

Toxicity of pulp mill sediments from River Ångermanälven on zebrafish (*Danio rerio*) embryos

The pulp mill effluents have been found quite toxic, with a complicated chemical composition including more than 250 chemicals used in papermaking process. In the viewpoint of ecotoxicology, sediments play two roles in ecosystem: a reservoir of persistent chemicals from water bodies and the other role is a secondary source that releases contaminants back to aquatic systems. There located several pulp mills along the banks of River Ångermanälven (Sweden). In the present study, the sediments sampled from pulp mill areas Sandviken and Våja were investigated. One additional sampling site at Sandviken was regarded as non-contaminated reference site.

The toxicity testing of sediments were performed on both pore water and whole sediment using newly-fertilized zebrafish (*Danio rerio*) embryos. Combined with the measured abiotic parameters of pore water and sediment samples (e.g. pH, oxygen saturation, conductivity, etc.), the toxicity of pore water and sediments on zebrafish embryos were comprehensively evaluated.

In the pore water test, the fibre bank sediment close to the shore at Sandviken had the highest lethal toxicity. Other pore water samples showed low toxicity, although minor effects on malformation and hatching failure were observed for the outer fibre rich samples at Våja and for the reference site. In the sediment test, samples from both sites at Våja resulted in high toxicity. In contrast, less lethal toxicity was observed for the fibre bank sediment samples at Sandviken, although sub-lethal effects were observed. Consequently, the comparisons between the two different types of tests showed inconsistent results making it difficult to establish relationships between the sediment toxicity and its pore water toxicity, respectively. In addition, several of the abiotic factors showed extreme levels, which might have influenced the results of the tests.

For possible explanation of biological differences between samples, the further testing of differences between pore water and whole sediment should include analytical chemistry to elucidate possible differences in chemical compositions.