

Anthropogenic changes in Lake Korttajärvi, central Finland, during the last 400 years

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Many European lakes have been heavily affected by human activity. These human-induced changes often relate to the post-1850s industrialization and modern agriculture. Lake sediments record these changes as variation in the physical and chemical properties of the sediment and in the species assemblages of the biological remains that are preserved in the sediment. In addition, anoxic conditions at the bottom of deep lake basins allow the formation of varved lake sediments. These can be inexpensively and rapidly used for dating the changes recorded in the sediment. Therefore, varved lakes are excellent archives for examining environmental change and the effect of humans on lakes.

In this study, we investigated the human-induced changes in the varved Lake Korttajärvi in central Finland during the last 400 years. The sediment core was dated by varve counting to the year 1600 CE and divided into subsamples covering 10 years. From each subsample, we determined the sediment total phosphorus (S-TP), identified diatoms, examined their species turnover with multivariate analysis, and reconstructed the diatom-inferred total phosphorus (DI-TP) values of the past lake water. Three different phosphorus fractions will also be determined from the subsamples. In addition, the magnetic susceptibility (MS) of the whole core was measured prior to subsampling.

According to our preliminary results, a constant diatom species turnover in Lake Korttajärvi started in the 1840s. However, the most notable anthropogenic deterioration phase was from the 1920s to the 1970s. During that time period catchment erosion and DI-TP increased, planktonic diatoms became more abundant in relation to benthic diatoms, and S-TP decreased. In the 1970s, municipal waste water treatment reduced nutrient loading into the lake. This started a recovery phase during which an opposite trend in these parameters can be observed. Currently, the diatom assemblage in Lake Korttajärvi resembles those of the early 20th century.