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# Forest Fire Prevention and Control in the Russian Forest Management System

## Executive Summary

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Below is a brief (executive) summary of the monograph ***Forest Fire Prevention and Control in the Russian Forest Management System.***

The monograph summarizes policy notes and studies performed as part of the ENPI FLEG Program *Improving Forest Law Enforcement and Governance in the European Neighbourhood Policy East Countries and Russia.*<sup>1</sup>

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<sup>1</sup> At its 3-rd meeting on September 15, 2010, the Russia National Program Advisory Committee (NPAC) of ENPI FLEG Program arrived at the following decision: "In view of disastrous forest fires in summer 2010, it should be deemed necessary to strengthen activities under the current Country Workplan to facilitate improvements in forest management required for forest fire prevention and mitigation of related emergencies and their impact".

It was noted that there is room for actions in this area, *inter alia*, under Activity 2.1 *Develop (draft standard) guidelines for the development and implementation of coherent interventions to prevent and reduce illegal logging and illegal timber trade; and their testing at the regional level.*

In view of the above, the World Bank has initiated a new activity (2.1.a) *Forest fires and illegal forest use in Russia* under Activity 2.1 of the Country Workplan of the Program.

In the St-Petersburg Declaration (2005), participants of the Forest Law Enforcement and Governance Ministerial Conference expressed their concern about forest crime as it is a significant problem in many countries in the Region, about *illegal forest-related activities which have significant negative impact including: general weakening of the rule of law; loss of revenue, and degradation of forest ecosystems, and impair the contribution of forests towards the fulfillment of internationally agreed development goals.*

Though key objectives of the FLEG process are chiefly related to illegal logging and timber trade, the range of problems causing the declared negative impact, also includes other aspects of forest management and practical forestry which – directly or indirectly – define the levels of legality of forest use and sustainability of forest management. Earlier undertaken studies of the FLEG process show that forest fires are a major contributor of illegal logging growth in Russia.

In summer 2010, forests in several Russian regions were exposed to extremely fire-prone weather conditions which led to catastrophic forest fires. The forest fires of 2010 revealed overall inadequacy of the forest management and law enforcement system, including the regulatory and legal framework of fire management, and inconsistency of the applied management strategies.

In burnt areas, it is necessary to undertake urgent reforestation operations and measures to prevent potential pest and disease outbreaks in affected forests, and excessive littering caused by the decline of stands in burnt forests. Uncontrolled forest fires not only cause direct losses of wood and environmental forest resources, but also bring about substantial distortions of the forest use arrangements in burnt areas with different degrees of damage.

Another contributor to such development is the non-existence of regulations to govern economic use of fire-damaged forests which would provide for both timely salvage of timber, and subsequent rehabilitation of forest ecosystems.

The existing practice of burnt timber salvage is increasingly indicative of the public authorities' failure to align and control such operations. Abandoned burnt areas subject to intensive decline can potentially facilitate the incidence of new, even more disastrous fires. All these call for purposeful systemic studies to develop government and community measures to prevent and fight forest fires in the overall context of the fight against growing illegal logging and timber trade.

Human misbehaviour is the main cause of forest fires. Systemic and continuous efforts are needed to prevent anthropogenic fires; they include public awareness campaigns targeting various populations to explain how to behave in forests, and restrictive legal interventions. Forest fire prevention is the most effective tool of forest fire management. It goes without saying that it is much easier to prevent a fire than to suppress it. Forest fire prevention as a major constituent of the national forest fire management system should be based on a systemic approach, employ specific methods and arrangements and have a sound institutional framework.

## Introduction

Forest fires pose a major threat to Russian forests. The catastrophic fire situation of 2010 was accounted for, among other things, by unforeseen consequences of forest governance reform after the effectiveness of the new Forest Code. This law decentralized the responsibilities for forest firefighting with respective powers devolved to the Russian regions, many of which turned out to be incapable to undertake such responsibilities.

The paper is based on the review of situation in three typical well forested Russian regions: the Far East Federal Okrug, Arkhangelsk Oblast and Krasnoyarsk Kray.

The main objectives of the study were to:

- Review the main aspects of forest fire control in the public forest management system;
- Reveal the major gaps in the existing forest fire protection system;
- Highlight the role of communities as the primary source of fires and the major agent of their control and prevention;
- Propose measures to improve the efficiency of forest fire management.

Mass-scale forest mortality largely determines the threat of fire in Russian forests. In this respect, the objective of the study is to establish dependence between forest mortality and the dynamics of natural fuel accumulation as a factor of forest fire frequency and destructiveness.

### **Part I. Scale, Impact, Causes and Dynamics of Forest Fires in Russia**

#### *The Scales and Dynamics of Forest Fires in Russia during the Recent Decade*

The chapter presents the main characteristics of forest fires in the Russian Federation during the recent years: types, number and area of fires, average fire size, dead forest area, etc. Peculiarities of forest fires in 2010 are detailed. 33.5 thousand forest fires occurred in Russia in 2010 covering 2.1 million ha of forested area. The number of forest fires and the size of burnt areas have significantly increased in Russia during the recent five years. There is a stable trend towards increased frequency of fire occurrence. Official fire statistics is noted to be underestimated and unreliable. Satellite observations of forest fires demonstrate a much larger size of burnt areas. The chapter includes a detailed analysis of forest fire statistics and multi-year dynamics in model regions.

Conclusions: A stable rise in the number and area of forest fires is noted with a 4-5-fold increase of the average fire area. The efficiency of forest fire management is affected by the quality of forest sector reforms.

#### *Social, Environmental and Economic Impact of Forest Fires in Russia*

Forest fires cause significant economic and environmental damage. The annual damage from forest fires due to direct timber losses is usually underestimated but, in any case, largely exceeds the costs of fire control. Just in 2010, the fire destructed 93 083.7 thousand m<sup>3</sup> of standing forest, and young stands over the area of 126.6 thousand ha. Fire

suppression costs amounted to RUR 2 291 615.7 thousand. Vast areas and frequent occurrence of forest fires cause significant transformations and depletion of indigenous ecotopes in highly productive forests; changes in hydrothermal and hydrochemical river conditions, disturbance of soil cryogenesis, etc., which ultimately leads to irreversible change of vegetation types, reduction of biological productivity of forest habitats, loss of biotopes and biodiversity. 2010 forest fires in the Moscow region, in addition to direct fire impact, had a significant health impact due to smoke.

### *Challenges of Forest Fire Protection in Russia*

Forest fire statistics uses a standard set of sources causing forest fires: man-made factors, weather conditions, atmospheric electric discharges, etc. Data analysis has shown that the share of forest fires of human origin amounts to 93%. However, the deep-rooted causes of high forest fire frequency and incidence are much more complicated and depend on a combination of organizational, technological, institutional, economic, social and climate factors, as well as the system of forest management and use in the country.

### **Major Factors Causing High Rates of Forest Fire Occurrence in Russia:**

1. Forest legislation deficiencies, complete lack of regulations on forest fire prevention
2. Destruction of the earlier established regulatory frameworks and ruined technical and human resource capacity to ensure fire safety in forests
3. Inconsistency of the public forest fire management system at the federal and regional level.
4. Poor interagency cooperation/coordination
5. Insufficient funding and other inputs to control forest fires
6. Lack of targeted preventive activities

Studies of the challenges facing the forest fire protection system in Russia enabled to summarize the whole set of factors affecting the current frequency of forest fire occurrence in the form of a cause-and-effect tree. General conclusion: The existing system of forest fire control at the local level fails to follow the main principle – a fire is easy to suppress at the initial stage but practically impossible to stop when it reaches catastrophic scales.

### *Forest Fire Protection Practices as of 2011*

Practical interventions on establishing the system of forest fire protection adopted by the Russian Government after catastrophic fires in 2010 were analyzed in detail. The list of institutional, information, financial and technical activities taken by the FFA to strengthen the national fire control capacity was elaborated. Specific examples are given to illustrate how the adopted measures affected the forest management practice in Arkhangelsk Oblast, Khabarovsk and Krasnoyarsk Krays.

The adopted measures obviously had some effect. However, these steps are insufficient both at the federal and regional level, and cannot significantly contribute to addressing of the problem, and change the forest fire situation.

### *Evaluation of Forest Fire Incidence in Areas of Mass-Scale Forest Mortality in Russia*

Areas with high forest mortality are of primary importance for the evaluation of fire incidence since it is these areas where intensive decay of damaged stands takes place, and dead tree mass is rapidly accumulating thus transforming the forest into a potential “bonfire”.

During the recent two decades, an average of about 300 thousand ha of forest stands have been annually dying in Russia. The size of dead forest areas is steadily increasing. According to the official data, the size of dead forest areas in 2010 was 2.3 times as large as in 2001, and by 36% larger than the average figure for the recent 10 years.

Fires are the major contributor to the scales of forest mortality (80.2%). The second important cause of stand mortality (16.1%) is related to unfavorable weather and soil conditions. The impact of other factors (first of all, damage by pests and diseases) was manifested over an insignificant area.

The analysis showed that massive forest mortality in Russia has a cyclic pattern related to periodic impact of combined negative factors with the size of dead forest areas steadily increasing. Noteworthy that data on mortality spots are collected only within the territory covered by surface monitoring. Therefore, the scale of mortality is underestimated.

Based on the results of the study, a classification of forest mortality types and causes was developed, which, in combination with the scale of incidence, can be used as a methodological framework for forest fire forecasts and justification of economic response measures. Rapid one-time mortality (e.g., as a result of a wind storm) increases potential incidence of catastrophic fires, but only for a short period of time until the dead wood is “grounded” and destructed by wood-destroying fungi.

Typical scenarios of massive forest stand mortality were developed, as well as the pattern of their decomposition and accumulation of the most fire-prone components – dead wood mass – with due regard for hypothetical natural cycles of forest fire recurrence for the main forest formations in model forests.

The paper also presents typical examples of dead stand spots as potential sources of catastrophic forest fire incidence. These examples show that tracking of the size and conditions of dead forests, and knowledge of the rates of inflammables accumulation enable to timely evaluate the risk of catastrophic fire occurrence, and therefore properly define priorities and allocate the required resources for forest fire control or prompt suppression.

#### *Brief Review of Gaps in the Forest Legislation on Protection of Forests against Fire*

In the recent two decades, forest legislation, including regulations on protection of forests from fire, has undergone several significant changes. Fundamental changes that eliminated the previous regulatory framework occurred in 2007 after the adoption of the new Forest Code. All this has led to gaps in the regulatory and legal framework for forest relations, inconsistencies between the forest and other related legislation, contradictory legislative rules, and imperfection of many regulations in terms of law enforcement practice.

The chapter presents the complete list of Russian legislative documents providing the existing regulatory and legal framework for protection of forests from fire. Key deficiencies of the federal legislation are revealed and described in detail. To fill the gaps in the federal legislation, several regulations on protection of forests from fire were adopted at the regional

level. However, they are not unified. Each region adopted its own package of regulatory and legal documents but they generally use similar approaches to address the forest fire issue.

Laws and regulations providing the legal framework for consistent outreach activities on forest fire control are non-existent in the post-2007 legislation. There is general understanding and recognition of the importance of this work for prevention of forest fire incidence, as well as an extensive practical experience generated in previous years.

The analysis has shown that many areas of the regulatory and legal support of forest protection against fires are still underdeveloped. The most poorly addressed issues include forest fire prevention and outreach activities.

## **Part II. Strategy and Measures of Forest Fire Control**

### *Key Areas of Forest Legislation Improvement*

Among all areas of the forest fire control strategy, priority attention should be given to the improvement of forest legislation to address the following issues:

- Establishment and legal support of a national system of forest fire management
- Division of powers and responsibilities for protection of forests against fires between the federal, regional and local authorities
  - Division and legal establishment of forest users' responsibilities for protection of forests against fires in the leased areas, as well as adjacent and unallocated territories
  - Institutional, methodological and policy framework for forest fire prevention and control from the viewpoint of risk management concept
  - Monitoring of inflammable materials in areas of dying and degrading forests, and control over their accumulation
  - Forested area zoning according to potential fire incidence, and responsibility of parties to forest relations for forest fire prevention and suppression
  - Regulatory, legal and institutional framework for forest fire prevention
  - Community involvement and participation in forest fire prevention and control
- Improvement of financing procedures and mechanisms
- Scientific and information support of forest protection against fires

### *Economic Use of Dying and Damaged Stands as Part of Forest Fire Prevention*

The key interventions aimed at forest fire prevention and control in areas of forest mortality, as well as reduction of catastrophic fire incidence include the following:

1. Streamlining of the regulatory and legal framework for involvement of dying forest areas in economic use
2. Development of draft fire management arrangements for dying forest areas
3. Timely assignment of newly burnt areas and other dying forest areas for use
4. Construction of forestry roads to large dying forest areas
5. Arrangement of fire breaks and reference lines in dying and destroyed forest stands
6. Preventive burning of dead stands using the technology ensuring fire manageability

7. Lopping and crushing of dead trees using heavy forestry and harvesting machinery
8. Selection of optimal cutting methods and technologies
9. Economic incentives to encourage harvesting and processing of burnt timber

### *Zoning of Forest Fires according to Social and Environmental Hazard with due Regard for Transboundary Impact*

Forest fires are part of the natural system. The evolution process has created forest formations whose existence and renewal are directly related to fires. The attitude to forest fires depends on the permissible or acceptable socio-environmental rates of fire incidence in a given area. Implementation of the new approach requires elaboration of:

- Permissible rates of fire incidence in major forest formations;
- Zoning of areas according to social, economic and environmental significance of potential forest fires, and levels of costs required for their control and suppression;
- Methods of detection, real-time forecast and evaluation of forest fire hazard, and environmental and economic damage from occurred fires;
- Legal grounds (rules) for establishing forest users' responsibility for the security of leased forested areas;
- Mechanisms of interagency coordination and division of powers and responsibility for protection of various categories of forest lands and facilities against fire;
- Institutional and legal framework for forest fire monitoring, and making of prompt decisions on forest fire suppression.

A zoning model was developed that can serve as a basis for division of responsibility for protection of forests against fires based on selective prompt decisions on fire suppression, and differentiated approach to sound allocation of budget and municipal finds, as well as leasers' funds intended for forest fire control and suppression.

Maximum permissible rates of fire incidence both in forest formations and natural complexes of various size provide the grounds for establishing legal responsibility for protection of forests against fires at all levels.

### *Promising Methods and Technologies of Early Fire Detection and Prevention of Forest Fire Development up to an Uncontrolled Level*

A promising way to ensure early fire detection may be to equip the watchtower network with automatic TV cameras with surveillance area covering the whole or part of forested land. Fire-fighting forces are unable to perform real-time monitoring of all forests with equal quality. The chapter proposes a know-how to justify the selection of sites for ground-based monitoring and location of equipment with due regard for environmental and silvicultural factors.

The approach is based on three principles – video observation devices are to be located in forests that: 1) have high value; 2) have high rates of fire incidence; 3) are actively visited by the population.

The proposed methodological framework enables to: reveal the key factors of forest fire propagation in a given area; forecast forest fire development; develop a sound system of

coordination between ground-based, airborne and satellite video devices for forest fire monitoring.

*Rehabilitation and Post-Fire Restoration of Forests and Non-Forested Lands Degraded as a Result of Recurrent Natural Fires*

Recurrent fires lead to degradation of forest lands. As a result of multiple recurrent forest and grass fires, hundreds hectares of mixed coniferous-deciduous forests of medium and high productivity in the Russian Far East have turned into grassy and shrub heaths. The chapter considers the origin of this phenomenon, and provides specific recommendations for rehabilitation of such areas. The described areas are suitable for creation of forest crops and plantations.

***Outreach Activities on Forest Fire Prevention***

One of the reasons why fire prevention efforts have no proper effect is the lack of focus on target categories of forest visitors. The most important challenge is related to the forms of preventive work among various social groups that, in turn, require a detailed study.

Several social groups that are in a different way responsible for the occurrence of forest fires were selected according to the “type of activity”. These include: hunters, fishermen, collectors of non-timber products, etc. The chapter presents a brief description of these social groups. The place of residence is the second important criterion of target group identification. Social status also characterizes the people’s mentality and level of culture in terms of relations with the environment. Many psychological aspects that should be taken into account depend on the gender and age structure of a specific social group.

The chapter presents methodological approaches to the assessment of social groups and arrangement of preventive work among them.

**CONCLUSION**

The study enabled to organize the data on forest fire incidence in Russia, analyze the causes of high frequency of forest fire occurrence, develop methodological approaches to the assessment of forest fire risks, and consider the role of communities in protection of forests against fires and practical interventions to reduce the forest fire incidence.

*Main Conclusions:*

- Forest fires in Russia continue to develop according to a catastrophic scenario. This largely results from the elimination of the centralized system of forest protection against fires.
- Man is the main source and the most prevalent cause of forest fires. High rates of forest fire occurrence and spread are preconditioned with a broad range of managerial,

technological, institutional, economic, social and climatic factors as well as with the national forest management system in general.

- Among the broad range of factors contributing to high rates of forest fire incidence, one should highlight various forms and ideology of illegal forest use, and overall inconsistency of the forest use system.

- The efforts of federal and regional authorities, specialized agencies responsible for forest protection against fires fail to effectively change the forest fire trends.

- There is an increasing trend of man-made fire occurrence, and accelerated rates of inflammable material accumulation in forested areas due to massive forest mortality and degradation.

- Regulations providing a legal framework for outreach activities on forest fire control are non-existent in forest legislation.

- Efforts to reach local communities to prevent forest fire are a key tool for forest fire prevention. To reduce forest fire incidence, it is necessary to develop a legal and regulatory framework for public involvement and respective guidelines and procedures.

- A methodology is proposed for *Assessing the Level of Fire Hazard from Social Groups Staying within a Forest Area (Forest District)* enabling to perform targeted activities aimed at forest fire prevention.

In general, the strategy of forest protection against fires should be focused on:

- Improving forest legislation,

- Shifting the forest fire policy paradigm from total fire suppression to fire prevention and management.

- Structuring the institutional framework and a system of coordination between federal, regional and local authorities, concerned agencies and forest users to ensure efficient monitoring, forecasting of forest fire conditions, prompt response to detected fires, focused mobilization of funds, and suppression of forest fires.

- Establishing a special centralized service of public forest protection against fires at the federal level, and respective local branches.

## About ENPI FLEG Program

The ENPI FLEG Program supports governments of participating countries, civil society and the private sector in the development of sound and sustainable forest management practices, including the prevention of illegal forestry activities. Participating countries include Armenia, Azerbaijan, Belarus, Georgia, Moldova, Russia and Ukraine. This Program is funded by the European Union with a contribution from the Austrian Development Cooperation.

[www.enpi-fleg.org](http://www.enpi-fleg.org)

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