

Comparison of sedimentation in CRT (Controlled Reduced Tide) and RTE (Regulated Tidal Exchange) restored sites along the Schelde Estuary

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In estuaries formerly embanked land is increasingly restored into tidal marshes and mudflats in order to re-establish estuarine habitats and with that valuable ecosystem services. One of these ecosystem services is water buffering capacity during storm tides, which is negatively correlated with high sedimentation rates. Along the Schelde Estuary (Belgium/Netherlands), tidal marshes and mudflats are restored using different techniques, among them controlled reduced tide (CRT) and regulated tidal exchange (RTE). In the CRT-area (8ha) high inlet culverts and low outlet valves allow a reduced tidal regime of 3m to enter the former agricultural polder. This freshwater site, Lippenbroek, is being monitored from the start in March 2006. In the other project, Burchtse Weel, water enters through low inlet culverts of a newly constructed RTE-area (14 ha). Since the start in January 2011 sedimentation is measured at this brackish site. For both sites the spring tide neap tide cycle is maintained. In natural tidal marshes spatial and temporal variation in sedimentation result in a number of typical patterns for long-term changes in marsh elevation. Changes in elevation are crucial for the colonization and evolution of tidal marsh ecosystems. It may be expected that in marsh systems with a CRT-regime or a RTE-regime sediment deposition mechanisms and consequent changes in elevation will be different from a natural tidal marsh. The low CRT sites are initially characterized by a strong increase in surface elevation (rates between 0.01 to 0.13m per year) and progressively decrease towards approximately 0.085m by the fourth year. Five years after implementation of the tidal regime in the CRT area a characteristic estuarine habitat with marshes, mudflats and creeks formed. However, after implementation of the tidal regime in the RTE area extreme high sedimentation rates (approximately 32cm.month⁻¹ at the lowest elevated sites and approximately 6cm.month⁻¹ at the higher sites) were observed within the first months. Almost anaerobic, liquid mud covers the whole RTE area; therefore intertidal marsh development and vegetation colonization is expected to occur very slowly.