



UNECE

2021 IBFRA Conference – Changing Boreal Biome

The Science and Policy of Wildfires

20 August 2021



INTERNATIONAL
Boreal Forest
RESEARCH ASSOCIATION

Socio-economic and Socio-ecological Implications of Wildfires occurring in the Boreal Zone: How should they be addressed by Policy?



Johann Georg Goldammer

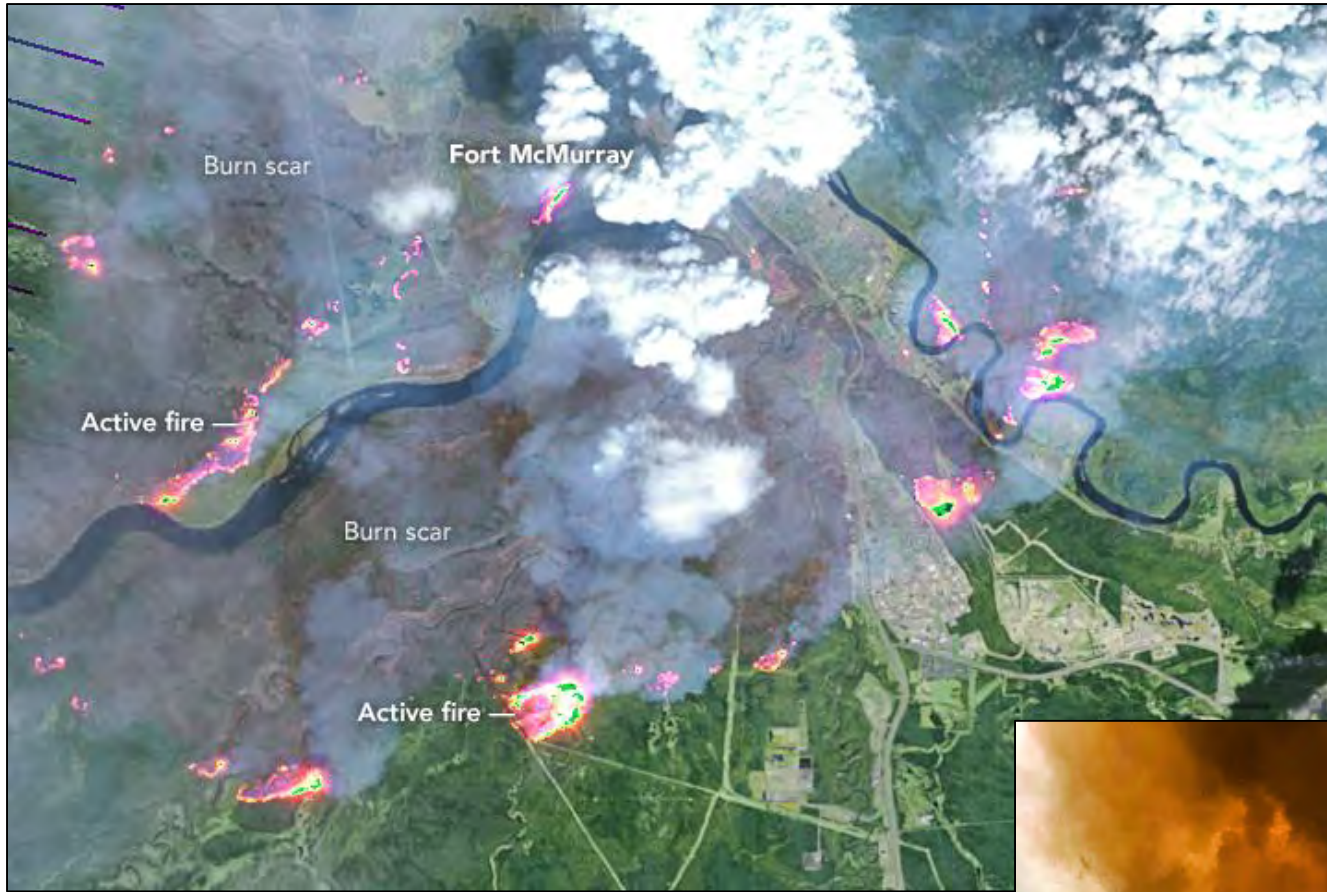
Eurasian Team of Specialists on Landscape Fire Management



The Global Fire Monitoring Center (GFMC)



Canada 2016 – Fort McMurray



Canada 2016 – Fort McMurray



Wildfires in Western Russia 2010



Transbaikal Region: Chita Oblast April 2019





Russia 2010

3000 villages abandoned

Russia 1990-2010

**30-40 million ha of
agricultural land
abandoned and subjected
to fallow**

Same trend in the Euro-
Mediterranean Region



Region	Estimate	Time Period	Source
European part of Russia	1) 31% 2) 90% 3) 31%	1) 1990-2000 – Eastern Kaliningrad, sections of northern Europe & Russia 2) 1985-2007, livestock numbers 3) 1990-2000, parts of Smolensk, Kaluga, Tula, Rjazan, Vladimir	1) Prishchepov et al. (2012) 2) Dubinin et al. (2010) 3) Prishchepov et al. (2013)
Russia, total	1) 12% 2) 20-30 million ha 3) 40 million ha	1) 1980-2004 2) 1990-2005 3) 1990-2010	1) Lerman (2009) 2) Ioffe (2005) 3) Prishchepov et al. (2012)

**Estimations of abandoned agricultural lands in Russia
GFMC study presented in Novosibirsk 2013**



Western Russia 2010

Increasing occurrence
of uncontrolled fires in
abandoned agricultural
lands:

**A consequence of
rural exodus, i.e.
reduced intensity of
land cultivation**



Cross-sectoral dimension of fire and management (I)

All over the circumglobal boreal zone wildfires and land-use fires affect the intermix of natural, cultural and urban-industrial landscapes

- Natural ecosystems: Forests and other protected areas
- Agricultural and pasture lands
- Farms, villages and peri-urban areas
- Infrastructures (incl. critical infrastructures), traffic
- Waste deposits and otherwise contaminated lands



Cross-sectoral dimension of fire and fire management (II)

Therefore fires are burning within the sectoral responsibilities of land owners:

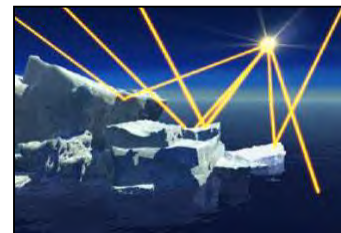
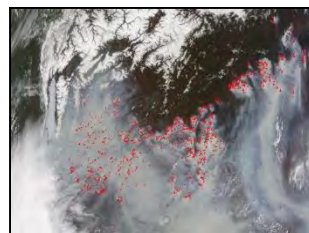
Typically responsible sectoral agencies / services

- Natural ecosystems: Forests and other protected areas
Forest Service
Park Service
- Agricultural and pasture lands
Ministry of Agriculture
- Farms, villages and suburbs
Ministry of Interior
- Critical infrastructures
Crisis Management
- Air pollution
Public Health
- Waste deposits and otherwise contaminated lands
Ministry of Environment
- Military terrain
Ministry of Defense

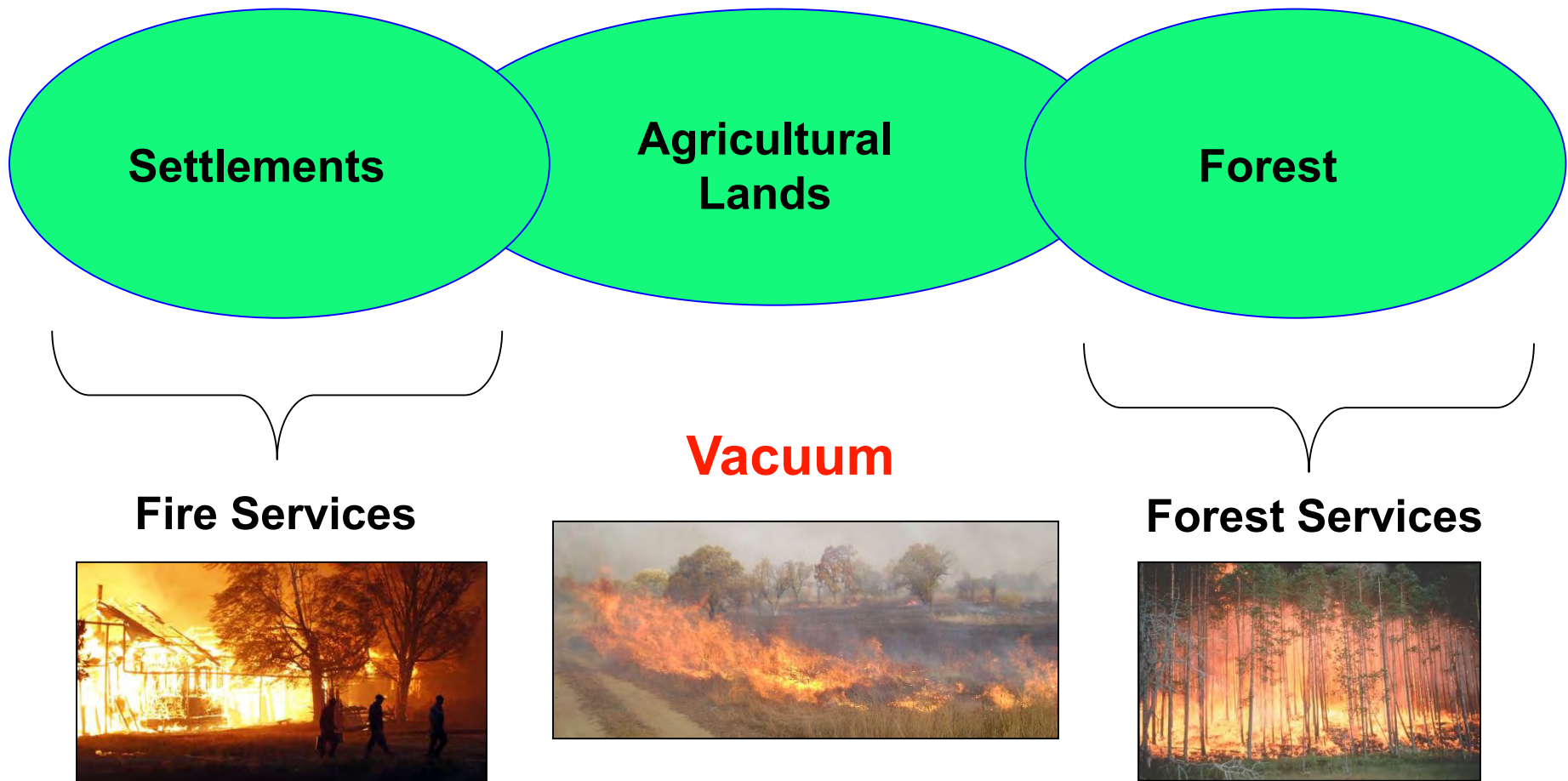
Cross-sectoral dimension of fire and fire management (III)

International / Transboundary Issues: Bilateral and international agreements / protocols / mechanisms (I)

- Border-crossing fires
 - **Bilateral agreements at national and state levels**
- Border-crossing fire smoke transport affecting human health
 - **Bilateral agreements**
- Long-distance transport of fire emissions
 - **UNECE Convention for Long-Range Transboundary Air Pollution (CLRTAP)**



In many countries of Eurasia :
Legal / technical vacuum for managing agricultural fires
which are the prime source of wildfires affecting forests,
other ecosystems and rural / peri-urban settlements

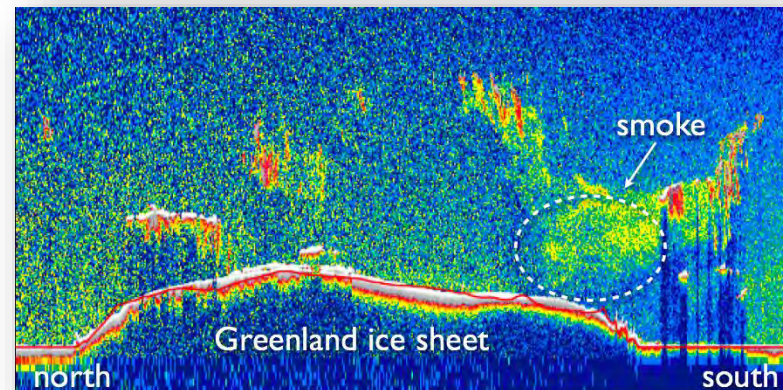


Black Carbon (BC) deposits on the Arctic Environment – North America

Aerial photo of the Greenland ice sheet surface from mid-August, 2005.

The dark areas are concentrations of light absorbing impurities. This example the impurities are some combination of dust, soot, and microbial activity.

Credit: Jason Box, Ohio State University



Agricultural Burning in temperate-boreal Eurasia:

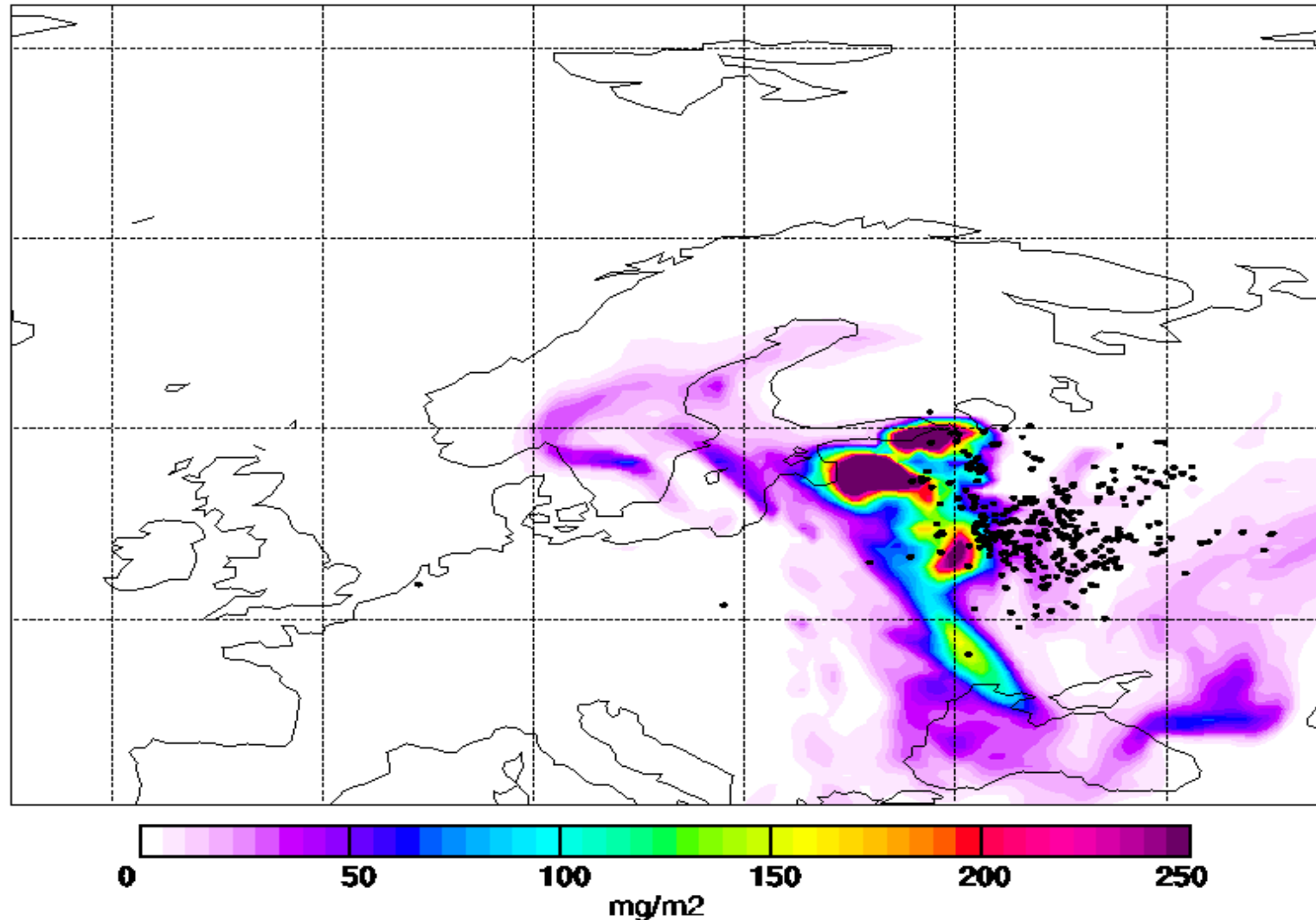
A major source of black carbon deposits on the Arctic environment



Transport of Fire Emissions to the European Arctic

Emissions transport modelling – courtesy of Norwegian Meteorological Institute

Simulation start 20060407. 0 Actual time 20060425. 0



**Smoke pollution
emergencies:**

**Smoke from fires in the
Trans Baikal Region in 2008
– blanketing Khabarovsk**

**Similarly – Fires burning in
Yakutia 2021 – reaching
Moscow Region**



Smoke Impacts of peat and forest fires

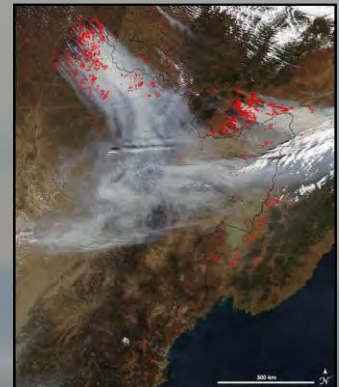
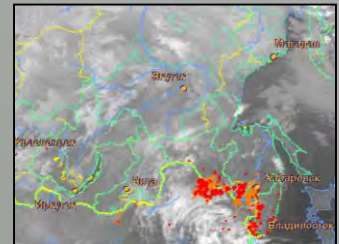
Composition of vegetation fire smoke

Acute toxicity:

- **Particulates below 2.5 μ m**
- Formaldehyde
- Acrolein
- Polycyclic Aromatic Hydrocarbons
- Free radical precursors
- Carbon monoxide

Particulate effects on the respiratory / cardiovascular systems

- **Respiratory infections** in adults and children
- Acute and chronic changes in pulmonary function
- **Asthma attacks**
- Cardiovascular diseases (CVD)
- Hospital admissions
- **Increase of daily mortality**



Challenges for Action

- **Is society – the public sector and civil society – sufficiently prepared** to meet the current and future environmental changes and the increasing wildfire threats?
- **Are current policies in agriculture, forestry and conservation appropriate** to be prepared for the changes? Have they been subject to review?
- **Are current institutional settings (responsibilities of agencies) appropriate** to be prepared for the changes? Have they been subject to review?
- Based on the scientific evidence: **What are the strategic visions** to cope with the aggravating fire situation in future?

Core Element of a Reform of Governance

- Establishment of a **Landscape Fire Management Organization (LFMO)**, which shall
 - Operate in a supervisory and co-operative manner with the multiple stakeholders involved in landscape fire management is proposed as a core element of a future reform
 - Have an advisory, coordinative and supervisory role in landscape fire management in the country
 - Develop an interagency National Landscape Fire Management Plan and to monitor and follow up its application.

Principles of a Landscape Fire Management Organization (LFMO) (I)

1. Transdisciplinary and Innovation

Policy and strategic planning and relevant decision making shall be based on sound scientific knowledge and considering technological capabilities and innovation

2. Holisticness, Integration and Inclusion

Policy development and strategic planning shall be holistic, i.e. address the fire problem at landscape level by including all relevant institutional mandates and the potential and capacity of contribution of the civil society.

Principles of a Landscape Fire Management Organization (LFMO) (II)

3. Coherence

The mandates and activities in fire management of State institutions and other stakeholders shall be coherent (harmonized) and meet the overarching national fire management policy and implementation plan.

4. Cohesiveness

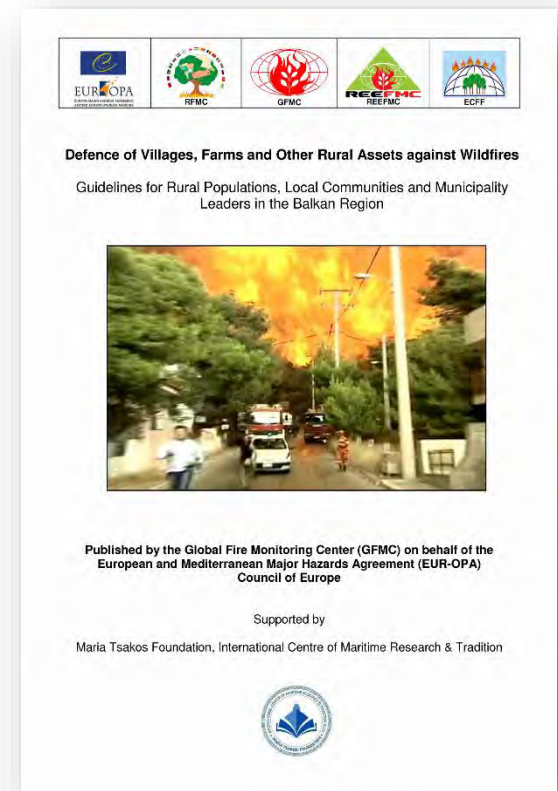
The National Fire Management Plan shall be considered obligatory for individual institutional / sectoral planning and activities of agencies / ministries.

5. Coordination

The implementation of actions under the National Fire Management Plan shall be monitored in a permanent basis.

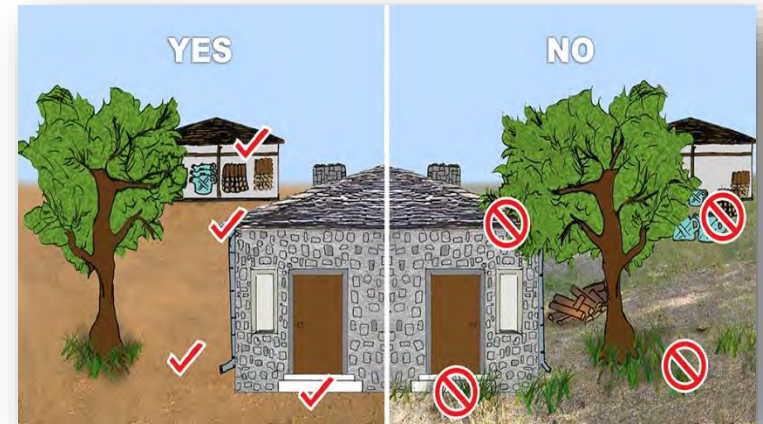
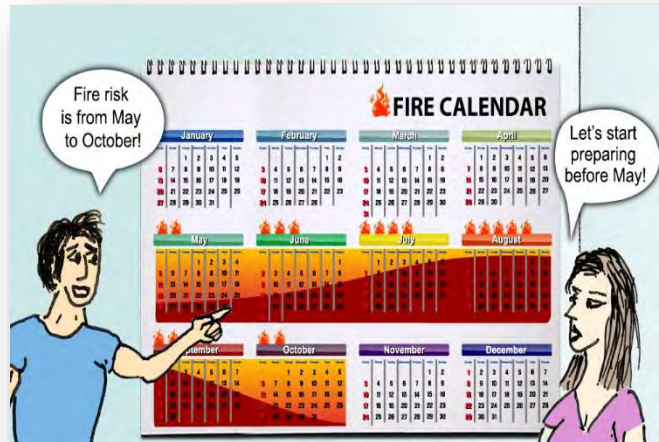
Outreach through Regional Fire Management Resource Centers in Europe: Development of Guidelines (2012-2013)

Defence of Villages, Farms and Other Rural Assets against Wildfires: Guidelines for Rural Populations, Local Communities and Municipality Leaders



First set of Guidelines for the Western Balkans and Greece

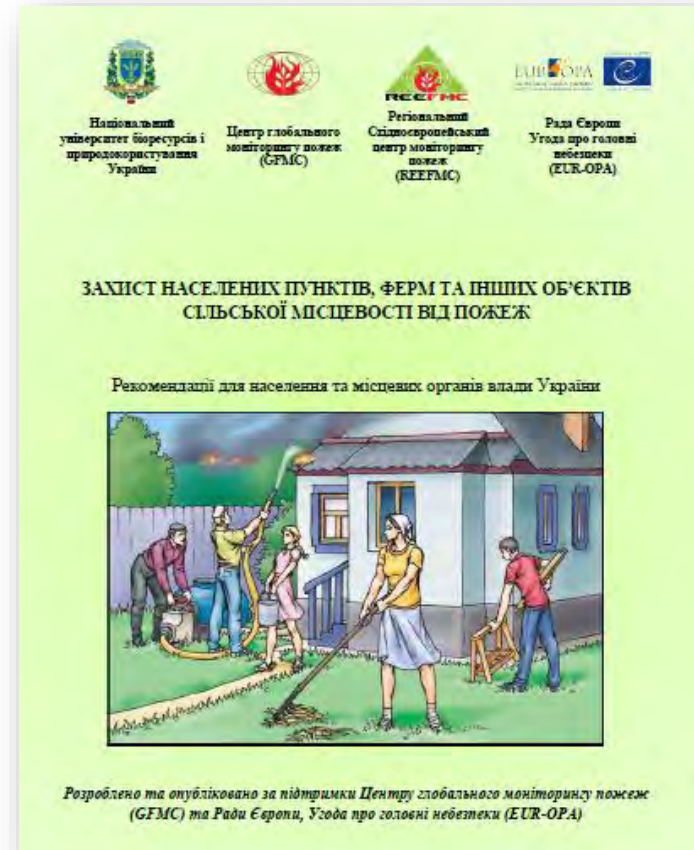
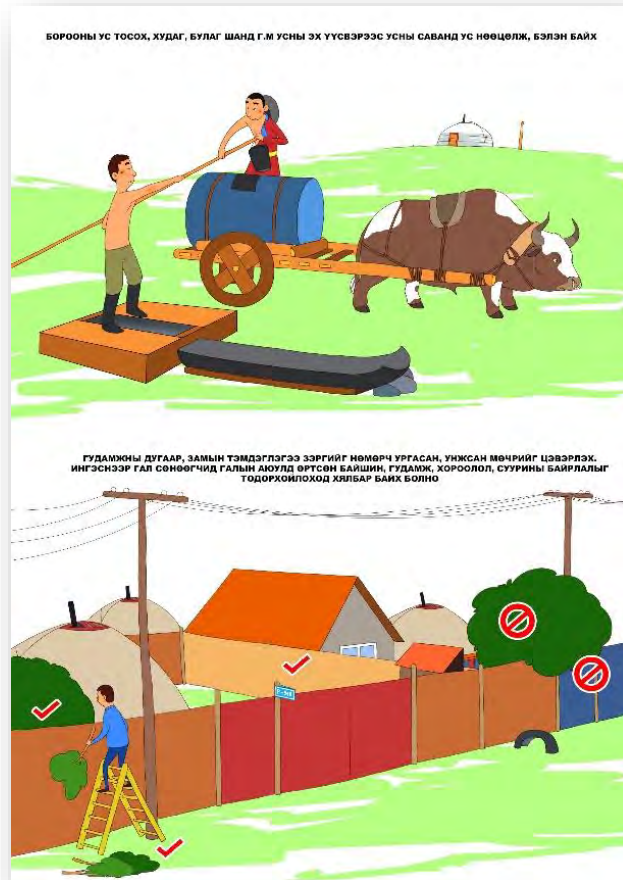
Defence of Villages, Farms and Other Rural Assets against Wildfires: Guidelines for Rural Populations, Local Communities and Municipality Leaders



Preparation of local people to become aware of wildfire threats and to prepare their home for defense against wildfires



Defence of Villages, Farms and Other Rural Assets against Wildfires: Guidelines for Rural Populations, Local Communities and Municipality Leaders



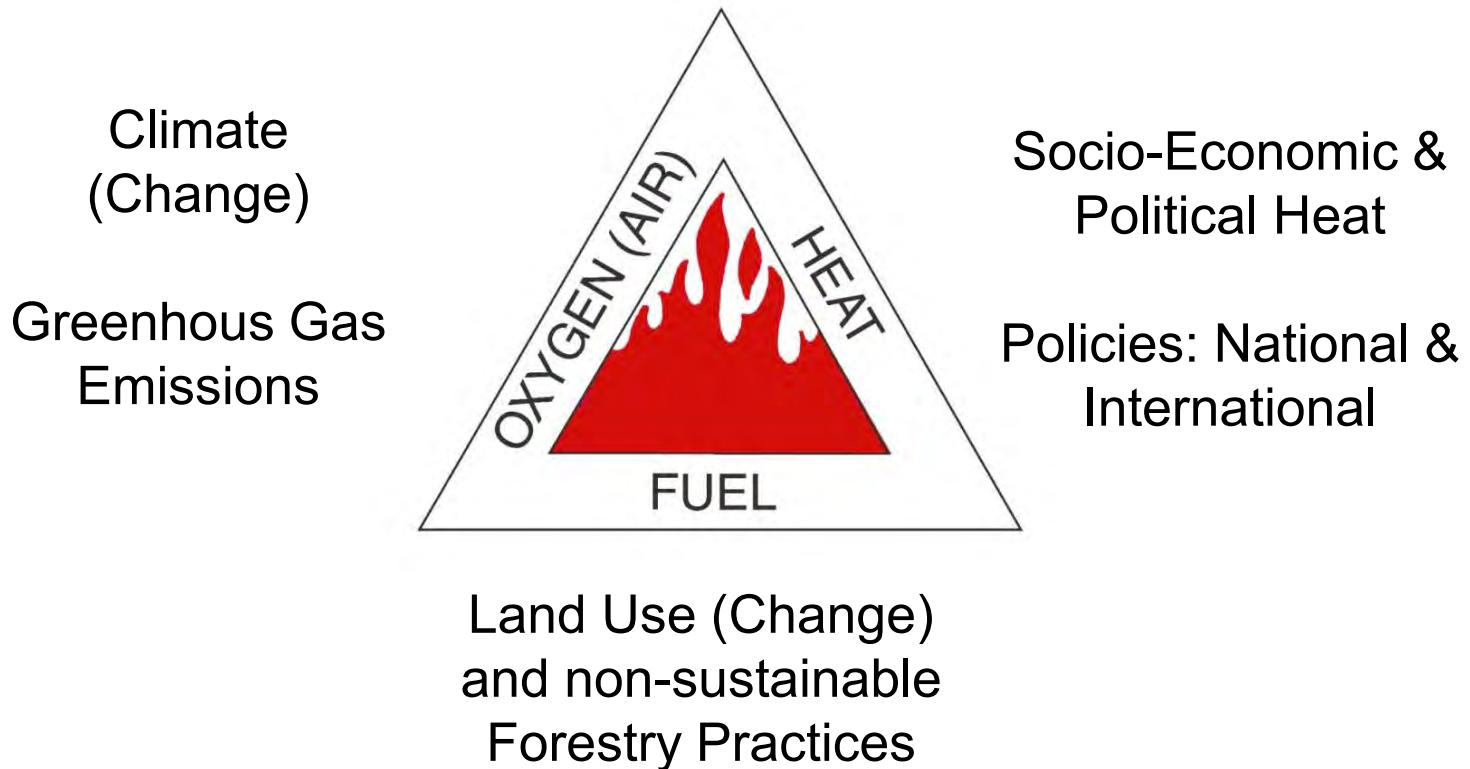
Example: Adaptation to Conditions in Mongolia and Ukraine

The Classical Fire Triangle



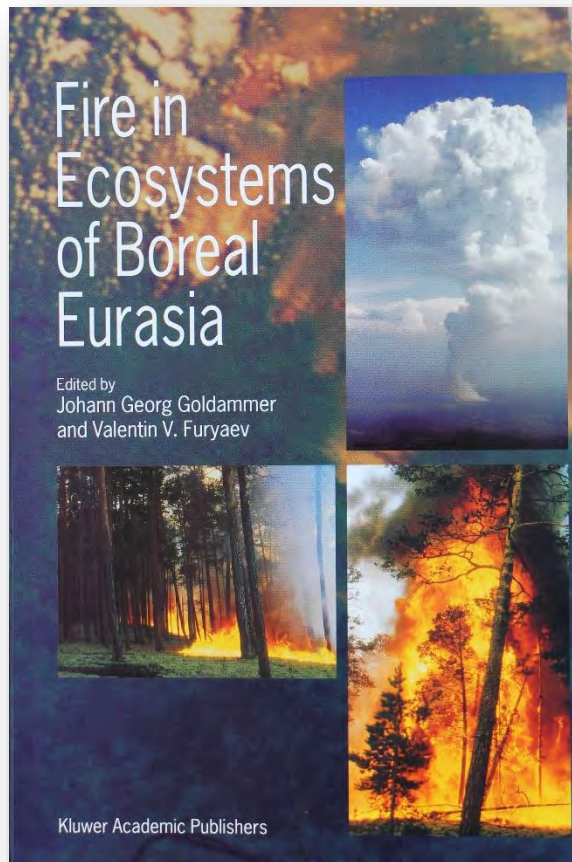
The Landscape Fire Triangle

Determining Factors in a Changing Global Environment



Selected GFMC Publications

Reflecting 30 years of cooperation GFMC / Russia



<https://gfmc.online/>

Joint Agenda by Rosleskhoz / Avialesookhrana, EMERCOM & Sukachev Institute of Forest RAS SB supported by the GMFC (I)

- 2010: International Conference on Cross-Border Forest Fires and Cooperation in their Suppression, organized by ROSLESKHOZ / Avialesookhrana & EMERCOM (Irkutsk)
- 2010: International Conference “Forest Fires: Management and International Cooperation for Preventing Forest Fires in the APEC Region”, organized by EMERCOM (Khabarovsk)



Joint Agenda by Rosleskhoz / *Avialesookhrana*, EMERCOM & Sukachev Institute of Forest RAS SB supported by the GMFC (II)

- 2012: First International Fire Management Week – First fire science-policy Round Table (Krasnoyarsk)
- 2013: Second International Fire Management Week – Second fire science-policy Round Table and re-visit of the Bor Forest Island Fire Experiment (Krasnoyarsk)
- 2013: International Congress “Forest Fire and Climate Change: Challenges for Fire Management in Natural and Cultural Landscapes of Eurasia” (Novosibirsk)
- 2017: International Conference Protection of Human Settlements and Social Infrastructure from Wildfires (EMERCOM with UNDRR & Council of Europe, Moscow)

**Int. Congress Forest Fire and Climate Change:
Challenges for Fire Management in Natural
and Cultural Landscapes of Eurasia**
Novosibirsk, Russia, 11-12 November 2013



Conclusions (I)

- **Предупредить и оповестить** Правительства России и соседних стран от имени научного и профессионального сообщества по пожароуправлению о том, что угроза природных пожаров в регионе станет возрастать в ближайшие годы, вследствие изменения климата и социально-экономических и демографических изменений
- **The governments of Russia and the neighbouring countries 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**

Conclusions (II)

- The extent of unnecessary burning of agricultural, pasture and steppe ecosystems must be reduced by
 - через проведение анализа и дальнейшее усовершенствование законодательства, правоприменения и разграничений ответственности властей по поводу использования огня на сельскохозяйственных и пастбищных землях, а также на брошенных сельскохозяйственных землях;
 - **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;**

Conclusions (III)



- The extent of unnecessary burning of agricultural, pasture and steppe ecosystems must be reduced by
 - через проведение анализа и продвижение сельскохозяйственными консультационными службами пропаганды знаний и опыта способов, альтернативных сельскохозяйственному сжиганию;
 - **Review and promotion of alternatives to agricultural burning by rural extension services;**
 - Введением субсидий на поддержку сельхозпроизводителей для применения альтернативных технологий, аналогичных субсидиям, применяемым в странах Европейского союза.
 - **Introduce subsidies for supporting the agricultural sector to apply alternative technologies, following the examples of subsidies in the European Union.**



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Thanks for your Attention

Спасибо за внимание!



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