To what extend the dam dredging can influence the background level of metals in the Rhine River: using chemical and biological long-term monitoring to answer

Dredging generates remobilisation of sediments contaminated by non-degradable compounds such as metals, to which aquatic organisms can be exposed. This study aims at assessing the environmental impact of sediments remobilised in the Rhine River (France) during the dredging of Marckolsheim dam by pumping/dilution in 2013 on metal speciation and organisms' exposure. The monitoring coupling chemical and biological tools was performed 2 years before dredging operation on 2 sampling sites, upstream and downstream from the discharge of pumping/dilution, to acquire data on the natural variability of labile (DGT as passive samplers), dissolved and particulate concentrations of Cd, Co, Cr, Cu, Ni, Mn, Pb and Zn in Rhine during full hydrological cycles. In parallel, size-calibrated zebra mussels were transplanted at both sites to monitor continuously metal bioavailability from particulate and dissolved fractions. This long-term monitoring allowed the establishment of reference baselines of Rhine water and mussels' contamination levels and subsequently, the detection of averred environmental changes due to the dredging. Indeed, Co and Mn accumulations in mussels exposed to the discharge were consistent with increasing labile species in Rhine whereas ones of Cr and Pb were likely due to an enhanced particulate bioavailability. Whatever the exposure route, the mussels recovered their basal metal contents 2 weeks after the end of dredging, suggesting a transient impact of sediment remobilisation on bioaccumulation. This long-term monitoring highlights the interest of coupling chemical and biological time-integrated tools for a better assessment of environmental risks because metallic exchanges between organisms and their media are complex and metal-specific.

Auteurs du document : Jérémie D. Lebrun, Marine Dufour, Emmanuelle Uher, Juliette Faburé, Raphaël Mons, Rayna Charlatchka, Catherine Gourlay-Francé, Lise C. Fechner, Benoît J.D. Ferrari
Obtenir le document : EDP Sciences
Mots clés : active biomonitoring, DGT, metal bioavailability, natural variability, biosurveillance active, DGT, Biodisponibilité, Variabilité naturelle
Thème (issu du Text Mining) : POLLUTIONS NUISANCES ET PREVENTION
Date : 2017-11-22
Format : text/xml
Source : https://doi.org/10.1051/kmae/2017049
Langue : Anglais
Télécharger les documents : https://www.kmae-journal.org/10.1051/kmae/2017049/pdf