

Bottom sediments and mud dynamics of the River Scheldt

S. WARTEL¹, F. FRANCKEN¹, R. PARKER², E. TAVERNIERS³ & P. SHELTON²

1. Royal Belgian Institute of Natural Sciences, Sedimentology, Vautierstraat 29, B-1000 Brussels, Belgium
2. Blackdown Consultants Ltd., Georges Farm, Wellington, United Kingdom
3. Ministry of Flanders, Waterways and Maritime Affairs Administration, Division Maritime Scheldt, Tavernierkaai, Antwerp, Belgium

The bottom of an estuary is constantly changing by nature, but anthropogenic influences may also rapidly alter the spatial distribution of sediments. Knowledge of the properties and spatial distribution of bottom sediments, combined into a digital lithological map, possesses in the first place a fundamental scientific value, broadening the insight into estuarine dynamics. On the other hand it also contributes to a sustainable management of the river, by properly addressing problems which may occur during siltation (filling up) or dredging of the navigation channel. Therefore it is useful to repeat these surveys every 4 to 5 years. Remote sensing techniques are preferred to sampling campaigns for the surveys, as they are fast, relatively cheap, reproducible and easily allow updating.

In conformity with previous surveys (1964-1986), the lithological map of the River Scheldt between Antwerp and the Belgian-Dutch border discriminates the bottom sediments into four categories: mud, sandy mud, muddy sand and sand. The present survey adds a fifth category, comprising hard bottom types, indicating strong erosion. It reveals the following global pattern: the shallow inner river bends consist mainly of mud, the deep outer bends display sand and hard bottom type sediments. In between exists a transition zone with sandy mud and muddy sand bottoms.

By comparing the recent survey with previous ones, an evolution of the amount of mud present in the River Scheldt can be estimated. Based on an extrapolation over a depth of 1 m of the data from the present study, the total amount of mud in the area is estimated to be 11 million m³. This corresponds to a total amount of ca. 8 million tons of dry mud, of which 83% can be found in the river and 17% in the access channels to major harbour locks. Compared to 1986, this equals to an increase of 9%. The increment during the period 1964-1986 was ca. 75.000 m³ per year, whereas for the period 1986-1999 this was 'only' 40.000 m³ per year. Seemingly the growth of the amount of mud was cut in half for the latter period. It is beyond any doubt that next to changes in the mud supply from the river basin, the dredging of mud from the access channels to the locks played an important role in this phenomenon.