



Long-term monitoring – a key to understanding peatland ecosystems in a changing climate

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The response of ecosystems to predicted climate change can be empirically estimated by experimental research, as well as by long-term monitoring. Peatlands are an example of very valuable ecosystems which need special attention in the face of the climate change challenges.

The position of the groundwater table plays a crucial role in peatland functioning, affecting rates of peat accumulation and organic matter decomposition, as well as biochemical processes that regulate greenhouse gases cycling. In the case of ombrogenic and topogenic peatlands, interannual and seasonal changes in precipitation and thermal conditions are reflected very accurately in the fluctuations of the groundwater table. Unfavourable meteorological conditions (prolonged drought, thin snow cover in high latitudes) within several years may cause tree encroachment, which in turn can affect the peatland ecosystem by further lowering the water table and by changes in microclimatic and surface conditions.

Our ten-years study of the groundwater table fluctuations and local climate of poor fen (ca. 6.0 ha) in northern Poland, shows, that 2-3-year-old layout of unfavourable hydrometeorological conditions is sufficient to peatland started to overgrow. We have also examined the differences in microclimates and species composition of testate amoeba between open and shaded (by trees) plots. The results of the study from the growing season 2012 showed that open plots were characterized by higher air temperature, despite often lower values of minimum temperature and increased vapour pressure deficit, what caused more frequent drying of surface moss layer. The cumulative value of growing degree days (GDD) showed that the coldest places were the shaded ones, what is an important message in the context of climate change refugia. Also, we have observed differences in dewfall occurrence, what has a significant contribution to the formation of microhabitat conditions.

Nowadays, basic monitoring of groundwater table position and local climate should be done along with other studies to fully understand the functioning of those ecosystems in a changing climate.