

Sedimentation ponds: hotspots for urban contaminants

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Sedimentation ponds receiving highway runoff are shown to accumulate several groups of contaminants, most importantly **polyaromatic hydrocarbons (PAHs)** and metals. Additionally, urban markers such as **polybrominated diphenyl ethers (PBDE)**, **benzothiazoles (BT)** and **organophosphate compounds (OPC)** have shown to be present. This investigation aimed at determining the levels of organic contaminant groups in aquatic matrices in sedimentation ponds and determine the potential for bioaccumulation. PAHs, including alkylated PAHs, BDEs, OPCs and BTs were determined in water, sediment, plants, dragonfly larvae and fish from sedimentation ponds and one reference site.

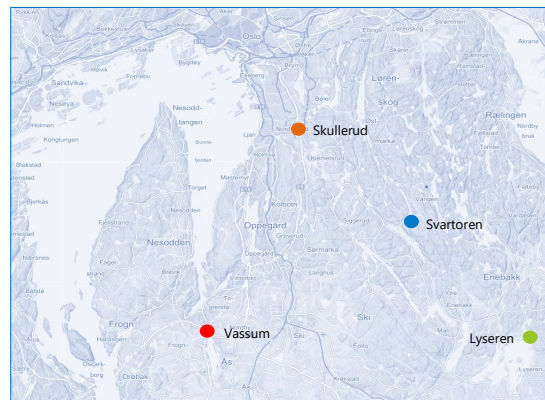


Figure 1 Map indicating locations of sampling sites. Vassum and Skullerud are sedimentation ponds, while Svartoren is the reference site. Perch from Lyseren was used as reference for pike from Skullerud. Colours in Figures 2,3 and 4 reflect location as indicated in the map

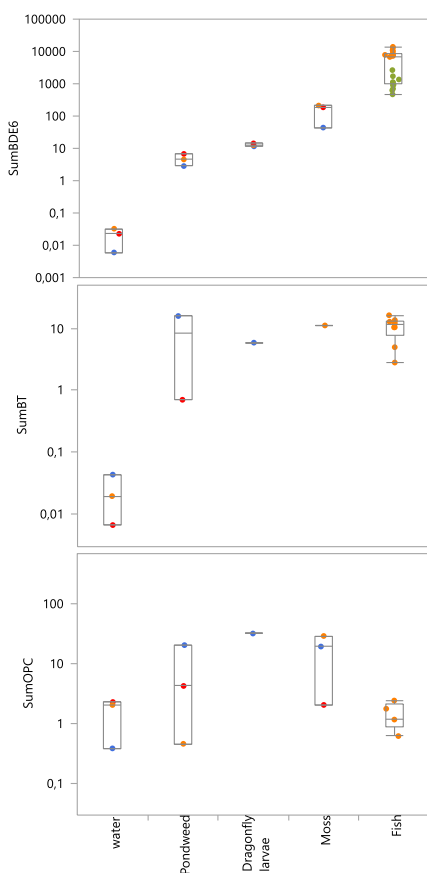


Figure 2 Levels of sumBDE6, sumBTs and sum OPCs (ng/kg ww) in different aquatic matrices



Pondweed



Dragonfly larvae



Moss



Pike

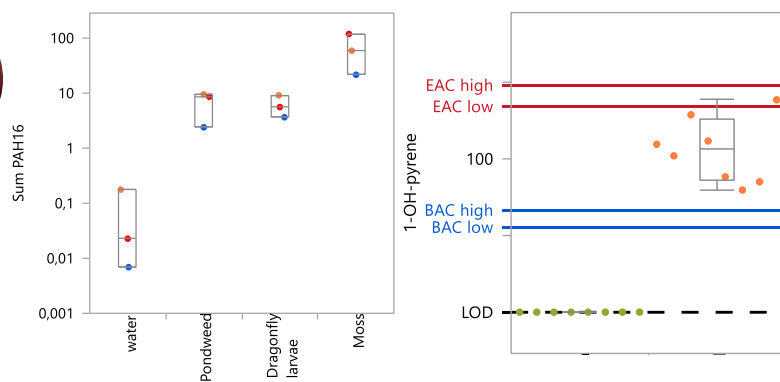


Figure 4 Levels of sumPAH16 (µg/kg ww) in different aquatic matrices (left) and one PAH-metabolite in fish (µg/kg bile) right. Background levels (BAC) in blue and environmental assessment criteria (EAC) in red for marine fish species are indicated, as well as limit of detection (LOD).

	PAH16	PAH16+alkylated PAHs	Alkylation
Svartoren	0.26	0.42	39 %
Skullerud	3.0	20	85 %
Vassum	2.2	16	87 %

Table 1 Sediment levels of PAHs and alkylated PAHs (mg/kg dw). Levels are coloured according to sediment classification criteria for PAH16, where blue, green yellow and orange indicate background, good, moderate and bad environmental levels respectively.

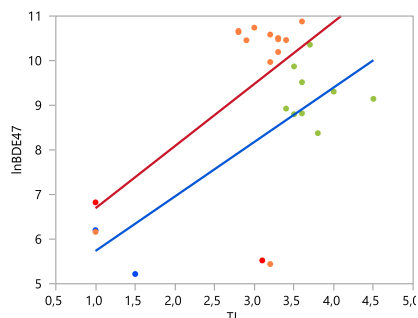


Figure 3 Levels of BDE47 plotted against trophic level (TL) for pondweed, dragonfly larvae and fish. Regression for sedimentation pond is indicated with red line, and reference site with blue line.

Results showed that in general, higher levels of all compound groups were found in sedimentation ponds than in reference. **PAHs** were found in all investigated matrices from the sedimentation ponds, and concentrations increased from water to biota. Fish from sedimentation ponds had elevated levels of PAH metabolites. Alkylated PAHs in sediment from sedimentation ponds were measured in much higher levels than regular PAH16, indicating that alkylated PAHs may play an important role in sedimentation ponds.

BDE47 was shown to bioaccumulate and biomagnify, and levels in sedimentation ponds were higher than in reference. **BTs** were detected in water and some plants. Only fish from sedimentation ponds had BTs above LOD. **OPCs** were detected in water, sediment and plants, but were only rarely detected in fish, and only in fish from sedimentation ponds. BTs and especially OPCs showed low potential for bioaccumulation.