

Reservoir-flooded river mouth areas as sediment traps revealing erosion from peat mining areas – Jukajoki case study in eastern Finland

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Many types of soil-disturbing land use have caused excess sedimentation in Finnish lakes. Identification and quantification of catchment sources of sediment material is crucial in cases where demands for remediation measures are considered.

We studied recent (50 yr) sediments of four small rivers, all draining to a reservoir impounded in 1971. Catchments of two of the rivers had had peat mining activities from early 1980s until recently, exposing large areas of peat surfaces to erosion.

The water level of the reservoir had risen to the river mouth areas of all rivers, while in each case, the river mouth areas still form riverine narrows separable from the main reservoir, hence collecting sedimentation from their own catchments. The original soils under the reservoir water level could readily be observed in core samples, providing a dated horizon under recent sediments. In addition, we used ^{137}Cs -stratigraphies for dating of samples from original river bed locations.

As expected, recent sediments of rivers with peat mining influence differed from others e.g. by high organic content and C:N ratios. Stable isotopes ^{13}C and ^{15}N both correlated with C:N ($r = 0.799$ and $r = -0.717$, respectively) and they also differentiated the peat-mining influenced samples from other river sediments. Principal components of the physical-chemical variables revealed clearer distinction than any variables separately.

Light-microscopy revealed abundance of leafs of Sphagnum mosses in peat-mining influenced river sediments that were nearly absent from other rivers. Spores of Sphagnum were, however, abundant in all river sediments indicating their predominantly airborne origin.

We find that combination of several physical-chemical characters rather than any single variable and microscopy of plant remains can result in reliable recognition of peatland-origin of sediment material when non-impacted sites are available for comparison. Dating of disturbed recent sediments is challenging. River-mouth areas with reservoir history can be particularly useful as the terrestrial soil strata provides a dated horizon under recent sediments.