



The effects of silt availability on ecology in the Westerschelde

Xavier Desmit, Hans Los and Luca van Duren
DELTAIRES



Policy questions

- How can we manage the Schelde in such a way that safety and accessibility are optimised, while safeguarding the natural values of the system?
- What is the impact of natural changes and anthropogenic activities on ecosystem functions?



Research Questions

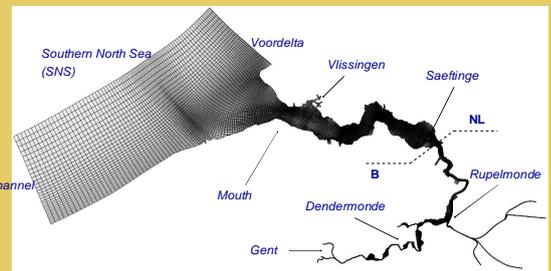


- Which factors govern carrying capacity of the Schelde system?
- How is primary production influenced by the silt dynamics of the system?
- What is required to set up a primary production model for the Schelde?

Project

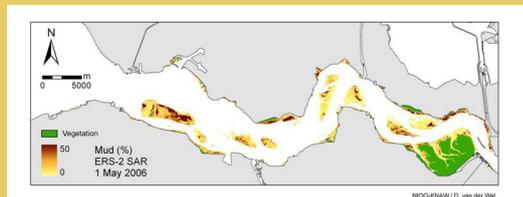
Primary production forms the basis for any ecosystem. Light and nutrients are the primary driving factors, both for pelagic and benthic primary production. In the Schelde, pelagic primary production is generally light limited. Benthic production on the mudflats is strongly influenced by silt content of the sediment. Silt is therefore a crucial factor for the ecology of the Schelde ecosystem. Conversely, benthic algae can influence the resuspension rate of silt into the water column.

This is an exploratory study into the requirements for a primary production model for the Westerschelde. It is based on the silt model developed by Thijs van Kessel and others under "LTV-accessibility".



The model domain extends from the southern bight of the North Sea and the mouth of the estuary (B-NL near coastal zones) to the freshwater part, close to Gent. This includes the Westerschelde (NL) and the Bovenschelde (Belgium). The model also includes Belgian rivers (Grote Nete, Kleine Nete, Rupel, Dender, Durme).

The transition from fresh water in the Belgian part to the marine environment at the mouth will require careful study. The DELWAQ-BLOOM model environment is one of the few that can deal with this transition.



Left: diatoms on a mudflat. Right: data on silt content of mudflats derived from remote sensing. Similar data should become available for benthic algae in 2009

For pelagic primary production robust algorithms are available and there are datasets available for calibration and validation purposes. Benthic primary production requires much more development. In 2008 a start has been made to derive biomass data for benthic algae from remote sensing images. Data on production are at present scarce. More data should become available in 2009.

Conclusions

A first model framework has been set up that now needs further refining and testing. Issues that need extra research in the near future are:

- Detail required in nutrient loading
- Benthic production
- Fresh water – marine transition
- Benthic exchange
- Impact of grazing by zoobenthos and zooplankton on primary production

Policy implications

Models such as these can help us understand how the system may react to changes in water quality (chemical and physical). When properly validated, they are a useful tool for analysis and prediction. However, we stress that model predictions should only be considered within the appropriate context.

These models are particularly useful in indicating where we lack essential knowledge. They can indicate where additional observations or experimental process studies are required to support decisions regarding sustainable management of the Schelde.