

Beneficial use of brackish dredged material

From burden to benefit?

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Introduction

In order to maintain navigational access to the port of Antwerp, continuous dredging activities are required, especially in the docks. At the moment, the dredged material is mainly stored in land consuming disposal sites. This policy cannot be maintained in the future, however, due to the restricted amount of space available in the port area. On the other hand, the economical function of port areas inevitably leads to environmental conflict situations (e.g. industry versus agriculture, nature and residential areas). A fast and at the same time sustainable solution is obviously needed.



◀ Figure 3. Early stage in the construction of the test dike (November 1999). First a supportive sand dike is built (left). The confined zone is then filled with consolidated dredged material (right). The small community of Magershoek is visible in the top left corner. (Foto: verzameling Gemeentelijk Havenbedrijf - HB/TD).

Landscape dikes: a combined solution



Ecological objectives

- Establishment of a reference frame that describes an ideal landscape dike and its immediate surroundings from the viewpoint of nature development
- Study of vegetation dynamics (colonisation, succession, ...)
- Influence of environmental parameters (soil texture, salinity, pH, organic matter, hydrology, ...) on the vegetation cover
- Influence of different management schemes (spontaneous development, mowing, sowing with flower- and with a grass-mixture) on the composition and structure of the vegetation

▶ Figure 4. Test dike immediately after completion of the 6 m level (May 2000). The sandy supportive dike is pale brown, the dredged material is dark brown. During the summer of 2001, a second level of 12 m will be added. (Foto: verzameling Gemeentelijk Havenbedrijf - HB/TD).



◀ Figure 5. Same view as in previous figure, late summer of 2000. The dredged material is rapidly colonized by pioneer species such as Aster tripolium, Atriplex prostrata and Matricaria maritima. (Foto: verzameling Gemeentelijk Havenbedrijf - HB/TD).

A test case at Magershoek

- Aim: evaluation of the sustainability of the concept of landscape dikes
- Test dike of three hectares, constructed with consolidated dredged material from the docks (figures 1 to 5)
- Surrounded by drainage channel and two pools enhancing the opportunities for nature development
- multidisciplinary research project (2000-2006) with ground mechanical, ecotoxicological, forestry and ecological approach



◀ Figure 1. The test site of Magershoek is located at the right bank of the Scheldt, immediately north of the locks of Zandvliet and Berendrecht. Possible future locations for landscape dikes are situated west and south of the communities of Zandvliet and Berendrecht.

▶ Figure 2. Aerial view of the disposal sites (DS) near Magers-hoek. The experimental dike (*) was constructed with consolidated dredged material from the disposal site in front of the picture. The locks of Berendrecht and Zandvliet are at the left of this picture (not visible). (Foto: verzameling Gemeentelijk Havenbedrijf - HB/TD).



Ecotoxicological objectives

The assessment and management of ecotoxicological risks will be decisive for determining the success of landscape dikes. Large scaled implementation of the concept largely depends on its ecotoxicological safety. The dredged material is contaminated with several pollutants, such as cadmium, EOX, mineral oils, and PCB's. However, it is the biological availability and uptake by plants and animals, rather than the absolute concentrations of pollutants which determine possible ecotoxicological risks. Dispersal of pollutants by percolation, runoff or bioaccumulation will be monitored and modelled in detail.

Forestry objectives

- Boundary conditions for optimal growth of several tree and shrub species
- Influence of tree cover on the ripening of the soil
- Sustainability of a forested dike in relation to the air-filtering capacity of trees
- Formation of litter layer on dredged material
- Influence of tree cover on percolation of water and pollutants