

BOG DRAINED FOR FORESTRY IS A STRONGER CARBON SINK THAN A NATURAL BOG FOREST

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The principle of natural peatlands is carbon accumulation. Water logged, anoxic soil conditions induce reduced decomposition of organic matter and continuous carbon storage. The natural carbon sink functioning of peatlands is threatened by increasing temperature and water table drop down, caused by climate and land use change.

This study focuses on the CO₂ exchange of a natural bog forest, and of a bog drained for forestry in the pre-alpine region of southern Germany. The net ecosystem exchange (NEE) has been investigated for 18 months, using the eddy covariance technique. The sites under investigation are separated by only ten kilometers, and thus share the same geological history and are generally exposed to the same climate and weather conditions. In contrast, the two measurement sites are clearly distinct by land use type: at the *Schechenfilz* site (47°48' N; 11°19' E, 590 m a.s.l.) a natural *Pinus mugo rotundata* forest grows on an undisturbed (> 6 m) thick peat layer, while in *Mooseurach* (47°48' N, 11°27' E, 598 m a.s.l.) a planted spruce forest (*Picea abies*) grows on drained and degraded peat (< 4 m).

Our investigations, after less than two growing seasons, indicate that the drained, forested bog is a much stronger carbon dioxide sink than the natural bog forest. Although the ecosystem respiration is two times larger at the drained site, the great gross primary production of the spruces leads to a net CO₂ uptake. However small differences of the driving parameters like increasing temperature cause a strong carbon release at the drained site. In contrast, the natural site appears to be more in balance and can compensate changing environmental parameters. To date, our study represents a “snap shot” in the long-term development of the two land-use types and the potential range of interannual climate variations. To compare estimates of long-term net biome production (NBP) between the two sites, the carbon loss from peat degradation on the drained site must also be taken into account.