



Freshwater Microplastics in Norway: A cross-compartment investigation utilising sediment cores, bivalves and historical plankton samples from Lake Mjøsa

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Fragmented plastics and those intentionally produced to be small are commonly known as microplastics (<5 mm). These particles have been found within all environmental compartments, with freshwater systems identified as an important pollutant pathway to the oceans. Unfortunately, there is less research available concerning microplastics in freshwater environments, and the research that exists is fragmented and often focuses on a single sample type. Investigating sources, fluxes and flows through freshwater systems has become a research priority for scientists, stakeholders and policy makers. Here we present the results of a cross-compartment investigation of microplastic pollution in Norway's largest lake, Mjøsa. Mjøsa has been impacted by a wide variety of anthropogenic influences, including effluents from waste water treatment plants, road runoffs, urban drainage, and river and agricultural drainage. Core sediment samples from 20 sites, 10 duck mussels (*Anodonta anatina*), and 12 historical plankton samples dating between 1971 to 2011 were analysed for microplastics. Microplastics were found in sediment from all sites across cores including as deep as 8 cm, estimated to represent 30 years. Highest numbers were found in sediment samples collected close to urban areas and road runoffs, 5.17 and 3.79 MPs g⁻¹, respectively. Lowest numbers were found in areas of low sedimentation, 0.04 and 0.05 MPs g⁻¹. Historical plankton samples appear to be promising to investigate the temporal change in particle composition and polymer type as 9/12 samples contained microplastics. A single fragment was found in one duck mussel, but it is not possible to infer microplastic contamination load from this result. This is the first comprehensive study assessing microplastics in different freshwater compartments from the Nordic countries, which highlights that a combination of compartments should be investigated to understand microplastic pollution in freshwater ecosystems.