

Forest Fireman

Professor Johann Goldammer is a specialist in the ecology and management of fire at Freiburg University, Germany. He co-ordinates the Global Wildland Fire Network and the United Nations International Strategy for Disaster Reduction (UNISDR) Wildland Fire Advisory Group, a high-level advisory body to the UN system in questions related to wildland fires. In 1998 he established the Global Fire Monitoring Center (GFMC)¹.

Johann G. Goldammer
World Fire Monitoring Centre,
Freiburg, Germany



Photo: Johann Goldammer

What is the GFMC?

The GFMC is an interface institution between wildland fire science, the fire management community and policy makers, working to enhance international co-operation in wildland fire science, management, training and sharing of knowledge and resources.

We have partners in all boreal countries. Our Canadian partners are very experienced leaders in the development of wildland fire early warning systems. For boreal Eurasia the Canadian Forest Service has developed the Eurasian Experimental Fire Weather Information System that is displayed in 2-day intervals on our early warning website².

We also work with people from Nordic countries, notably Finland, particularly on re-introducing prescribed fire in nature conservation, forestry and landscape management. This work is conducted under the European Fire in Nature Conservation Network (EFNCN), which aims to restore historic cultural burning practices that have positive effects on biodiversity, ecosystem productivity and stability.

Back in the early 1990s we recognised that wildland fire science and management in Russia and the states of the Former Soviet Union (FSU) was lagging behind approaches in western boreal countries. During the Soviet era fire had been considered as an enemy and was fought with all possible resources, despite natural fire having shaped the ecosystems and their functioning for millennia. Also, the use of remote sensing was not accepted as a tool for monitoring forest fires. Recently, this situation has changed.

Is fire a natural part of the boreal forest ecosystem or is it destructive?

The boreal forest zone is a circum-global lightning-fire belt. Both natural and human-made fires are important for the whole functioning and life cycle of a boreal forest.

In Alaska and Canada very intense fires in pine, spruce and fir stands 'recycle' the forests: so-called stand-replacement fires occurring at the end of the life cycle of a mature or overmature North American boreal forest allow the regeneration of the stand and the start of succession towards a new forest.

The situation in Eurasia, notably in Siberia, is quite different. Pine and larch forests are regularly affected by low-intensity lightning fires that occur under moderate weather conditions every 10–20 years, consuming dead organic debris on the forest floor. Pines and larches are quite resistant against such moderate surface fires: their thick bark protects them against lethal heat. By reducing the fuel loads these fires often result in relatively open stands that are less susceptible to high-intensity fires simply because an uncontrolled wildfire will find less material to burn. The open and sometimes park-like coniferous forests of the 'light taiga' provide valuable habitats for wildlife and plants, and they are economically of high value.

It is clear that high-intensity fires that scar trees or sometimes even consume tree stems reduce the value of timber. So, in areas of intensively managed and utilised forests fire may cause economic damage. And here we have a conflict.

Is the rate, scale or nature of fire (fire regime) changing in the boreal region?

There are dramatic changes of fire regimes in the whole boreal zone and the adjoining hemiboreal lands. The changes are driven by human activities, but in some regions also by the consequences of climate change. In southern-central Russia or in northern Mongolia, for example, increasing fire pressure is associated with economic weakness: the consequences of inappropriate forest management, reduced budgets for forest protection activities and economically motivated arson have brought an increase of destructive fires to these regions. This coincides with a trend of increasing regional aridity. For instance, we collected rainfall data in the Trans-Baikal region for the season preceding the extreme fire year 2003. Between August 2002 and May 2003, the total rainfall recorded in two stations in Buryatia Republic and Chita Oblast was 36.0 mm and 45.7 mm, respectively. The evaluation of vegetation health by satellite sensors confirmed this drought and the trend of increasing aridity in the Eurasian temperate-boreal belt between Europe and east Asia.

Extreme fires burned between May and September of 2003, leaving behind a total burned area of more than 20 million ha in the region around Lake Baikal. Many of these were fires in the so-called 'grass forests', which under normal conditions do not harm



Photo: Johann Goldammer

Contact:

johann.goldammer@fire.uni-freiburg.de

Notes:

1 www.fire.uni-freiburg.de/ or www.gfmc.org

2 www.fire.uni-freiburg.de/fwf/eurasia.htm

3 www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html

www.unisdr.org/eng/task%20force/tf-working-groups4-eng.htm

the trees at all. But in 2003 the fire severity was extreme: the fires burned the humus layers and affected the roots. We have confirmed this in two expeditions in 2003 and 2005.

Another aggravating factor of the wildland fire theatre in the region around Lake Baikal, especially in Buryatia and Chita, is the increase of arson fires. The underlying causes for arson fires are deeply rooted in the economic development of south-east Russia, Mongolia and neighbouring China. The depletion of China's forest resources and the increasing demand for timber products on the market in China have created an enormous pressure on the forest resources of Mongolia and the Russian Federation. Local people in the region informed the GFMC that Chinese timber dealers have encouraged or bribed locals in the Russian Federation and in Mongolia to set fires to forests in order to increase the permissible salvage logging areas and thus increase the timber export to China.

What questions remain unresolved about fire in the boreal region?

Collectively we are facing global change as a consequence of climate fluctuations, both natural and human-induced, and fire is playing a determinant role in that process, for instance accelerating the transition from forest to non-forest cover. We need to make a decision whether we wish to accept an accelerated 'steppisation' in Eurasia (i.e. the replacement of forests by steppes) or, alternatively, whether we could halt this development by appropriate fire management and maintain a forest cover that would offer a high carrying capacity for humans, biodiversity and carbon.

The new Canadian forest fire management strategy, which is currently in preparation, is carefully looking at the impacts of climate change and the fire management policy needed to respond to these changes. The Canadians do not intend to suppress those fires that will be an expression of changing climate, vegetation composition and fire regimes. Trying to halt stand replacement fires in boreal North America does not make sense: the process of change is so powerful and irreversible it cannot be stopped or redirected.

What are the biggest fire-related problems just now in Eurasia?

The biggest challenge is the development of human and technical capacities in fire management in Eurasia. The period of transition from centrally planned to market-based economies of the FSU countries in the 1990s and early 2000s has substantially weakened the formerly strong centralised system of forest management and conservation, including their fire management system, and their ability to respond to these requests. How do we apply advanced fire management knowledge in countries suffering extreme problems related to these socio-economic and political changes?

The situation in central Asia, including the hemiboreal forests of northern China, northern Mongolia and southern Russia, is suffering all the extremes of global change. This is one part of the Eurasian problem.

The other problem zones are quite outside public awareness: the wetlands and peatlands of Eurasia. In these ecosystems we have a rich biodiversity and the largest terrestrial carbon stores of the world. Whereas the peatlands in the tropical regions are primarily threatened by drainage and systematic conversion with the help of fire, the situation in the uninhabited regions

of the boreal zone is quite different. Here we will see the interactions between desiccating wetlands and wildfires which may lead, long term, to the triggering of the 'terrestrial carbon bomb'.

The melting of permafrost sites as a consequence of regional warming will also result in change to forest cover and fire regimes in central Asia. For example, the continental larch forests of Yakutia are extremely threatened. Carbon will be released by fire and will not be sequestered by this ecosystem because of irreversible changes from forest to steppe. In addition the 'palaeogases' trapped in the permafrost ice will be released and add a new pulse of greenhouse gases to the global atmosphere.

Finally, problems remain of radioactively contaminated forests and other vegetation in Eurasia. Remnants of nuclear weapons tests and nuclear accidents wait in the form of radionuclides in the organic layers of contaminated regions. Wildfires lead to a lifting of these radionuclides. Their redistribution is by chance: the wind direction and convective activity on the day of the fire. These are all high and unacceptable risks that we need to be aware of.

Do government policies need to change?

The Russian Federation is now undergoing a dramatic reform, at least on paper, and prescribed fire as an integrated forest and wildland fire management tool has been recognised. However, in the near future there are almost no human, technical and financial capabilities to change practice substantially. The Russian government is refusing to provide sufficient funding for forest fire suppression and the amount of large fires is on the rise. One may say this is a result of a new 'let burn policy' based on ecological considerations, but the reality is that this is simply the effect of insufficient financial support for fire management.

Can NGOs or local communities help?

The need for action in boreal Eurasia to reduce the risk of destructive fires is present at all levels. The majority of fires in Eurasia are caused by people, and so the most important need is fire prevention. Everybody must be included, from the youngest to the oldest, from civil society to those who have a responsibility in the government. NGOs will be crucially important. We have seen this in south-east Asia, for instance in Indonesia, where in the process of democratisation civil society is standing up and taking responsibility. This will also be the case in the FSU countries, I am quite confident.

International organisations and financial institutions will be involved too. Support of the World Bank and the Global Environment Facility in a fire management project in the Amur-Sikhote-Alin Ecoregion in the Russian Far East is a first encouraging example.

On our side we are working through the Global Wildland Fire Network (GWFN), which is co-ordinated by the GFMC as a UNISDR programme³. We are establishing three regional Wildland Fire Networks (Baltic, central Asia and northeast Asia) in which boreal countries participate, aiming to enhance international co-operation in wildland fire management between neighbouring countries, sharing human resources, knowledge and fire management technologies, and assisting each other in large fire disaster and emergency situations.

So, we can do a lot!

