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Bioavailability of dissolved organic matter originating from different sources in the River Vantaa

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Most of the dissolved organic matter (DOM) pool in the Baltic Sea is of terrestrial origin. Organic matter load to the Baltic Sea has been identified as the second greatest environmental pressure both in the Bothnian Bay and in the Gulf of Finland by the HELCOM Holistic Assessment. Loads of terrestrial DOM may increase the productivity, oxygen consumption and light attenuation in the coastal waters. The quantity and quality of DOM loads that enter the Baltic Sea depend on the properties of the catchment area, land use and the runoff as well as ecological processes and water retention time in freshwater systems, and are sensitive to temperature.

In this study we investigate DOM loads from River Vantaa, which has a catchment area of 1 685 km2 and flows through the most important population center in Southern Finland into the Gulf of Finland. We focus on the effects of soil type and land-use on the DOM load and on the bioavailability of DOM to bacteria in the Baltic Sea. In addition, samples will be collected from up- and downstream of main water treatment plants to estimate the effect of municipal waste on the DOM loads. Further, we aim to estimate the total DOM loads to the Baltic Sea from samples taken at the river mouth. Water samples are collected from river branches selected according to the main land-use (forest or agricultural land) and soil type (mineral or organic soil) in the catchment area. The DOC, DON and DOP loads will be measured. The bioavailability of DOC is measured by incubating the DOM samples (<0.2 μm) in nutrient replete conditions with bacterial inocula (<0.8 μm, retentate of 100 kD TFF) from either river mouth or the Gulf of Finland for two months at dark. Time courses of DOC and DON concentrations, CDOM absorption and fluorescence, bacterial biomass and respiration will be followed.