

Sediment quality management in the Netherlands: measures and prevention

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Introduction: Since 2010 sediment quality is regulated within the Dutch Water Act. The Dutch Water Act has implemented the objectives of the European Water Framework Directive (WFD). The Dutch Water Act requires a program of measures in order to achieve a good chemical and ecological state of the river basins in 2027. Each six years the water authorities present a river basin action plan that includes a set of measures from the total program of measures. Since contaminated sediment might inhibit a good chemical or ecological state, some of these measures are remediation of sediment. The Dutch national water authorities are preparing the next set of measures for 2016-2021. Based on monitoring results the current state of all water bodies is assessed and all sources, including contaminated sediments, are considered in order to select the best and most cost-effective measures.

Besides the program of measures the Dutch Water Act has a prevention part that includes several legal tools that prevent any deterioration of the water quality of the river basins by means of permits.

Pre-screening project: The Dutch Ministry of Infrastructure and Environment has developed a Guidance for Sediment Assessment in 2010 [1] that enables water managers to assess whether sediment quality inhibits compliance with the objectives of the WFD. The national water authority has started an inventory project to select the national water bodies that need further assessment using the Guidance. In the pre-screening, all so called 'sediment relevant' contaminants that exceed the water quality standards have been considered. Sediment relevant contaminants have a partition coefficient greater than 1000 ($\log K_d > 3$); otherwise they do not bind to sediments. For these contaminants the sediment quality is assessed. If the sediment quality exceeds the MPC for sediment, it is considered a possible source. Also data of other sources are collected in this pre-screening project. The project will result in a first selection of sites that have to be further assessed by using the Guidance. Results of this pre screening project will be presented at the Sednet meeting in November since the project will be finished in September 2013.

In case further assessment by the Guidance for sediment assessment is necessary, the sediment quality is no longer checked with sediment standards, but directly related to the chemical and biological standards for surface water. The relationship depends on the contamination level, but also on the properties (residence time, depth, etc.) of the water body. The Guidance expresses the contribution of the sediment in the same way as other sources are defined (e.g. mg/m²/day). The water authority can compare different measures and select the most cost-effective measures.

Prevention: In the Netherlands it is common that deeper layers of the sediment are more contaminated compared to the surface layers. The Handbook for managing Immissions prevents that dredging leads to direct contact of deeper layers with surface water that may deteriorate the water quality [2]. There are also legal tools that prevent depositing sludge or soil on the riverbed that could deteriorate the water quality. The base of these legal tools is that sediments of the same quality as the surface layer will not deteriorate the water quality. Furthermore, only sediments or sludge that has concentrations of contaminants greater than a certain sediment quality criterion (warning level) are prohibited to deposit. The legislation takes into account the background concentration of both the sediment quality as well as the water quality, meaning that if the water quality is good, legislation is less strict compared to a water quality that already exceeds the water criteria. The national water authority has furthermore developed a tool that assessed the contribution of contaminants from an exposed deeper layer of more contaminated sediment to the water quality. This tool will be further explained in the Sednet meeting in November.

References: [1] Ministry of Infrastructure and Environment (2010) Guidance for Sediment Assessment (*in Dutch*); [2] Ministry of Infrastructure and Environment (2011) Handbook for managing Immissions (*in Dutch*).