

SUSTAINABLE MANAGEMENT OF DREDGED SEDIMENTS: PERSPECTIVES ON BENEFICIAL USE

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Abstract

Dredging of sediments occurs worldwide to maintain water levels of harbours or other water bodies or restore aquatic ecosystems. As a result, dredged sediments are produced around the world and require proper management. Traditionally, the material is disposed of in open oceans or landfills. However, the methods are restricted by environmental and legal concerns. The recycling of dredged sediments can contribute to finding more sustainable-management alternatives and stop the depletion of natural resources. Dredged material can be employed in construction and soil conditioning, among others. Nutrients are essential for life, and elements like phosphorus are limited on Earth, increasing the need to find more sustainable sources. Therefore, the use of sediments to recover nutrients is highly encouraged. As pollutants can be present in sediments, the risk of pollution while using the material must always be considered. This study aimed to research the use of dredged sediments as a plant-growing substrate and characterise and study the risk of metal pollution. The studies are part of the doctoral thesis “Sustainable management of dredged sediments: potential recovery of valuable compounds”. Sediments from Malmfjärden bay, Kalmar, Sweden, were employed in this study in the context of the LIFE SURE project, which aimed to dredge the bay without causing resuspension and implement beneficial uses for the dredged material. Results showed that sediments were rich in nutrients and presented low-medium contents of metals/metalloids. The more mobile (more linked to non-residual fractions) elements were lead and zinc. Moreover, lettuces were grown on different substrates, and the main risk of pollution was the uptake of cadmium. A life cycle assessment showed that using sediments in soil conditioning projects represented environmental savings related to the avoidance of production and use of fertilisers. The implementation of beneficial uses of dredged sediments was encouraged to incentivise the sustainable management of the material.

Keywords: dredging, sediments, nutrients, metals, speciation, recovery, circular economy