2015 세계산불총회
International
Wildland Fire Conference
KOREA

Fire Management in Protected Areas: A Side Event of GFMC, Council of Europe, OSCE and UNESCO

Pyeongchang, Republic of Korea, 13 October 2015

AGENDA

Chair: Johann Georg Goldammer (Global Fire Monitoring Center – GFMC / Specialized Center operating under the Council of Europe, EUR-OPA Major Hazards Agreement, and partner organization for fire management projects of OSCE and UNESCO)

Co-Chair: Josef Kreidi (UNESCO Regional Bureau, Beirut, Lebanon)

1. Introductory remarks
Johann Georg Goldammer (GFMC) and Josef Kreidi (UNESCO)

2. Brief Summary Reports on Fire Management in Protected Areas

- Wildfire Threats and Fire Management of UNESCO World Heritage Sites in Member States of the Council of Europe: A Regional Survey (Esteban Beltran, Oyunsanaa Byambasuren, Ioannis Mitsopoulos and Johann Georg Goldammer)
- Wildfire Risk Assessment in the UNESCO World Heritage Site Mount Athos, Greece (Ioannis Mitsopoulos, Giorgos Mallinis, Esteban Beltran and Johann Georg Goldammer)
- Fire Management in Protected Areas of Mongolia (Oyunsanaa Byambasuren, Johann Georg Goldammer and Enkhmandal Orsoo)
- Wildfire Threats and Fire Management in Protected Areas in Europe Contaminated by Radioactivity (Sergiy Zibtsev, Johann Georg Goldammer, Valeriy Kashparov, Stephan Robinson, Olexandr Borsuk)
- Fire Management in Protected Areas in Europe Contaminated by Unexploded Ordnance: Experiences Gained at the Heidehof-Golmberg Nature Reserve, Brandenburg, Germany (Johann Georg Goldammer, Frank Meyer, Egbert Brunn, Birgit Paul and Joachim Schulz)
- Wildfire Threats and Fire Management of UNESCO World Heritage Sites: A Global Survey (Johann Georg Goldammer, Esteban Beltran, Oyunsanaa Byambasuren, and Ioannis Mitsopoulos)

3. Discussion: Suggestions for inputs to the Conference Statement

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BACKGROUND

Many ecosystems, natural and cultural landscapes, which are now under a protection regime, have evolved under natural fire regimes or under cultural activities that have included fire as a traditional tool for land management. Fire is one of the potential factors that may contribute to maintain or to disturb protected areas. However, as a consequence of climate change the frequency and duration of extremely dry weather episodes, as well as uncontrolled human interventions by land-use, land-use change or tourism, those areas that were neither subjected nor adapted to fire are becoming increasingly vulnerable. These protected areas include registered UNESCO World Heritage Natural Properties in which unprecedented wildfire threats are putting at risk the legacy of natural evolution or the heritage of cultural history and traditions. The Side Event will be convened by the GFMC, the Council of Europe “EUR-OPA Major Hazards Agreement”, UNESCO World Heritage Center the Organization for Security and Cooperation in Europe (OSCE).

OSCE UNESCO

Wildfire Threats and Fire Management of UNESCO World Heritage Sites in Member States of the Council of Europe: A Regional Survey

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Abstract

Many ecosystems, natural and cultural landscapes, which are now under a protection regime, have evolved under natural fire regimes or under cultural activities that have included fire as a traditional tool for land management. Fire is one of the potential factors that may contribute to maintain or to disturb protected areas. However, as a consequence of climate change the frequency and duration of extremely dry weather episodes, as well as uncontrolled human interventions, those areas that historically had been neither subjected nor adapted to fire are becoming increasingly vulnerable. These protected areas include registered UNESCO World Heritage Natural Sites in which unprecedented wildfire threats are putting at risk the legacy of natural evolution or the legacy of cultural history and traditions.

The objective of this study, conducted by the Global Fire Monitoring Center (GFMC), was to identify current wildfire threats, fire incidents and management implications in UNESCO World Heritage Sites in the Member States of the Council of Europe who are signatory parties of the European and Mediterranean Major Hazards Agreement (EUR-OPA) by thoroughly screening regional reports on wildland fires and other online sources that provide examples of the critical fire protection situation in World Heritage Sites. The approach to classify the protected areas was based on their fire regime characteristics (available fuels, flammability, ignitions, and fire spread conditions within a given ecosystem) and divided into four main fire regimes. ***Fire independent***: sites that naturally lack the conditions to support fire as a factor for evolution; ***fire dependent*** or ***fire adapted:*** sites where species and processes have evolved with fire; ***fire sensitive:*** sites with ecosystems adapted to fire where an inappropriate introduction of fire may cause negative impacts; ***potentially threatened:*** sites that have not evolved in the presence of fire, but if confronted with extreme fire condition could receive negative impacts.

Out of 433 World Heritage Sites for 45 EUR-OPA Member States, divided in 383 cultural, 41 natural and 9 mixed sites have been inventoried. Overall, 55 WHS had experienced or been threatened by wildfires, 27 of them are Cultural sites, 24 Natural sites and 4 mixed sites. The methodology and results of this inventory may serve future assessments in other regions and allow the development of recommendations for fire management in protected areas. The research has been funded by the Council of Europe under the frame of the European and Mediterranean Major Hazards Agreement (EUR-OPA).

Key words: *UNESCO World Heritage Sites, wildfire risk, landscape management, fire-dependent ecosystems, fire-independent ecosystems, fire-sensitive ecosystems, fire-adapted ecosystems, European and Mediterranean Major Hazards Agreement (EUR-OPA), Global Fire Monitoring Center (GFMC)*

Wildfire Risk Assessment in the UNESCO World Heritage Site Mount Athos, Greece

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Abstract

Fire management implications in terms of fuel management on fire prone landscapes within the UNESCO World Heritage Sites require the application of wildfire risk assessment at landscape level. The objective of this study was to analyze the spatial variation of wildfire risk on Holy Mount Athos in Greece, which is one of the UNESCO World Heritage Sites in the Member States of the Council of Europe who are signatory parties of the European and Mediterranean Major Hazards Agreement (EUR-OPA).

The area includes twenty monasteries and more than 700 sketes, houses, cells and hermitages that are threatened by increasing frequency of wildfires. The Minimum Travel Time (MTT) algorithm, as it is embedded in FlamMap software was applied in order to evaluate: Burn Probability (BP), Conditional Flame Length (CFL), Fire Size (FS) and Source- Sink Ratio (SSR) under normal summer weather and fuel moisture scenario. Furthermore, ArcFuels software was utilized to estimate the wildfire risk exposure and expected Net Value Change (NVC) of the UNESCO protected structures found in the area. Site specific fuel models of the study area were created by measuring in the field fuel parameters in representative natural fuel complexes, while the spatial extent of the high value monastery structures and fuel models was determined using a RapidEye very high resolution image. The results revealed high wildfire potential in dense shrubland areas and low burn probability for the monasteries; however eight out of the 20 monasteries of the site, are in high potential, which means that if an ignition occurs, intense fire is expected. The outputs of this study may be used for decision making for short-term predictions of wildfire risk at operational level, contributing to fire suppression and management in the UNESCO World Heritage Sites.

The research has been funded by the Council of Europe under the frame of the European and Mediterranean Major Hazards Agreement (EUR-OPA).

Key words: *Wildfire risk, landscape fire modeling, fine-scale fuel mapping, very high resolution imagery, RapidEye, UNESCO World Heritage Site, Greece, Council of Europe, European and Mediterranean Major Hazards Agreement (EUR-OPA), Global Fire Monitoring Center (GFMC)*

Fire Management in Protected Areas of Mongolia

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Abstract

The Central Asian region including Mongolia for the last several decades is experiencing an increase in occurrence, area burnt and environmental impacts caused by wildland fires. In Mongolia the damages caused by wildfires, as well as their influence on human health and wellbeing, are increasing. The negative effects of wildfires have increased in Protected Areas (PA), demanding a detailed assessment and better management efforts to address the problem. Mongolia has 87 protected areas, which cover 17.4% of the total land territory (156 million ha).

The objective of this study was to evaluate current wildfire threats, fire management implications in Mongolian protected areas. The approach to classify the protected areas was based on their fire regime characteristics (available fuels, flammability, ignitions, and fire spread conditions within a given ecosystem) and divided into four main fire regimes. *Fire independent*: sites that naturally lack the conditions to support fire as a factor for evolution; *fire dependent* or *fire adapted*: sites where species and processes have evolved with fire; *fire sensitive*: sites with ecosystems adapted to fire where an inappropriate introduction of fire may cause negative impacts; *potentially threatened*: sites that have not evolved in the presence of fire, but if confronted with extreme fire condition could receive negative impacts.

Out of 87 Protected Areas of Mongolia, which are organized in 99 management units, 20 PA are classified as Strictly Protected Areas (SPA), 33 Nature Conservation Areas (NCA), 32 Natural Reserves (NR) and 14 Cultural Sites (CS). Overall, 35 PA had experienced or been threatened by wildfires, 5 of them are Cultural Sites, 30 Natural Reserves. By looking at their management plans, none of them has particular fire management plan. In May 2015 a fire assessment mission has been conducted in Eastern Mongolia with the support of the Global Fire Monitoring Center (GFMC) and the Organization for Security and Cooperation in Europe (OSCE). The spring fires in Eastern Mongolia affected more than 4 million hectares (ha) of steppe and forest lands. Three people were severely injured, over 40 local Gers (homes) destroyed and several thousand livestock killed. Larger part of Tosonkhulstai Nature Reserve and the Onon-balj Protected Area has been severely affected by this fire.

This primary research suggests that in the management plans of the Protected Areas explicitly include prevention and mitigation measures that target the particular fire threats faced by each area. Also, detailed research on fire threat by specific protected areas necessary to develop better management plan.

Key words: *Mongolia, wildfire risk, landscape management, fire-dependent ecosystems, fire-independent ecosystems, fire-sensitive ecosystems, fire-adapted ecosystems, fire management, Global Fire Monitoring Center (GFMC), Organization for Security and Cooperation in Europe (OSCE)*

Wildfire Threats and Fire Management in Protected Areas in Europe Contaminated by Radioactivity

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Abstract

Fires burning in environments contaminated by radioactivity create additional, non-standard risks to firefighters and may have negative health impacts on the firefighters and local populations. This refers particularly to the region which was contaminated by radioactivity as a consequence of the failure of Chernobyl Nuclear Power Plant in 1986. In 2014 the Organization for Security and Cooperation in Europe (OSCE) commissioned the Global Fire Monitoring Center (GFMC), the Ukrainian Institute of Agricultural Radiology and the Regional Eastern European Fire Monitoring Center (REEFMC) of the National University of Life and Environmental Sciences of Ukraine, and Green Cross Switzerland to identify and review special fire management measures, notably means for the personal protection of firefighters, for safe fire suppression in the abovementioned contaminated environments. The study provides a state-of-the-art compilation of best practices and guidelines on fire suppression in contaminated terrain and an analysis of the radioactive dose estimate during fire spread and assessment of best practices to reduce radiation exposure during firefighting and development of recommendations for personal safety. It is concluded that wildfire control on contaminated terrain is extremely dangerous and difficult. This is why investments need to be prioritized to provide appropriate equipment and increase preparedness and capabilities for safe and efficient wildfire control in order to reduce primary and secondary risks to firefighters and civilian populations. The recommendations of the study include:

- Special fire management measures, personal protection means and tactics as well as appropriate health and environmental monitoring services should be identified, adapted and used for safe fire suppression in abovementioned environments.
- Plans for the reduction of wildfire hazard and fuel management (management of combustible materials) are needed in the zones with low level of contamination.
- Fire service personnel in areas with nuclear contamination hazards should be properly trained and equipped to fight fires and understand these non-standard risks.
- For all types of contaminated terrain the early detection, monitoring and control of fires requires advanced solutions that would reduce the onsite operation and presence by humans. Remote sensing for the early detection of fires (ground-based automated and autonomously operating equipment for the rapid detection of vegetation fire smoke or heat) and unmanned, remotely controlled or autonomously operating ground vehicles or airborne systems provide reduction of health risks, injuries or fatalities to firefighters.

The establishment of the REEFMC has been funded by the GFMC and the Council of Europe under the frame of the European and Mediterranean Major Hazards Agreement (EUR-OPA).

Key words: *Protected areas, radioactivity, fire management, unmanned fire detection, Chernobyl Exclusion Zone, Ukraine, GFMC, European and Mediterranean Major Hazards Agreement (EUR-OPA), Organization for Security and Cooperation in Europe (OSCE)*

Fire Management in Protected Areas in Europe Contaminated by Unexploded Ordnance: Experiences Gained at the Heidehof-Golmberg Nature Reserve, Brandenburg, Germany

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Abstract

Military training ranges in Germany, some of them in use for more than a century, have been subjected to mechanical disturbances as consequence of movements of military vehicles and tanks, and the direct and indirect impacts of artillery shooting and bombing exercises, often associated with wildfires started by explosive ordnance. Since other land-use was largely banned in those military grounds the combination of disturbances with the absence of pesticides, fertilizers, agricultural crops or reforestation activities have resulted in the formation of open land ecosystems, in which natural succession was halted, often associated with impoverishment of soil nutrient status. These training ranges provide habitats and refugia for endangered species and open land ecosystems. A total of 650 000 hectares (ha) of active and abandoned military exercise and shooting ranges in Germany have a high conservation value. Abandoned or reduced disturbances by military training have resulted in plant succession towards forest formation, resulting in losses of habitats for endangered species and open-land ecosystems, notably the *Calluna vulgaris* heathlands. In some areas the desired effects of meanwhile abandoned military activities and wildfires are substituted by targeted grazing, mechanical treatment or prescribed fire. However, within Germany a total area of about 250 000 ha of high-conservation value is contaminated with unexploded ordnance (UXO). While grazing alone cannot maintain openness in all cases, mechanical treatment and prescribed burning cannot be considered as complementary measures due to the threat of UXO explosions. A concept has been developed by a pilot project in the Heidehof-Golmberg conservation area, an abandoned military training range in Brandenburg State, Germany, to safely apply prescribed fire by using converted military tanks as armored prescribed fire ignition vehicle and fire suppression apparatus. Prescribed burning operations are supported by unmanned aerial vehicles for monitoring progress and decision support. This report summarizes the background, objectives and experiences gained in this pilot project between 2009 and 2014. The GFMC is a partner of UNESCO and operates as a Specialized Center under the European and Mediterranean Major Hazards Agreement (EUR-OPA) of the Council of Europe.

Key words: *Protected areas, wildfire risk, unexploded ordnance, land mines, fire management, European and Mediterranean Major Hazards Agreement (EUR-OPA), UNESCO, Global Fire Monitoring Center (GFMC)*

Wildfire Threats and Fire Management of UNESCO World Heritage Sites: A Global Survey

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Abstract

Many ecosystems, natural and cultural landscapes, which are now under a protection regime, have evolved under natural fire regimes or under cultural activities that have included fire as a traditional tool for land management. Fire is one of the potential factors that may contribute to maintain or to disturb protected areas. However, as a consequence of climate change the frequency and duration of extremely dry weather episodes, as well as uncontrolled human interventions by land-use, land-use change or tourism, those areas that were neither subjected nor adapted to fire are becoming increasingly vulnerable. These protected areas include registered UNESCO World Heritage Natural Sites in which unprecedented wildfire threats are putting at risk the legacy of natural evolution or the heritage of cultural history and traditions.

The objective of this study was to identify current wildfire threats, fire incidents and management implications in UNESCO World Heritage Sites globally by thoroughly screening reports on wildland fires. The approach to classify the protected areas was based on their fire regime characteristics (available fuels, flammability, ignitions, and fire spread conditions within a given ecosystem) and divided into four main fire regimes: ***Fire independent***: sites that naturally lack the conditions to support fire as a factor for evolution; ***fire dependent*** or ***fire adapted:*** sites where species and processes have evolved with fire; ***fire sensitive:*** sites with ecosystems adapted to fire where an inappropriate introduction of fire may cause negative impacts; ***potentially threatened:*** sites that have not evolved in the presence of fire, but if confronted with extreme fire condition could receive negative impacts.

Out of 981 evaluated World Heritage Sites worldwide 158 have experienced or have been threatened by wildfires, 44 of them are cultural sites, 44 natural sites and 4 mixed sites. The methodology and results of this inventory may serve the development of recommendations and policies for fire management in protected areas. The database is continuously updated by incorporating all recent fire incidents.

The research has been funded by the Council of Europe under the frame of the European and Mediterranean Major Hazards Agreement (EUR-OPA).

Key words: *UNESCO World Heritage Sites, wildfire risk, landscape management, fire-dependent ecosystems, fire-independent ecosystems, fire-sensitive ecosystems, fire-adapted ecosystems, European and Mediterranean Major Hazards Agreement (EUR-OPA), Global Fire Monitoring Center (GFMC)*