IMPACT OF WILDFIRES BURNING ON PEATLAND ENVIRONMENT IN LATVIA

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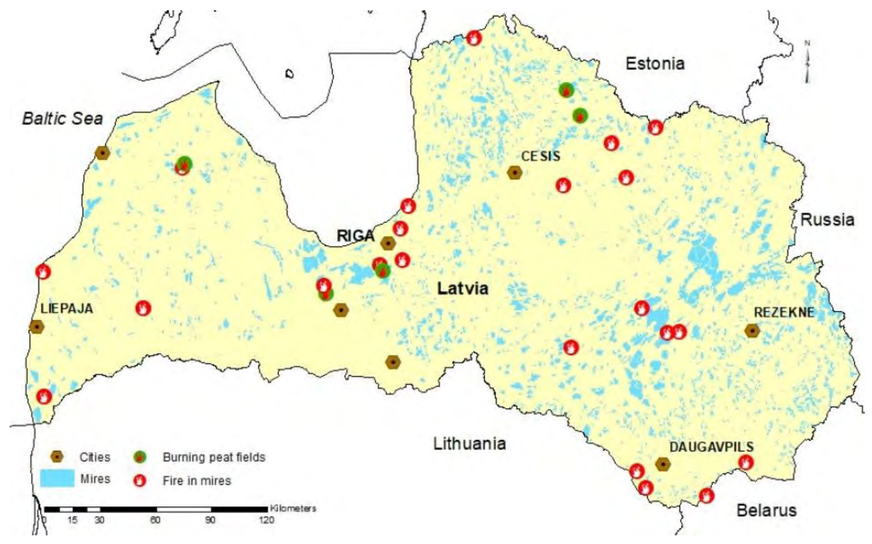
It is assumed that bogs and fens in their healthy, natural state are quite fire resistant. However, the number of peatland wildfires has increased over the recent decades. It is usually caused by reckless human activity, but also by natural ignition, which can be partly explained by the climate change. Air temperatures soar during summer seasons, and are usually accompanied by very low volume of precipitation. Dry and hot spells like this are becoming longer, causing lowering of groundwater level in peatlands.



Large scale peatland fires during last decades in Latvia.

Stiklu peatland 2018
Photo: LETA, Ģirts Grenevics/Talsu TV

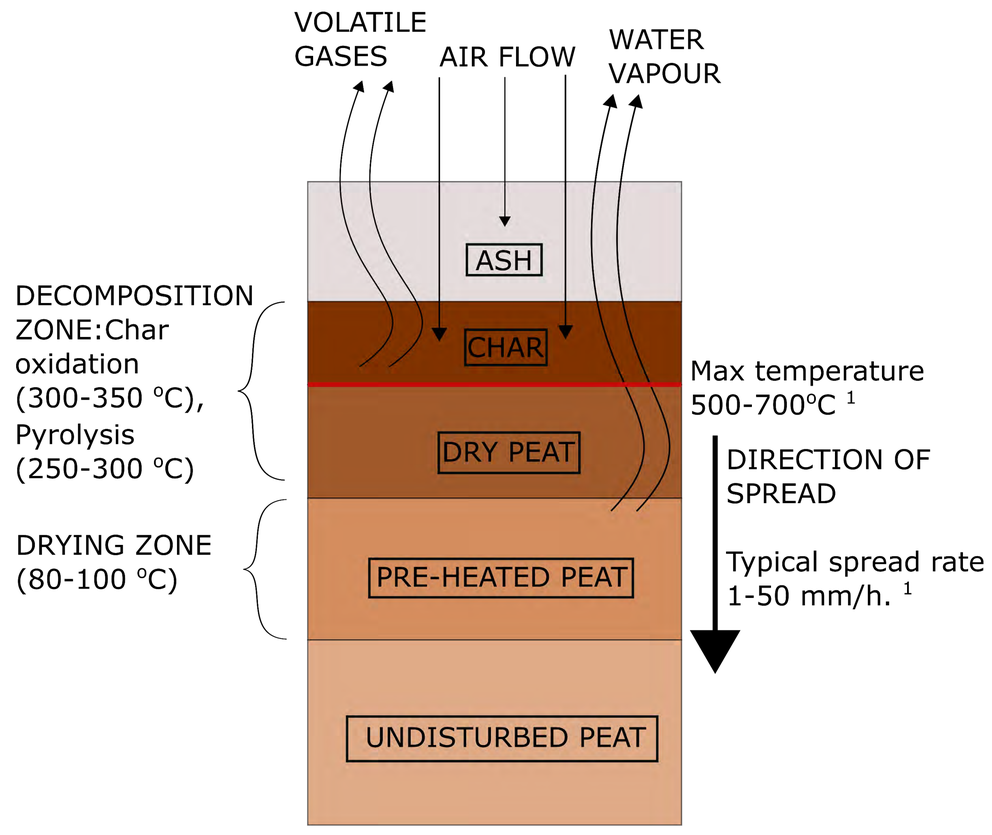
Usually wildfires happen in the areas with the dominance of raised bogs or raised bog peat type, mainly Sphagnum. It is well known that fires change the vegetation of mire, however their rehabilitation depends on many factors. While there are few studies on fire impact on vegetation in Latvia, little is known of its effect on peat, as well as to what extent the peat characteristics and quality have changed. The results of study will provide suggestions in the future management of bog ecosystems and peatlands in the light of climate warming.

Smouldering combustion of peat - perspective of fire science

During smouldering the heat is released as oxygen directly reacts with the solid surface.[1]

Smouldering driving factors	Influencing parameters
Oxygen availability (by diffusion)	Distance from the decomposition zone to the free surface
	Permeability of the peat, ash and char
Net heat (heat generated – heat lost)	Heat generated (by combustion). Higher organic content and composition contributes to more generated heat.
	Heat lost (by conduction, convection, radiation, water evaporation, pyrolysis). Thermal properties influence heat losses. Higher water content will increase heat losses by evaporation. Critical water content ~ 110 – 135 % of the dry base. [2,3]

Schematic of in-depth downward smouldering combustion spread. Reproduced from ref. 4



[1] G. Rein, Smouldering Combustion, SFPE handbook of Fire Protection Engineering, 5th edition, Springer, 2016
[2] G. Rein, N. Cleaver, C. Ashton, P. Pironi, J. L. Torero, The severity of smouldering peat fires and damage to the forest soil, Catena 74 (2008), 304 – 309 DOI: 10.1016/j.catena.2008.05.008
[3] W.H. Frandsen, The influence of moisture and mineral soil on the combustion limits of smouldering forest duff. Canadian Journal of Forest Research 17 (1987), 1540–1544, DOI: 10.1139/x87-236
[4] X. Huang, G. Rein, Smouldering combustion of peat in wildfires: inverse modelling of the drying and the thermal and oxidative decomposition kinetics, Combustion and flame 161 (2014) 1633 – 1644 DOI: 10.1016/j.combustflame.2013.12.013