Fens are valuable wetland ecosystems, supporting occurrence of many rare plant species. Fens are found in areas with continuous, slow discharge of mineral-rich ground water. High soil moisture hampers organic matter decomposition which results in peat deposit formation. Low productive fens are usually dominated by small plant species adapted to unfavorable soil conditions, such as hypoxia or low soil fertility. Low availability of nitrogen or phosphorus is essential for occurrence of specialized and small fen species because nutrient deficiencies reduce plant productivity and impair growth of fast growing, competitive species such as shrubs or trees. Vegetation of fens is very vulnerable to eutrophication or any disturbance leading to ground water level decrease. Most of fens in Europe have been heavily disturbed and lost rare plant species.

Fire may strongly disturb functioning of fens. Fires can be divided into two types. Surface, flame fires consume only aboveground plant biomass. Ground smoldering fires occur mostly on drained peatlands and consume soil organic matter. Ground fires significantly impact habitat conditions of fens through releasing nutrients stored in peat. Additionally, burning of superficial peat layer brings peatland surface closer to ground water level. It may result in increase of soil moisture.

There is little information available on the influence of ground fires on nutrient availability and vegetation recovery on European fens. Published papers refer mainly to peatlands of different types or peatlands located outside of Central Europe. Because of lack of data and projected increase in fires frequency and severity there is need to better understand the long-term effects of ground fires. The presented research tries to supplement knowledge about ground fire influence on fen functioning. The research was conducted on partially drained Biele Suchowolskie fen located in the Biebrza National Park. In 2002 a ground fire covered about 1200 hectares of the fen and was characterized by uneven severity. As the effect of fire there were areas burnt to different depths, from unburnt to deeply burnt up to 80 cm. Earlier fire took place in 1965, so it was possible to check if fire effects are still detectable after almost 50 years since burning.

The main goal of my research was to comprehensively assess the long-term changes of habitat properties and vegetation recovery trajectories on the burnt Biele Sucholowskie fen. After the 2002 fire most of the burnt areas lost rare fen species and became dominated by dense willow shrubs. Strongly drained areas, where soil moisture remained low, were covered by nitrophilous plant communities. The most severely burnt areas were initially covered mainly by willows but later reed bed species became dominant. Unburnt areas retained herbaceous vegetation and were resistant to shrubs invasion, however vegetation degradation typical for drained peatlands was noted.

Comparison of properties of soil collected from closely located burnt and unburnt areas showed that even after 11 years since the fire, there are still clear differences present. Most importantly, on the burnt areas I recorded six times higher content of plant available phosphorus, higher ash content and soil moisture, and lower total carbon and nitrogen contents.

Burnt areas covered by willow shrubs or nitrophilous plant communities were characterized by increased content of plant available phosphorus in soil and water. However, phosphorus availability was low in the most strongly burnt areas. Phosphorus was probably bound to iron and was unavailable to plants. High total Fe:P prevented release of phosphorus, even when ground water level was high. Availability of nitrogen in the most strongly burnt areas was also low, both in soil and water. Soil samples taken from areas burnt in 1965 were still enriched in phosphorus.

Nutrients ratio in leaves of *Salix cinerea* clearly showed potassium deficiencies in the unburnt areas, although soil and water analyses did not suggest that. In the most strongly burnt areas there were probably weak nitrogen deficiencies. In the rest of the burnt areas I did not find marked nutrient deficiencies.

Ground fire caused disappearance of valuable fen plant species and enhanced expansion of plant communities typical for fertile areas. Adverse fire effects seem to be long-lasting and are clearly visible after almost 50 years since fire. Fire led to significant increase of plant available phosphorus content, so phosphorus-limited fens are especially subjected to degradation caused by ground fires.