

Morphological changes in the Zwin and Westerschelde estuaries

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Goal of this research

Goal of this research is to investigate what the influence of embankment activities has been on the dimensions of the Zwin and Westerschelde tidal inlet over the course of history. The research will look how from 1561 AD upto 2013 AD the dimensions of both have changed. Furthermore it will be investigated if they are in geomorphological equilibrium. Geomorphological equilibrium would mean that a plot of its surface cross sectional area versus tidal prism fall on a straight line (D'Alpaos, 2009).

Material and methods

This research makes use of historical maps of both inlets. These were digitalised and processed in GIS. Due to lack of historical topographical and tidal data, proxies have been used to calculate tidal prism and depth of the tidal inlet. The width of the tidal inlet is a proxy for the depth, whereas the surface of the tidal basin area is a proxy for the tidal prism.

Results

The results show that the width of the Westerschelde inlet decreased slightly between 1795 AD and 2013 AD. The width of the Zwin inlet decreased sharply between 1561 AD and 1900 AD. For both locations the surface of the tidal basin versus the inlet width was plotted. This shows the relative speed with which the inlet narrowed as a result of embankment. Furthermore for both locations a theoretical tidal prism and surface cross sectional area (SCA) was calculated. These data were plotted against the widely used Jarret (1976) dataset.

Conclusion

Both inlets followed the relation between tidal prism and surface cross sectional area as proposed by D'alpaos *et al.* (2009). None of both inlets proves to be presently in equilibrium, since a plot of their SCA versus tidal prism doesn't match with the dataset of Jarret (1976) for tidal inlets in geomorphological equilibrium.