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Optimization of Forest Fire Fighting Expenditures

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The relevant background is analyzed in the USA and Russia. It is pointed out that expenditures for forest fire fighting and forest fire damage are in a dynamic reverse dependence. The main principle to optimize expenditures is formulated: the sum of expenditures and damage should be in the minimum. This becomes possible when expenditures and damage are equal. However, it is obvious that it is necessary to take into account a comprehensive damage, direct and indirect, including a predicted one. This principle is difficult to realize in practice since there are undefined and considerable fluctuations of fire areas and fire damage by years, as well as uncertainties in monetary evaluation of environmental fire effects (in particular, forest fire impact on atmospheric oxygen and carbon balance). The paper considers ways to overcome some difficulties on the assumption of equal estimation accuracy for various damage components. It is suggested that forest fire behaviour prediction based on vegetation fuel (VF) maps should be used for optimization of expenditures for forest fire fighting. Methods of making VF maps are developed at the Sukachev Institute of Forest SB RAS. The information databases for making such maps using forest inventory data are available for some parts of Russia: Chunskiy Forest Office (Krasnoyarsk krai) and nature reserves (Stolby, Sayano-Shushensky, Kuznetskiy Alatau, Ubsunurskaya kotlovina). With forest inventory information being absent or not relevant, it is possible to use a method of VF maps creation based on space images of high and ultrahigh resolution.