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Effects of long-term drainage on microbial community composition vary between peatland types

Zuzana Urbanová and Jiri Barta
University of South Bohemia in Ceske Budejovice, Faculty of Science, Department of Ecosystem Biology, Czech Republic

Peatlands represent an important reservoir of carbon, but their functioning can be threatened by water level drawdown caused by climate or land use change. Knowledge of how microbial communities respond to long-term drainage in different peatland types could help improve predictions of the effect of climate change on these ecosystems.
We investigated the effect of long-term drainage on microbial community composition in bog, fen and spruce swamp forests (SSF) in the Sumava Mountains (Czech Republic), using high-throughput barcoded sequencing, in relation to peat biochemical properties. Longterm drainage had substantial effects, which depended strongly on peatland type, on peat biochemical properties and microbial community composition. The effect of drainage was most apparent on fen, followed by SSF, and lowest on bog. Long-term drainage led to lower pH, reduced peat decomposability and increased bulk density, which was reflected by reduced microbial activity. Bacterial diversity decreased and Acidobacteria became the dominant phylum on drained sites, reflecting a convergence in bacterial community composition across peatlands after long-term drainage. The archaeal communities changed very strongly and became similar across drained peatlands.
Overall, the characteristic differences between distinct peatland types under natural conditions were diminished by long-term drainage. Bog represented a relatively resilient system while fen seemed to be very sensitive to environmental changes.