

EVALUATION TOOLS FOR AN ESTUARINE ECOSYSTEM

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The Schelde Estuary, with its tidal mudflats and marshes along a continuous gradient from fresh to marine water, is almost an unique ecosystem in Europe. Within this estuary several aspects of the ecosystem are being monitored regularly. To determine ecosystem health and functioning an evaluation method is prerequisite. Currently, only the Water Framework directive provides an evaluation method, yet it concerns water quality, not ecosystem functioning. In this study indicators of the physical-chemical key parameters for ecosystem functioning, i.e. dissolved oxygen and nutrient concentrations, are identified. Starting point was not a historical or pristine reference. Instead preconditions of these indicators are investigated in consideration of the ecological functioning. The specification of these preconditions implies boundaries between which the indicators may fluctuate so that the ecosystem functioning is not hampered. Not only the functioning in the estuary is considered, but also the coastal sea needs to be taken into account. The ecological functioning of the coastal sea is to a large extent depending on the delivery from estuaries. Conditions in the Schelde must be such that delivery from the estuary is sustaining a good ecological status in the coastal zone.

Oxygen is of vital importance for all (estuarine) life and a crucial indicator of the quality of an ecosystem. The amount of dissolved oxygen is a result of physical aeration and primary production on the one hand and consumption by respiration and oxidation processes on the other hand. Minimum values of dissolved oxygen concentrations were set, based on the minimal requirements for different organisms or processes. When oxygen concentrations do not reach minimum preconditions, this will affect the whole ecosystem. These values may vary in space and time. A surplus of nutrients in the estuary may cause eutrophication problems within the estuary itself or in the coastal zone. High concentrations of nutrients and especially aberrant nutrient ratios may lead to oxygen depletion and switches in phytoplankton composition. In this study these consequences are the main determinants for setting indicators and preconditions.