding for fire management activities
- Awareness raising
- Fire and climate change interaction
- Fire and REDD+ Mechanism
- Fire management and livelihoods of local communities

Photo Credit: P. Aarim

International / Regional Initiatives / Needs

Foundation of the UNISDR Regional South Asia Wildland Fire Network under the auspices of the Global Wildland Fire Network (GWFN), UN International Strategy for Disaster Reduction (UNISDR), the UNISDR Wildland Fire Advisory Group (WFAG) and its Secretariat, the Global Fire Monitoring Center (GFMC)



Objectives of the Network:

Enhance and strengthen cooperative resource mobilization in fire management for creating synergies and enabling environments, and sharing knowledge within a guiding framework by action on the ground – and mobilization of international awareness



Enhance existing national / regional capability in fire management, including early detection, monitoring, early warning, fire response and impact assessment with these partners:

UNISDR Global Wildland Fire Network, GFMC, FAO, ITTO, SAARC, ICIMOD, WWF, UNDP/UNEP, Global Observation of Forest and Land Cover Dynamics (GOF/GOLD) and AfCoCo



Enhance cooperation among countries within the region and at inter-regional levels, aimed at sharing technology, expertise and data exchange in fire management: Activation of the International Wildfire Preparedness Mechanism (IWPM)

UNISDR IWPM
International Wildfire Preparedness Mechanism

Integrate fire as a component of land use and forest management tool by giving emphasis on:

- Improvement of participatory / community-based fire management approaches and institutional and technological capabilities at all levels
- Building capacity to 'Wise Use of Fires' for habitat management and biodiversity conservation; and fuel management
- Promotion of education and awareness-raising programmes on wildland fires
- Support of countries to conduct national fire and fire management assessments, formulate legal frameworks and strategies, build sustainable fire management capabilities and institutions, develop fire management plans and human resources
- Development of policies, strategies and action plans aimed at building capacities in local, national and transboundary forest fire management





Regional Wildland Fire Networks: North America – Mesoamerica – South America – Caribbean – Mediterranean – Southeast Europe / Caucasus – Euro-Alpine – Near East – Sub-Saharan Africa – South Asia – Southeast Asia – Australasia – Northeast Asia – Central Asia – Eurasia

Regional Sub Sahara Network – West Africa Region

Introduction

Wildfire occurrence in West Africa is mostly associated with rural livelihood activities such as land preparation for crop production. Interventions to curb its occurrence has involved activities both at national and local scales in member countries. Local level activities has involved the building of capacity of local fire volunteers, stakeholder analysis to clarify roles and responsibilities of different stakeholders at all levels and the planting of trees at the periphery of fire prone-forest reserves in some member countries to serve as firebreaks. At the national level wildfire management manuals for staff of government institutions, national wildfire policies and strategies have been developed and operationalised. Manual and guidelines for community based fire management have been adopted by some countries as the blue print for successful fire management in the sub region. Though the fire regimes and sources of fire in most member countries are similar there is very limited opportunity for cross country information sharing on best practices and capacity building using regional experts. A sub regional focal point is needed to facilitate and coordinate collaboration among member countries.



A parade of trained fire volunteer squad



A canopy of Senna siamea fire break in a Forest Reserve in Ghana

Gaps in scientific knowledge and policy

- Inadequate scientific knowledge on fire behavior
- Lack of systematic efforts to collect weather data to assist in fire danger forecast
- Low capacity for fire monitoring and fire damage assessment
- Absence of legislation to back national wildfire policies

Way forward

- Establishment of a center for coordinating information sharing and best practices in wildfire management in the sub region
- Facilitate sub regional project development
- Create an electronic news letter to share information of events relating to fire management in the sub region
- Standardize fire information reporting in the sub region

Way forward

- Facilitate the recruitment and training of young fire volunteer squads and provision of fire fighting tools
- Facilitate the development of fire prevention materials based on the context of each member country



Fire use in land preparation for farming



A parade of trained fire volunteers with an officer from a National Fire Service

Community-based activities

- Training of community fire volunteers who form a network for early fire detection and suppression
- Community involvement in finding alternatives to the use of fire in agriculture
- Determination of roles and responsibilities of stakeholders in fire management
- Planting of trees (as fire breaks) at the periphery (40m from forest boundary) of fire prone forest reserves in some member countries



Community discussion on the alternatives to the use of fire in farming.



Identified stakeholders by a community in a stakeholder analysis



Award system to encourage members of fire volunteer squad



Fire management strategies in member countries

- Fire management manual for government institutions (e.g. Ghana)
- Community based fire management guidelines and manuals (e.g. Ghana)
- National Wildfire Management policy (e.g. Ghana)
- National Strategy on fire management and associated action plans (e.g. Burkina Faso)
- Use of incentives (award system in some districts in Ghana)
- Institutionalization of green fire break establishment around fire-prone forests



Wildfire Management Manuals and National Policy Documents

Photo / Graphics / Images Credits: Lucy Amisshah and Richard Kuutah Ninnoni

Network Website and Link to the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html>



The Global Wildland Fire Network

United Nations International Strategy for Disaster Reduction (UNISDR)



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REGIONAL MEDITERRANEAN NETWORK (SILVA MEDITERRANEA NETWORK)

Between the 5th and the 6th International Wildland Fire Conferences the following initiatives have continued and taken place:

European Forest Fire Information System (EFFIS)- European Commission

The extension of EFFIS to all Mediterranean countries, members and non members of the European Union has continued. Improvements in information sharing and standardization of data have been developed. This platform is an excellent tool for all countries in the Region in order to be aware of the wildfire situation in the past, present and possible future.



European Union Civil Protection Mechanism – European Commission

With the objective of civil population protection this mechanism supports all countries facing disaster and emergency situations such as wildfires. In the Mediterranean Region supporting wildfire suppression is one of its main roles. Many field exercises, training and exchange of resources are channelled through the mechanism structure.



1st Euromediterranean Conferences on Wildfires (18-20 November 2013, Barcelona, Spain)

Born with the intention of establishing a meeting point between the operative wildfire community, the university researchers and the society with the aim of trying to find a reply to our common needs. Based on the promotion of a continuous learning culture focusing on safety and effectiveness within our wildfire community.



VII International Conference on Forest Fire Research (17-20 November 2014, Coimbra, Portugal)

The Conference is organized every 4 years since 1990, bringing together scientists from all around the world to present and discuss advances on Forest Fires related research topics. A short course on fire safety and a short course on fire behaviour took place as side events.



Aerial Fire Fighting Europe (AFF) (29-30 April 2015, Zadar, Croatia)

Aerial Firefighting Conferences take place every year. On this particular event one of the objectives was to focus global attention on wildfire aerial response in Eastern Europe. Live demonstrations and Presentation of the Walt Darren Award to Colonel Bodino (France) for his merits in safe, effective and efficient aerial firefighting were part of the Conference.



1st International Workshop on Large Forest Fires and Field Exercise (19-21 May, 2015, Olympia, Greece)

The workshop was organized with the aim to improve capacity building, based on exchange of experiences and expertise. Several field visits and simulations, including a settlement evacuation, took place.



II International Conference on Fire Behaviour and Risk (26-29 May 2015, Alghero, Sardinia, Italy)

The Conference involved scientists, researchers and policy makers whose activities were focused on different aspects of fires and their impacts such as Fire Behaviour and Risk, Modeling and Monitoring fuel characteristics and fires, Fire Management and Climate and Fires.



Photo / Graphics / Images Credits: GFMC Conference and events webpage, European Union Civil Protection Mechanism and European Forest Fire Information System.

Network Website and Link to the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html>



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Sub-Regional Euro-Alpine Wildland Fire Network

Wildfires in the European Alpine region

- Fire behaviour – heterogeneity of landscapes and cultures
- Fire weather – different meteorological gradients (continental, vertical – altitudinal zones), winter / spring
- Role of tourism and anthropogenic factors will increase
- Frequency of lightning-induced fires might increase
- Changed forest management has effects on fuel (extensive, near to nature; natural hazards windthrows/bark beetle)
- Lack of „fire management culture“
- Difficult terrain for fire suppression activities
- No common framework for fire danger assessment

Origin and Scope

Wildfires in mountain ecosystems: the social and economic implications of changing fire risk and potential scenarios are set in accordance with a sustainable development.

ALP FFIRS network: Continue with international Euro-Alpine Network from 2012 onwards. Coordination of Fire Management in Alps, 14.04.2012

Euro-Alpine database of forest fires

Recorded parameter:

- coordinates
- ignition cause
- altitude
- Aspect
- Vegetation type
- size

Field activities: a geographical view

Schwarzsach (GER), Hermering (AUT), La Motta (ITA), Targona (ITA), Gaisma (CH), Gaviorno (ITA), Velche (BUL), Chisnovea (ITA)

ALP FFIRS Warning System

Region: Alpine
Fire: Fire
Risk: High
Status: Active
Start date: 01/01/2012
For more info: see the link in the top right corner of the map

Basic Research

- Fire behaviour and fire intensity (fuel, weather, fuel mapping, physical models, ground experiments)
- Training and academic/professional exchange
- Operational procedures and tools development, prevention
- Decision Support Systems and Early Warning Systems
- Link between research and operational management
- Fire mapping
- Socio-economic factors for fire ignition
- Fire danger and risk assessment

Forest Fires in the Alps

Evaluation of fire potential in climate scenarios

Shift of the FFMIC between the periods 1991-2010 and 2031-2050

median (top) and 90th percentile (bottom) of the FFMIC

- Strong temperature increase in the Alps since 1950 (about +1K)
- No significant trend of mean precipitation; slight increase of precipitation days north; decrease south of the Alps
- Distinctive trend towards more days with very high fire danger south of the Alps
- Slight increase of mean forest fire danger north of the Alps; no signal in the Alps; strong increase south of the Alps
- Only small differences between 6 fire weather indices

MANFRED Fire Atlas

Documentation of Case studies

definition and documentation of procedures among partners

Procedures operate per the agreement of the partners: University of Applied Sciences FH St. Gallen, University of Applied Sciences FH Nordwestschweiz, University of Applied Sciences FH Basel, Alps in focus and the Institute of Forest Fire Management, University of Applied Sciences FH St. Gallen, University of Applied Sciences FH Nordwestschweiz, University of Applied Sciences FH Basel, Alps in focus and the Institute of Forest Fire Management.

Contact regional Euro-Alpine Networks

Harald Vacik: Institute of Forest and Soil Sciences (IFSS) - University of Natural Resources and Life Sciences, Vienna
Marco Conedera: Head of Research Unit Ecosystem Restoration, Swiss Federal Research Institute WSL
Eva Valsecchi: IFSS - Faculty of Forest Sciences, University of Applied Sciences FH St. Gallen

MISSION and OBJECTIVES

- Get people involved in common activities (permanent change of leading role)
- Plan and conduct cross-border exercises and workshops (e.g. prescribed burning workshops, fire fighting exercises)
- Update common terminology and glossary
- Regular update of fire date base
- Collect case studies for different fire intensities
- Run the Alpine Forest Fire Warning System (daily alert, notes and regular newsletter)

Photo / Graphics / Images Credits: Harald Vacik, Eva Valsecchi, Clemens Wastl, Marco Conedera
Network Website and Link to the Sub-Regional Euro-Alpine Wildland Fire Network:
<http://www.fire.uni-freiburg.de/GlobalNetworks/EuroAlpine/EuroAlpine.html>



The GOFC-GOLD Fire Regional Networks Global Observation on Forest and Land Cover Dynamics

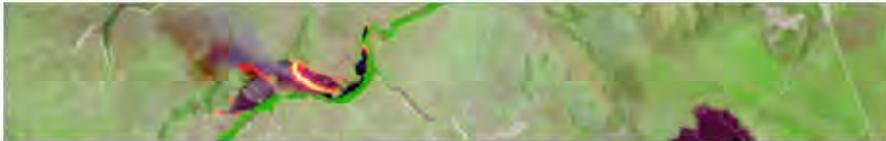


RedLaTIF – The Wildland Fire Remote Sensing Network: Recent Activities

The regional networks provide a forum for users and researchers operating in (or with an interest in) a common geographic area, and represent a link between national agencies and user groups and the global user/producer community. They provide a mechanism for sharing of resources and expertise, and perform an essential cross-cutting role in the implementation and integration of the thematic components of GOFC-GOLD.



RedLaTIF – the satellite remote sensing network addressing wildland fires in Latin America, was established in 2002 as a regional contributor to the GTOS panel GOFC-GOLD (Global Observation of Forest and Land Cover Dynamics). GOFC-GOLD coordinates international efforts to provide space-based and in-situ observations of forests and other vegetation cover for the sustainable management of terrestrial resources and to obtain an accurate, reliable, quantitative understanding of the terrestrial carbon budget.



Its activities have included regional projects with countries in Latin America and the Caribbean to integrate and validate vegetation fire data from remote sensing satellite imagery, publication of papers in journals and conferences, participation in international meetings, and submission of projects to financing institutions. The coordination shifts among the participating countries and after turns in Argentina and Mexico, since late 2012 is based at INPE, in Brazil.

Main current activities include a web-based portal to assist users in their access to different international sources of near-real time satellite fire monitoring data, with a unique regional option to define customized products and reports operationally provided by INPE's *Queimadas* program - see <http://www.redlatif.org/pt/datos>

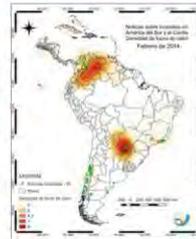
A data base of media news related to forest fires published since 2014 in Latin America has been created with a double purpose: to evaluate the interest of the press in the subject of forest fires in the region, and to assess the effectiveness of satellite fire monitoring based on the media reports of fire occurrences. Results presented in tables, graphs and maps can be found at <http://www.redlatif.org/pt/noticias>



The Global Wildland Fire Network (GWFN) is a sister network of the GOFC-GOLD Fire Regional Networks and is coordinated by the Global Fire Monitoring Center (GFMC). The GWFN and GFMC are active in sharing fire management expertise under the International Wildfire Preparedness Mechanism



<http://www.fire.uni-freiburg.de/iwpm/index.htm>



Studies are currently being conducted to validate regional burned area products distributed by agencies of global monitoring, and also to evaluate and improve INPE's maps of Fire Risk numerical estimates and forecasts; results of a recent cooperation with FAN/Bolivia along those lines resulted in a few scientific papers in international remote sensing conferences; similar initiatives with other countries are being prepared.

A RedLaTIF technical workshop is planned for November/2015 at INPE to gather operational producers of active fire detection and burned area estimates with their regional users. The objective is to promote a hands-on validation of the data through the analyses of real events in the participant's countries to generate comparable sets of fire data and fire impact in the vegetation; a publication describing the results is also planned. Support for this RedLaTIF event is from GOFC-GOLD, NOAA, START, and INPE.

Network Website and Link to the GOFC-GOLD Fire Regional Network: <http://www.redlatif.org>

Network Website and Link to the Global Wildland Fire Network: <http://www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html>



The GOFC-GOLD Fire Regional Networks
Global Observation on Forest and Land Cover Dynamics



Southern African Fire Network – SAFNet in 2015

GOFC/GOLD – Fire Implementation Team Objectives

- Increased user awareness of EO fire data
- Data and Service Continuity and Long-Term fire data records
- Establishment of a geostationary global fire network
- Operational polar orbiters with adequate fire monitoring capability
- Routine Assessment of Fire Product Accuracy and Quality
- Global Fire Early Warning Systems operational products
- Use of EO in fire emissions product suites
- Improved fire data and information access
- Enhanced user products and services
- Experimental fire observing systems and related research

The principal role of GOFC/GOLD is to act as a coordinating mechanism for national and regional activities. To achieve its goals GOFC/GOLD has developed a number of regional networks across the world. Regional networks are expected to cater the regional users needs and foster lateral transfer of technology and methods within and between regions relating to Fire activities. Regional network issues:

- Capacity building,
- Data accessibility
- Regional validations
- Training workshops

Objectives of SAFNet

- To enhance the use of validated remote sensing products for operational fire management and fire science,
- To promote a forum for informed communication of recent fire science and satellite based fire products,
- To communicate national and regional fire management and research needs at international level,
- To collate & disseminate regional fire information, data and best practices for field observations,
- To develop and maintain links to existing fire and other natural resource and land use management networks.

SAFNet Focal Areas

- Provision of satellite based fire products
- National to Regional scale systematic fire monitoring in support of fire management and fire science
- Remote sensing based capacity building and training
- Validation of new satellite fire products
- Support national and regional fire policy development

Global Wildland Fire Network

The Global Wildland Fire Network (GWFN) is a sister network of the GOFC-GOLD Fire Regional Networks and is coordinated by the Global Fire Monitoring Center (GFMC). The GWFN and GFMC are active in sharing fire management expertise under the International Wildfire Preparedness Mechanism

<http://www.fire.uni-freiburg.de/wfn/index.htm>

Satellite Fire Data Validation - Field Campaign – Kruger National Park

High resolution fire remote sensing with FireBird (G. Ruecker, O. Frauenberger and E. Lorenz)

To refine and test satellite algorithms (fire detection, FRP) and derived applications to serve the broader fire community. Focused on testing the performance of the German TET-1 satellite for retrieving the fire characteristics.



Photograph (left) of fire at Shabeni plot, shortly after TET-1 overpass, (right) TET-1 satellite image (FRP of fire detections in yellow, background: midwave-IR channel, National park boundary in green, plot outlines of Shabeni plot string in blue)



Georeferenced helicopter camera images: left: NIR image of Shabeni plot 3 fire burning at peak intensity, right: Midwave IR of the fire burning at peak intensity (background: high resolution aerial photograph)

Burn Plot Field Measurements & Protocols (M. Wooster, R. Paugam, M. De Jong, B. Main and A. Turbelin)

Validate Satellite Measurement of FRP & to fuel consumption
Simulate the scene as recorded by the MIR camera in the helicopter and also by the overpassing satellites

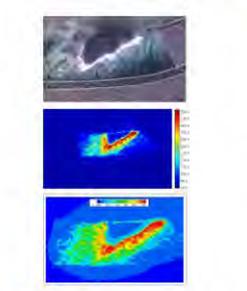
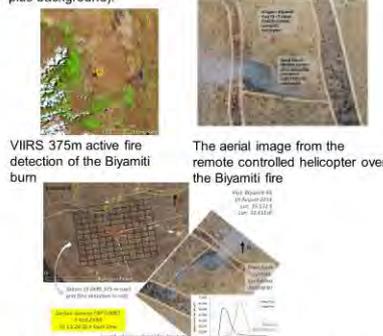


Image from Shabeni burn at peak intensity, from top to bottom: Near IR, LWIR (K), MIR (K) images. Brightness temperature are in Kelvin.

Coordination of field and satellite active fire observations: A description of methods and tools applied to the new VIIRS dataset (W. Schroeder, L. Giglio and E. Ellicott)

The goal was to validate the satellite fire retrievals using the coincident reference data sets together with appropriate scaling analyses (ranging from point measurements (<10m2, tower-mounted radiometers), to plot-wide measurements (e.g. cameras onboard manned helicopter), to landscape-scale (fire plus background).



Radiant heat fluxes estimated for back and head fire for the burn at plot Biyamiti 5 (left panel), and total fire energy release estimates as a function of fuel load based on 9 different plots including annual and bi-annual burns.

Development of a SADC Integrated Fire Management and Community-Based Fire Management Curriculum

The concept of Integrated Fire Management (IFM) is a holistic framework for managing fires in the various ecosystem types while providing associated co-benefits for local communities and sustained ecosystem services. The SADC project on Transboundary Use and Protection of Natural Resources developed in partnership a curriculum for IFM and Community-Based Fire Management (CBFM) to bring together the various, often disjointed, elements and information existing. The curricula aim at natural resource managers and extensionists.

KEY elements of IFM

- Prevention (Risk Reduction)
- Preparedness (Readiness)
- Suppression (Response)
- Restoration (Recovery)
- Research and Analysis

The two curricula were developed in an iterative process through 3 partner workshops in 2013, 2014 and 2015 at the Mweka Wildlife College. A 30-day practical fire management training program was conducted in South Africa in Sep 2014. In March 2015 the two curricula were piloted as a 2-week fire management training in Tanzania.



There are numerous plans under way for both the integration of the modules developed into existing courses and the development of the modules as short courses. In the case of the short courses a number of partnerships have already been formed or plans being made for partnering.

GLTP Transboundary Fire Mgt. Project Kruger and Limpopo National Park

Fire management within the GLTP can be described as two very different strategies

KNP	LNP
Very structured and intensive fire management	Unstructured or hands off approach
Command and control	Lazier fair
Long history of fire research (>60yrs)	Fire research <5 yrs
Limited number of people	More than 7500 people
Ecological tool	Sustains livelihoods and ecological tool

Project Objectives

- Determine the fire regime characteristics for the GLTP
- Determine the consequences on biodiversity
- Develop an operational FM strategy for LNP
- Implications for FM in LNP and KNP

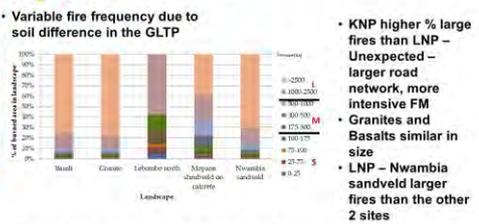
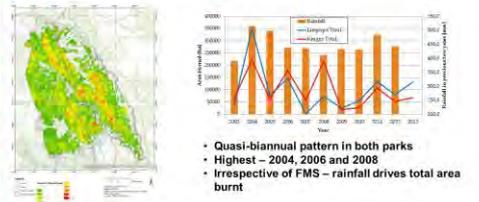


Photo / Graphics / Images Credits: Navashni Govender, Anja Hoffmann, Les Ashley, Zebris, Nokukhanya Mpanza, Martin Wooster, Wilfrid Schroeder

Network Website and Link to GOFC-GOLD Fire: <http://gofc-fire.umd.edu/> and SAFNet <http://safnet.meraka.org.za>

Network Website and Link to the Global Wildland Fire Network: www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html



2015 세계산불총회
INTERNATIONAL
WILDLAND FIRE CONFERENCE
PYEONGCHANG, KOREA

CONFERENCE NEWS

VOLUME NO.1 TUESDAY 13 OCTOBER 2015

Fire of the Past, Fire of Future

The 6th International Wildland Fire Conference: the First in Asia!



The 6th IWFC officially kicked off yesterday with participants from around the world. The very first conference to be held in Asia attracted interests of both domestic and international organizations. At the Exhibition Hall, the official opening of the exhibition was held in presence of invited guests and local people from Gangwon Province. The opening ceremony started off with welcome remarks from the Minister of Korea Forest Service. In his statement, Minister Shin called for strengthened international cooperation. The humorous governor of Gangwon

Province delivered welcome remarks. Now, everyone knows it's PYEONGCHANG, not Pyeongyang! The Secretary-General of the United Nations sent a welcome message emphasizing the importance of wildland fire management in achieving the newly adopted Sustainable Management Goals (SDGs). The Prime Minister of the Republic of Korea and the UNISDR also conveyed their congratulatory messages. After an array of speeches, participants enjoyed an energetic, powerful performance of the Painters Hero.





2015 세계산불총회
INTERNATIONAL
WILDLAND FIRE CONFERENCE
PYEONGCHANG, KOREA

CONFERENCE NEWS

VOLUME NO.2 WEDNESDAY 14 OCTOBER 2015

International Arena of Knowledge Sharing Experience and Expertise



Opening the second day of the 6th IWFC, plenary sessions were held to shed light on the dynamics between wildland fire and humankind. The first plenary session on “Legacy of Fire” started early in the morning and was moderated by Brett Shields, Asia Pacific Team Director of Spatial Informatics Group. The first keynote speaker, Stephen J. Pyne, Regents Professor at Arizona State University, elaborated on the long history of fire and its relationship with humanity. He particularly provided profound explanation on how the meaning of fire has changed through time and that we should properly understand the relationship to cope with fire by diverting efforts to restore good fire into actions against bad fire. Next, based on his 40 years of study on fire in African Grasslands and Savannas, Winston S.W. Trollope, Research Adviser of the Working on Fire in

South Africa, took the podium to send a strong message that **fire can be a bad master, but a good servant**. During the following Q&A session, it was highlighted that fire needs to be controlled particularly considering the social, cultural, and biological conditions of each region.

The second plenary session was moderated by Mr. Sang Man Jeong, President of the Korean Society of Hazard Mitigation. Dr. Sarah McCaffrey started the session with her presentation, **Understanding the Social Dynamics of Fire Management: a review of social science research since 2000**. She stressed that communities are key part of fire adaptation and we all need to be cautious of ‘imagined public’. Her findings also revealed that three influential dynamics are Knowledge, Trust, and Interactive communication. She was followed by Mr. Pieter van Lierop of FAO. His presentation was on **Challenges for Community-based Fire Management (CBFiM)**. Among challenges he highlighted, one of them was financing CBFiM. In order to get investment in CBFiM, the economic costs and benefits need to be quantified and demonstrated. The last presentation was by Joseph C. Kreidi of UNESCO on **Wildfire Threats and Fire Management in UNESCO World Heritage**. He mentioned that not only World Heritage Sites, but also wooden heritage structures can be put in danger of wildland fire, giving an example of the loss of Naksan Temple in Yang Yang in 2005.





2015 세계산불총회
INTERNATIONAL
WILDLAND FIRE CONFERENCE
PYEONGCHANG, KOREA

CONFERENCE NEWS

VOLUME NO.3 THURSDAY 15 OCTOBER 2015

Experience is the Teacher of All Things!



Yesterday morning, the Korea Forest Service demonstrated its Aerial Fire Suppression System. Conference participants enjoyed formation flying of eight helicopters. The demonstration was attended by more than 1,000 forest fire experts from a number of government ministries and organizations from the Ministry of Public Safety and Security to the Korea National Police Agency. Under the scenario of large

wildland fire set off in Pyeongchang, total 13 helicopters and two fixed-wing aircraft of the Korea Forest Service, the Ministry of Public Safety and Security, the Korea National Police Agency, and the Republic of Korea Air Force were mobilized to control the fire. In addition to aerial fire suppression, 300 fire fighters demonstrated on ground suppression utilizing Korea's advanced Information and Communication Technology(ICT).





2015 세계산불총회
INTERNATIONAL
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PYEONGCHANG, KOREA

CONFERENCE NEWS

VOLUME NO.4 FRIDAY 16 OCTOBER 2015

Bringing Regions Together Demand for Stronger International Cooperation



Led by Dr. Johann Georg Goldammer, at the Global Wildland Fire Network Session, chairs of five sessions delivered outcomes and recommendations of each regional session. Some of the key points raised by multiple regions were enhancing international cooperation, promoting community participation, financing fire management, and integrating fire management in climate change issue. The chair of Mediterranean and Near East Cluster, Elena

Hernandez from Forest Fires Service of Spain stressed that educating and raising awareness of politicians, public and media is crucial in wildfire management. Dr. Johann Georg Goldammer urged governments to take all necessary measures to develop integrated fire management concepts and put in place capabilities to manage fire at landscape level. After reports from each regional cluster, results of side events were shared with participants.

Engaging Our Youth Future of the International Wildland Fire Management



For the first time in the International Wildland Fire Conference history, the 6th IWFC has invited 18 teams of students from 12 countries to present their theses at the Youth Program. From forest fire risk assessment dynamics of silvopasture, interesting studies were shared at the program. Four teams will be recognized and awarded at the closing ceremony.

Youth Interview

“I was a bit nervous to present at an international event for the first time; however, it has been a memorable experience great opportunity for me.” – Jae-hee Lee (Republic of Korea)

“It was a great opportunity to meet my peers from different countries and peer review our papers.” – Mina Jang (Republic of Korea)

“This is my first time to be abroad. I felt nervous and was worried. But this was a great opportunity. I learned about many researches of other students.” – Libo Zhang (China)

Newsletter 13 Oct

Newsletter 14 Oct

Newsletter 15 Oct

Newsletter 16 Oct

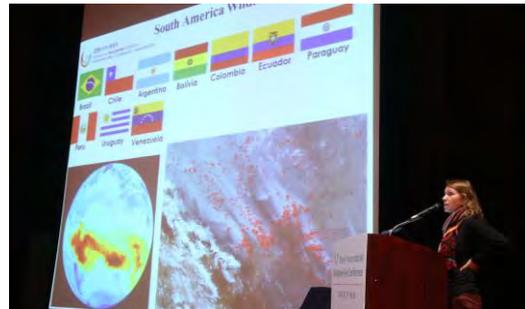
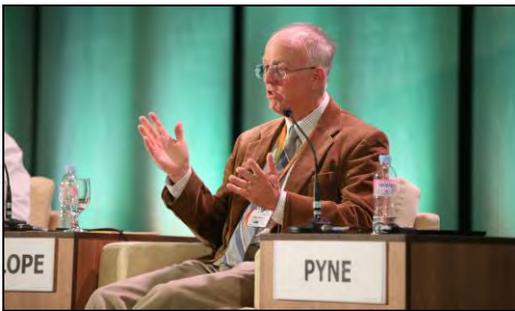
6th International Wildland Fire Conference Photo Gallery



Opening remarks by the Minister of Korea Forest Service, Mr. Shin Won Sop, the Governor of Gangwon Province, Mr. Choi Moon-Soon, United Nations Secretary General, Mr. Ban Ki-moon, Mr. Johann Georg Goldammer, Global Fire Monitoring Center (GFMC), and Mr. Tom Harbour, U.S. Forest Service.



Opening Ceremony



Vivid presentations and discussions by keynote speakers and panelists



IWFC-6 provided an opportunity for recognizing the merits of the community of scientists and practitioners



Representatives and discussants from the continents included Southeast Asia (Viet Nam, Malaysia), East Asia (Korea), North America (the United States of America), Australia and Africa (Ghana)



The conference provided an opportunity for organizing side events such as the Korea-Philippines Forest Cooperation Committee