Water sources in the landscape in relation to extinguishing forest fires

The aim of the project "Water Sources in the Landscape in Relation to Extinguishing Forest Fires" was to find out about the degree of fire risk to forest stands in the Czech Republic and, related to it, the identification of factors that have the greatest influence on the presence of fire (threat). Simultaneously, there was an assessment of whether there are enough water sources in the Central European landscape usable for fighting forest fires, how these sources are registered, and how the data are updated and how the actual state in the field is verified.

Threat to forest stands from fires

The greatest risk factor for the occurrence of a forest fire is the presence of humans (Fig. 1). In the Czech Republic, up to 98% of forest fires are caused by human activity. According to the analysis, another factor significantly affecting the occurrence of forest fires is the number of coniferous forests in the area, as they are more flammable than deciduous forests. From these results it is clear that the most endangered areas of the Czech Republic in relation to forest fires are the surroundings of large cities, especially the whole of Central Bohemia near Prague. Based on the factors, a map of forest fire risk was created (Fig. 2).
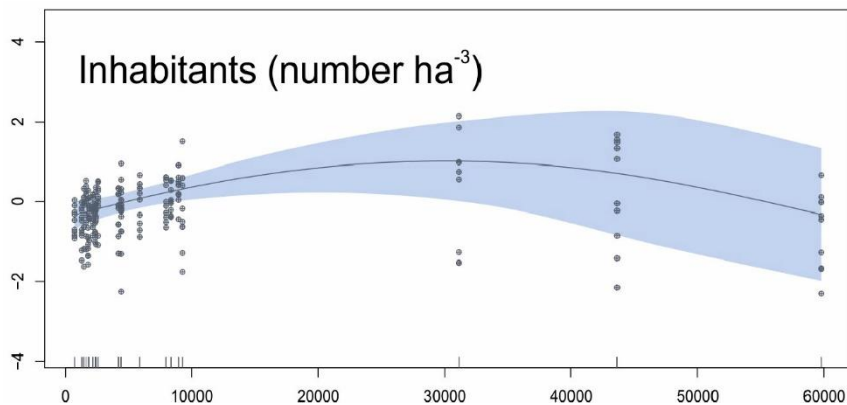

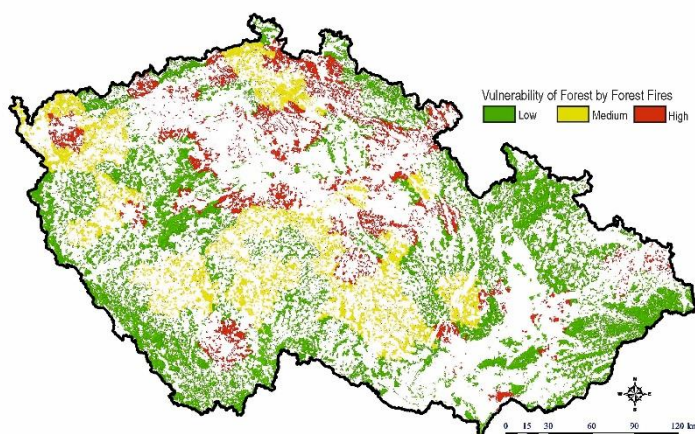Fig. 1 Dependence of forest fires on human population

Fig. 2 Map of forest fire risk in the Czech Republic

Water sources for fire fighting

In the GrassGIS environment, an algorithm was developed for the use of different types of water sources and their influence on the availability of fire extinguishing water, distance from water sources,

the size of the forest per water area, and so on (see Appendix). In the analyses of water sources, a number of existing reservoirs were identified which are immediately usable for firefighting, but they are not recorded in the databases of fire brigades. In times of climate change and increasing drought, it is therefore advisable to include a number of reservoirs in fire protection plans.

The obtained results show that there are enough water sources for forest fire extinguishing in the Czech Republic (Fig. 3). However, analyses may reveal weak points in various parts of the Czech Republic where there is a local shortage of fire extinguishing water sources or the sources are too far away. The above-mentioned analysis can be used for strategic planning of building water sources, for local increase of prevention against forest fires, etc. The algorithm can be recommended to all Central European countries to evaluate the adequacy of water reservoirs to fight forest fires.
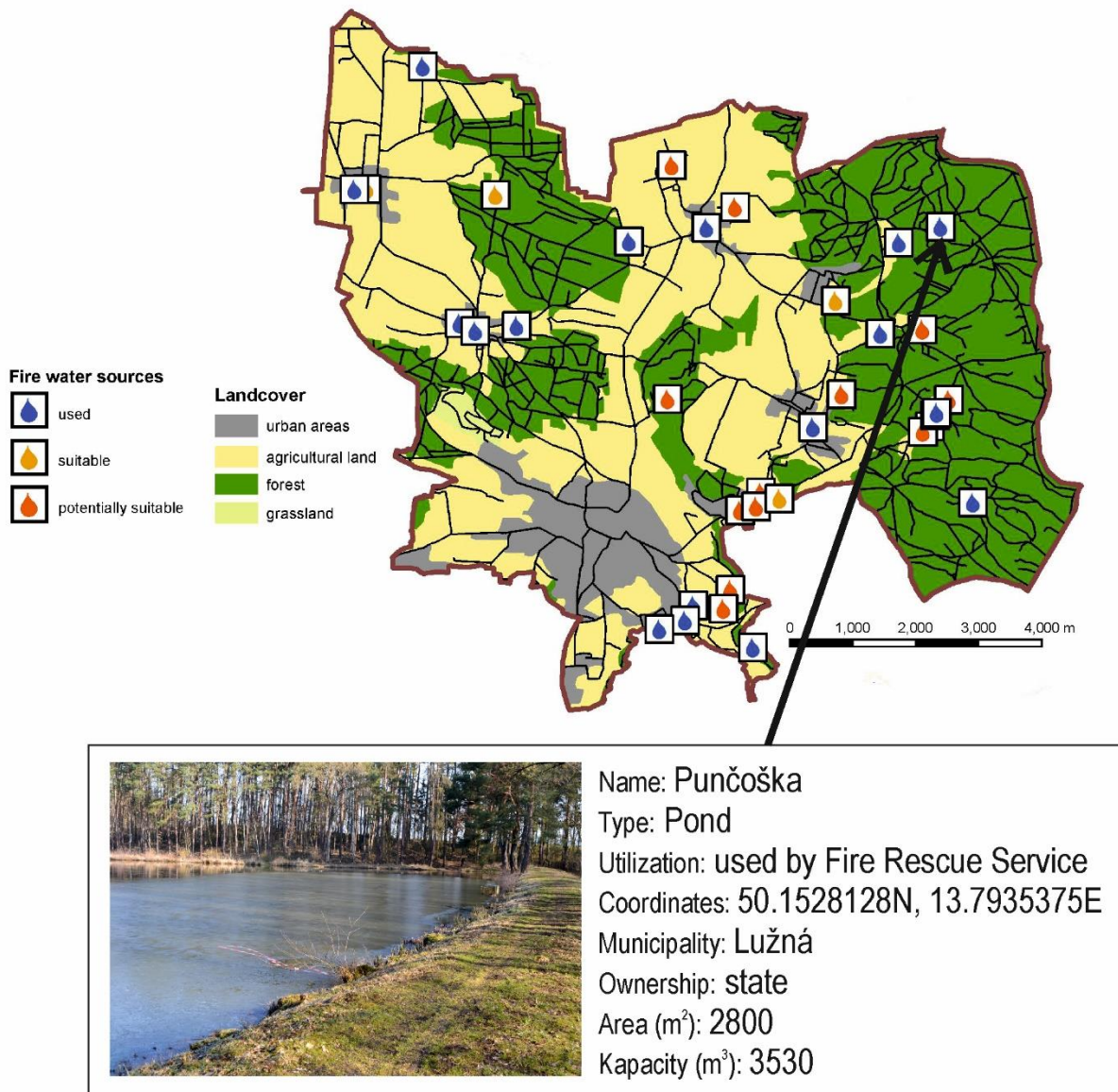

Fig. 3 Example of distribution of water reservoirs entering the model