



Impact of peatland restoration on nutrient and carbon leaching from contrasting sites in southern Finland

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Impacts of peatland restoration on nutrient and carbon leaching from contrasting sites in southern Finland

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Less than 20 % of the original mire area of southern Finland is still in natural state. Even many peatlands in today's nature conservation areas had been partly or totally drained before conservation. Until now, about 15000 ha of peatlands have been restored in conservation areas. Here we present data concerning changes in leaching due to restoration in two contrasting areas in southern Finland.

The peatlands in Seitsemien have originally been fairly open, growing stunted pine, and unfertile, either bogs or poor fens. The responses of tree stand to drainage in the 1960s were moderate, and the tree stand before restoration was about 50 m³/ha, on average. The trees were partly harvested before filling in the ditches mainly in the years 1997-1999 .

The peatlands of Nuuksio are much more fertile than those in Seitsemien, and had greatly responded to drainage, which took place already in the 1930s and 1950s. The tree stand consisted mainly of spruce and exceeded 300 m³/ha in large part of the area. The ditches were dammed in the autumn 2001 and the tree stand was left standing.

Runoff water quality was monitored in three basins in both areas. To obtain the leaching rates, we used simulated runoff data obtained from the Finnish Environment Institute, Hydrological Services Division. The responses in leaching were in the same direction in both cases. However, especially when calculated per restored hectare (Table 1), the responses were much stronger in the more fertile areas of Nuuksio for organic carbon and nitrogen, but not so much with phosphorus. The reasons for the greater responses in Nuuksio are partly hydrological. The mires are minerogenic, catchment fed mires, and by restoration the peat layers regain their contact with the waters from the catchment. This is not the case with the bogs of Seitsemien and of less importance in the poor fens with a small catchment. Also biological reasons exist. The peat layers have changed much more in the fertile peatlands of Nuuksio. Moreover, the living biomass is much larger in Nuuksio, and due to restoration this biomass is inundated and consequently exposed to anaerobias. This has caused death of the forest species, release of bound nutrients, and gradual colonization by mire species leading to renewed bounding of nutrients.

Restoration of drained peatlands is a positive action, but harmful water impacts should be avoided. This urges for hydrological knowledge in the planning and accomplishing phases.

Table 1. Annual unrestored leaching rates of organic carbon, nitrogen and phosphorus in the study sites,

and increase in leaching as a sum of 6 post-restoration years, calculated per restored mire area.

Site Unrestored leaching

g C m-2 a-1 Increase in leaching

g C m-2 6a-1 Unrestored leaching

g N m-2 a-1 Increase in leaching

g N m-2 6a-1 Unrestored leaching

g P m-2 a-1 Increase in leaching

g P m-2 6a-1

Seitsemien 10.5 58 0.19 1.18 0.009 0.21

Nuoksio 5.3 107 0.13 2.54 0.004 0.18