

The hydrological properties of waterlogged and drained forests in Latvia

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Abstract: Almost half (47%) of Latvian forest areas (3611 thousand ha) are considered degraded or partly improved by the hydro-technical drainage. The degradation is caused by very poor soil aeration due to waterlogged conditions. The location of waterlogged forests in Latvia is neither uniform nor occasional. Comparison of the abundance of waterlogged forests and the amount of atmospheric precipitation showed that the waterlogged forests are mainly located in areas with least precipitation. This hydrological phenomenon is connected with water discharge in drainage ditches: even during the dry summers of the years 1963, 1964, 1975, 1976 and 2002 in the drained forests with deep peat soils water flowed continuously in 1 m deep ditches and the discharge exceeded the amount of precipitation. Using the data from 182 sample plots in drained forests with the peat layer depth of 4.2 m, it was found, that coniferous forests are most productive in areas where the peat layer is most dense. One of the possible explanations for this phenomenon is that the most intensive paludification and formation of most dense peat layer are characteristic for the areas with intensive water discharge from confined aquifers. This discharge provides necessary mineral nutrients for the forest soil regardless of the peat layer thickness. The forest productivity may increase several times due to the enhancement of water movement in soil and to improved soil aeration by hydro-technical drainage. Also the flow regime of rivers connected with the drained areas changes considerably, mitigating extremely high and low flow events.

Key words: forest paludification, nutrients, water discharge, waterlogged forests