Chapter 13

Influence of Environmental Conditions on the Susceptibility of the Territories to the Occurrence of Forest Fires: Forest Fire Danger

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ABSTRACT

The chapter describes the conditions of predisposition of territories to the emergence of forest fires on different continents of the world. Information on the types of forest fires and the characteristics of burning materials is given. Human and economic losses from the forest fires and other emergencies (earthquake, flood) are compared. The causes of forest fires and their dynamics in Europe, USA, Canada, Southeast Asia, and Russia are given in this chapter. An analysis of the factors of their occurrence is given. Forest fires in the Russian Federation, where they annually cover large areas, have been studied in detail. The dynamics of the burning of Russian forests in the regions and administrative districts of the Tomsk region is considered. The causes of fire emergence is revealed. The forecast of forest fires is given and zoning of forest areas of the region as for fire danger is carried out. The research identifies the role of natural conditions in the occurrence of forest fires at various territorial levels (continents, countries, regions, areas).

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INTRODUCTION

Forests are to be an important element of a country’s natural resource potential and play a diverse role. The Russian Federation accounts for over a quarter of all world timber reserves (82 billion m³), more than two thirds of its territory is covered by forests of various composition.

Annually, forest fires occur in various regions of the Federation, posing a danger to people, settlements, animals and birds. Fires cover large areas, often hundreds of thousands of hectares, leading to the burning of millions of hectares of forest, including those covered with valuable coniferous species. In the massive fires there is a large-scale smoke, which disrupts the operation of air, water and road transport. Smoky clouds slow the ripening of crops. There is a burnout of settlements. Appealing to ambulance is increasing, and the mortality rate rises sharply. All this causes enormous economic, environmental and social damage to regions and countries.

Several thousand people from the Ministry of Emergency Situations and Forest Protection and hundreds of different vehicles, including aviation, are involved in the fight against fire. With the transfer of the forest fund to tenants, the involvement of forest areas into economic circulation, the increasing number of loggers, expeditions, tourists and collectors of forest products there is an increase in fire danger in all federal districts of Russia. Therefore, the task of identifying the main factors of predisposition of the territory to the occurrence of forest fires and the development of new methods of prevention are particularly relevant for the foreseeable future. The reduction of ecosystems’ burning becomes a major contribution of researchers to the preservation of forest resources and the protection of nature of the Russian Federation.

The aim of the research is to identify the common global and regional patterns of the forest fires’ occurrence and course.

To achieve this goal, the following tasks are solved to:

- Determine the number and types of forest fires, the burned-out area at different territorial levels (country, region, administrative region)
- Reveal the role of the regional environmental conditions on the predisposition of the territory to forest fires
- Differentiate the regional and seasonal pyrogenic situation of the region, its temperature, the amount of precipitation and wind strength
- Assess the environmental consequences and financial losses from fires
- Propose some modern preventive measures for the burning forests reduce, worsen the state of forest stands, increasing their productivity, sustainability and diversity

**The object of our research** is the statistical material as for the forest fires, presented on the official websites of different countries. Information on the forest fund and fires that have been obtained from forestry’s inventory materials of all the 85 subjects of the Russian Federation. The forest fund of the Russian Federation, which amounts to 1172 million ha, is characterized by a timber stock of 81.3 billion m³ and an average of annual growth, that is about 931 million m³ (Kovyazin, Romanchikov, Pasko, 2015). Information as for the forest management gives an idea of the country’s forest complex, it is updated every 10 years and is placed in special collections (Moved from below).