

# Sediment quality assessment by Sediment Profile Imaging (SPI) in contaminated Norwegian harbour and fjords

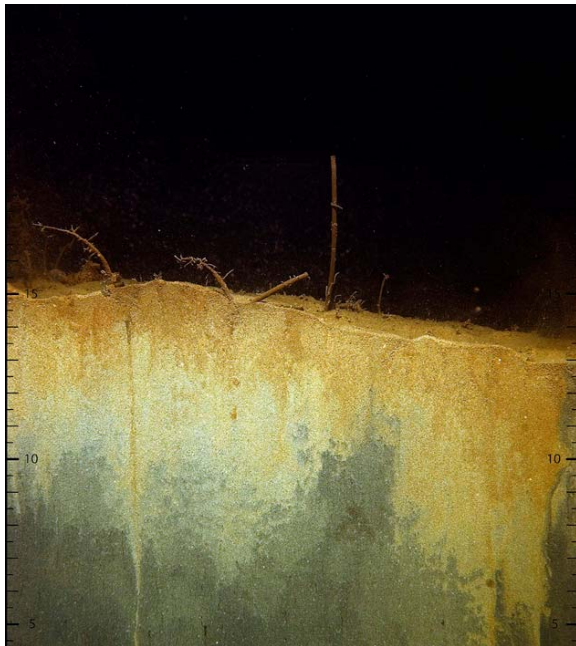
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**Introduction:** During the last decades, historically contaminated sediments have become a challenge in environmental management in coastal countries. The reason is that as industrial and municipal sources have decreased, contaminated sediments remain acting as a potential source for elevated concentration of contaminants in coastal water. In Norway, health advice has been issued on consumption of seafood from 32 fjords and coastal areas and ambitious plans for sediment remediation have been put forward.



**Fig. 1:** A sediment profile image (SPI) from one of the most heavily polluted area in the Grenlandfjord area (Frierfjord). However, ecological the area is healthy with a rich benthic fauna.

The total cost estimate of about 3 billion € for complete remediation of contaminated seabed areas in Norway shows that such operations are

expensive and need to be based on solid scientific knowledge and cost-efficient methods. **Methods:** Capping is a common remediation technology in which a layer of clean material is placed on top of the contaminated sediment to reduce contaminant uptake in biota and leakage to the overlying water. Traditionally, the ecological significance of cap design has received less attention than cap efficiency. We are using sediment profile imaging (SPI) for mapping benthic habitat quality in three contaminated areas before and after remediation (Oslo harbour, Kristiansand harbour, and a larger fjord area on the Norwegian south coast contaminated by dioxins).

**Results:** In organic enriched sediments in Oslo harbour the benthic habitat quality increased rapidly and was already recolonized by tube building polychaets 6 month after remediation. In Kristiansand harbour the SPI survey showed an incomplete cover of the cap, with less successful remediation of the sediment as consequence.



**Fig. 2:** SPI image from the Oslo harbour area. The sediment surface is recolonized of small tube building polychaet after a capping.