

Flood induced pollution

Methodology for quantifying effects on ecosystems



FLOODsite Task 10 has produced:

- A methodology for quantifying the effects of flood induced pollution (multiple pollutants) on ecosystems.

The methodology is intended for:

- Engineers, scientists and government bodies involved in flood risk management and assessment.

Where to find further details:

- FLOODsite report T10-07-13 '*Socio-economic and ecological evaluation and modelling methodologies*' by Sue Tapsell et al. provides an overview of the methodology, whilst full details can be found in FLOODsite report T10-07-14 '*The effects of floods and flood-induced pollution on ecosystem health*' by Arjan Wijdeveld et al. Both reports are available in the publications section of the website www.floodsite.net.

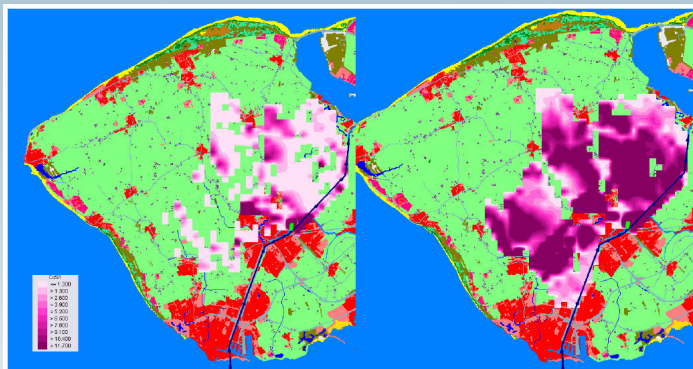


Fig. 1. Maps of Cadmium deposition at two time slices after a flood event (Middelburg)

In Brief

FLOODsite Task 10 looked at innovative methods to understand, model and evaluate damages to people, property and the environment from flooding. There were four strands to this research; this fact sheet focuses on the effects of floods and flood-induced pollution on ecosystem health.

This research was based around the existing Optimal Modelling for Ecotoxicological Assessment (OMEGA) framework. The framework was enhanced and tested for use against multiple pollutants in aggregating pollutant effects.

The methodology allows the integration of water quality and sediment modelling with the ecotoxicological response of receptors. The highest level of output is given as a Potentially Affected Fraction (PAF) of the total population of interest. The methodology is therefore intended as a tool for identifying areas particularly susceptible to flood induced pollution.

Case studies of typical applications of the OMEGA framework are also presented alongside the methodology. The first case study (Western Scheldt) illustrates the application of the modelling framework to chronic estuarine pollution response over a year. The second case study (Middelburg) models the ecological impact of inundation of a low lying polder due to dyke failure (see Fig. 1).

Effects of Flooding on Ecosystems

Fig.2 illustrates the hydraulic modelling components required by the OMEGA framework. The Sobek 1D/2D model is used to simulate the movement of water on tidal cycles. This is combined with a water quality model that allows simulation of pollutant concentration over time. Example maps are shown in Fig. 3 and Fig. 4.

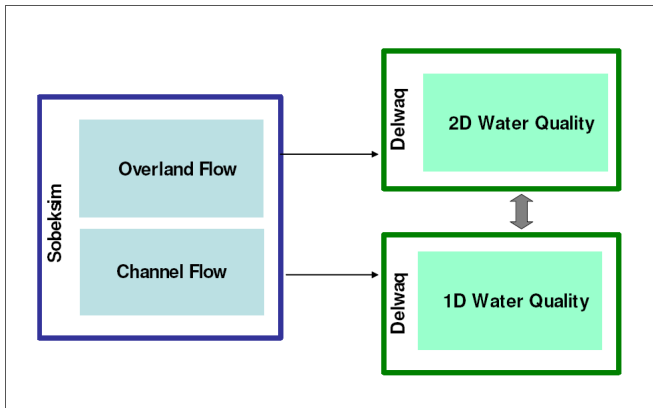


Fig 2. Combination of Sobek hydraulic modules with water quality models

Once the pollutant concentration has been modelled the OMEGA methodology may be implemented to calculate the PAF of different species groups for a combination of pollutants. This is extremely useful information as a component in considering the management of flood risk.

Related Work

FLOODsite Task 10 involved four separate activities. All of these activities are described in the FLOODsite report T10-07-13 'Socio-economic and ecological evaluation and modelling methodologies' by Sue Tapsell et al. available in the publications section of the website www.floodsite.net.

FLOODsite Task 8 looked at the inundation modelling tools and which models are best to use under which conditions. Further information regarding this task can also be found on the website.

The FLOODsite project

FLOODsite is an interdisciplinary project integrating expertise from physical, environmental and social sciences, as well as spatial planning and management. The project has over 30 research tasks across seven themes, including pilot applications in Belgium, the Czech Republic, France, Germany, Hungary, Italy, the Netherlands, Spain and the UK. The EC has identified FLOODsite as one of its contributions to the European Flood Action Programme. Further details can be obtained as follows:

Email: floodsite@hrwallingford.co.uk
 Website www.floodsite.net

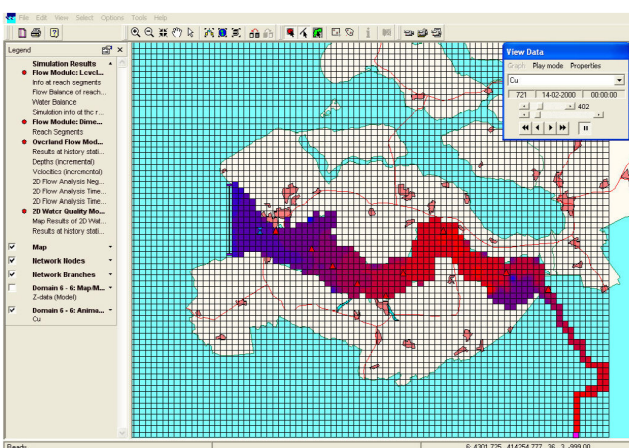


Fig. 3. Dissolved copper concentration in the Western Scheldt on 14-02-2000 (spring peak)

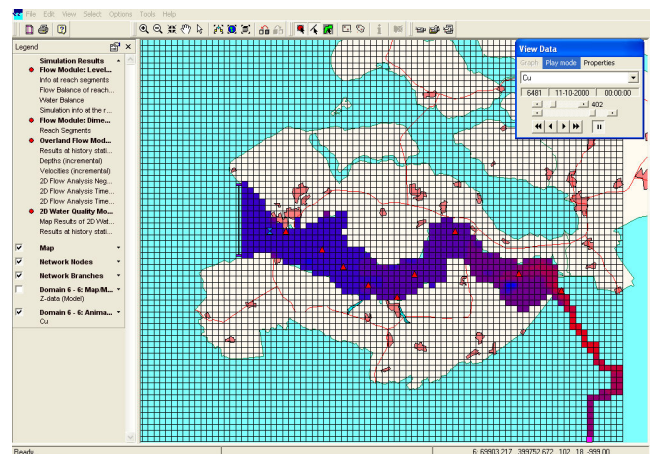


Fig. 4. Dissolved copper concentration in the Western Scheldt on 11-10-2000 (autumn low)