Variation of plant cover and soil nutrient content in two floodplain forests in Soomaa National Park, Estonia

M. Karu¹, M. Metsmägin¹, E. Roosaluste², K. Lõhmus¹ & Ü. Mander¹
¹Institute of Geography, University of Tartu, Estonia
²Institute of Botany and Ecology, University of Tartu, Estonia

Abstract

We studied the fluctuations in vegetation cover (during 1998-2000) and soil nutrient content (1998-2003) in two complex floodplain forests (Lemmjõgi and Karuskase) in Soomaa National Park, Estonia. Five main forest site types were distinguished: the Humulo-Ulmetum floodplain forest site type, the Calla swamp forest site type, the Aegopodium site type, the Filipendula site type, and the Filipendula-Oxalis transitional site type. The structure of the vegetation cover did not show significant temporal changes, although the hydrological regime varied significantly (1998 and 2000 were relatively rainy with higher floods, while 1999 was relatively dry). Only the values of the van der Maarel similarity index changed remarkably, showing higher differences in wet summers. The values of the Shannon and Simpson diversity indices were higher in species-rich and dry plots and lower in moist plots. In the area heavily influenced by floods, the temporal variation of C and Kjeldahl N contents in the topsoil (O-horizon and the 0-15 cm layer; 7-48 % C and 0.4-1.9 % N) had a larger amplitude than in the area of lesser flood influence. In the deeper zone (50-60 cm), C and N content was stable, varying from 0.1 to 0.2 % N and from 1 to 4 % C respectively. The higher variability of nitrogen content in the O-horizon and the topsoil is probably related to the higher variability of denitrification and lateral N fluxes. The available P content in soil varied more than the C and N content, and was 60-200 mg P kg⁻¹ in the O-horizon. The site types that are more influenced by floods showed a higher variation of P content. P appears to have leached from deeper horizons during the wet years. We were unable to find any significant differences in soil nutrient content between the different forest site types. We found a statistically significant (p<0.01) correlation between plant species abundance and the C, N and P content of the O-horizon and in the 0-15 cm layer of the topsoil. Chemical indicators explained 5.7 % of the variance of the species data.

Keywords: floodplain forest, Ellenberg indicators, Shannon diversity index, Simpson diversity index, similarity index, nitrogen, phosphorus.