

Propagation of Elevated Cadmium Contents of Suspended Particulate Matter in the Dutch part of the Meuse River

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Introduction: In the process of preparing river basin management plans for the European Water Framework Directive (WFD) much attention is being paid to the effectuation of monitoring schemes (e.g. surveillance, or operational monitoring). In general, these schemes are set up to deal with more or less 'average' flow conditions. For an adequate analysis of risks involved with a poor environmental quality of river basins it is required to consider water quality, sediment quality and suspended matter quality, not only during average conditions but also during extreme events such as droughts, floods, or calamity emissions. Over the past decades, many water and suspended particulate matter (SPM) quality data have already been collected for Dutch river systems. In this study we aim to gain knowledge about the Meuse river system behaviour during extreme conditions from an analysis of such existing quality data. We focus on the data that have been collected at different monitoring stations along the Meuse (Figure 1) during a period with elevated cadmium concentration.



Fig. 1: Monitoring locations of RIZA in the Dutch part of the Meuse [Adapted from www.waterplan.nl].

Methods and preliminary results: Data were collected as part of the regular monitoring by RIZA (Institute for inland water management and waste water treatment) at four locations (Figure 1). Discharge and general parameters such as pH and electric conductivity (Ec) are monitored in situ, and samples are taken from both river water and suspended matter. Analyses by the RIZA laboratory include organic micro pollutants, priority metals, nutrients and biological parameters. The Eijsden

station is monitored at a weekly frequency, Keizersveer at a 4-weekly basis and the other two stations 8-weekly.

For a general characterization of the SPM behaviour in the Dutch Meuse, a factor analysis was performed on data for the period January 2002 – December 2006 for both total and suspended concentrations, focussing on metal behaviour. Four main components control SPM quality. At higher discharge a **coarser component** becomes more dominant which has a dilutive effect on all metal concentrations. A **seasonal algal bloom** in the upstream part of the Meuse results in increased organic matter contents in summer and as a consequence relatively lower **clay contents and related geogenic metal** concentrations, but has no dilutive effect on anthropogenic metal concentrations. This implies that these **anthropogenic metals** enter the river system in the dissolved phase, becoming adsorbed to both clay and organic suspended matter.

The analysis of the Cd-peak is based on data for the period Januari 2005 - Januari 2007 (Figure 2). Evidently the propagation of the Cd-pollution is delayed by adsorption-desorption and sediment transport processes. A quantitative analysis will be presented.

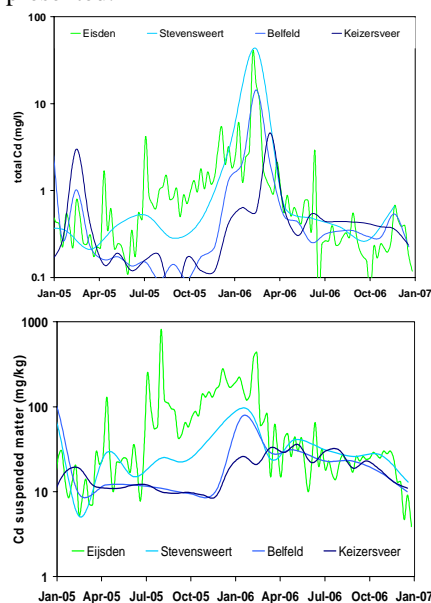


Fig. 2: Cd-concentrations at the four monitoring stations between 2005-2007.