
Microplastic Quantification in Nissan and Lagan River Systems in Shore and Bottom Sediments

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Abstract

Jakobs sjö, an electricity dam of the Nissan River system (Southwest Sweden) is contaminated with large microplastics sedimented out at its shores. In 2021 a field survey of microplastics was carried out in the Nissan River with the Lagan River as reference. We sampled three locations in each river (upstream, lake/dam and downstream). Four replicate bottom and shore sediment samples were taken at each location. Dried samples were fractionated into three size categories (> 2 mm; $2 - 0.9$ mm; $0.9 - 0.55$ mm) and microplastics per area and weight were estimated. We found a higher concentration of large shore microplastics in Jakobs sjö and downstream from it than upstream in the Nissan River. We found no large shore microplastics in the Lagan River system. Smaller size fractions of microplastics were omnipresent in shore and bottom sediments of both rivers. However, the smallest size category tended to be proportionately more dominant at upstream than at downstream locations. This could be explained by biofilm-microplastic floc formation and sedimentation as particles travel downstream. Concentrations of toxicants such as heavy metals can increase thousandfold on the surface of microplastics and since the five heavy metals most likely to sorb to microplastics in a freshwater environment (Cd, Cu, Ni, Pb and Zn) were all present in Jakobs sjö, we conclude that the high concentrations of microplastics in Jakobs sjö may pose a threat to aquatic life.

Keywords: Microplastic, shore sediment, bottom sediment, Sweden, freshwater

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