Dispersal of persistent organic pollutants (POPs) from wood fiber contaminated sediments of industrial origin

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Figure 1. Anna-Karin Dahlberg

Heavily polluted deposits of wood fibers, called fiberbanks, located along the northern Baltic coast of Sweden have recently received attention as potential sources of POPs in the aquatic environment. These pollution hot spots originate from pulp and paper industries, which in the past discharged large amounts of waste composed of contaminated cellulose and wood fibers.[1] The aim of this study was to quantify the fluxes of POPs from fiberbanks to other aquatic compartments. This knowledge is needed for proper risk management and for the prediction of dispersal of POPs in future scenarios. Three polluted fiberbank areas (Väja, Sandviken and Kramfors) were studied. Samples included sediments (in gradients from fiberbanks to more natural sediments), pore water, benthic organisms, suspended particles. Benthic flux chambers were also deployed to measure *in-situ* fluxes. Our study showed that both abiotic and biotic pathways are important for dispersal of POPs from fibrous sediments and that there is a need to further address the legacy fiberbanks as sources of POPs in the Baltic Sea.

In-situ capping has been proposed as a potential cost effective remediation technique for preventing release of contaminants from fiberbanks.[2] Extensive gas production in fiberbanks may, however, disrupt a cap's structural integrity and reduce its effectiveness. In a follow up research project (GASFIB), we aim to quantify contaminant transport of POPs mediated via gas ebullition in fiberbanks and to study the effect of gas ebullition on the effectiveness of different capping material to prevent contaminant dispersal. This project will include field measurements of un-capped fiberbanks, controlled lab experiments with capped and un-capped fiberbank sediment combined with chemical analyses and 3D-imaging using X-ray tomography. Given the impact contaminated fiberbanks may have on the aquatic and benthic ecosystem and the large number of sites known to exist, there is a need to find cost-effective methods for their remediation.

[1] A Apler et al. *SGU Report 2014:16.*
[2] A P Lehoux et al. *Battelle* **2019**.