Ecosystem service delivery in restoration projects: temporal effect of ecological succession on the net present value of a tidal marsh restoration project (Schelde Estuary)

Boerema Annelies, Lindsay Geerts, Lotte Oosterlee, Stijn Temmerman, and Patrick Meire

Ecosystem Management Research Group, Department of Biology, University of Antwerp
C2.20 Universiteitsplein 1, 2610 Wilrijk
E-mail: annelies.boerema@uantwerpen.be

Long term assessment of ecosystem restoration projects is complex due to ecological processes such as succession, certainly in highly dynamic ecosystems such as estuaries. Restoration of intertidal flats and marshes on formerly embanked land, often called "managed coastal realignment" (MR), became popular in estuarine management. In this study biophysical and monetary data were collected to calculate the value of 10 ecosystem services (ES) delivered by a large tidal marsh restoration project (>400ha). We hypothesize that ES delivery changes over time due to ecological succession and hence the long term benefits of a restoration project are subject to this phenomenon and need to be taken into consideration. Different habitat types were distinguished in the project area; cropland, mudflat, pioneer, intermediate and high marsh and grassland on the dikes. A marsh sediment accretion model (MARSED) was used to simulate potential marsh succession scenarios. In this way the temporal evolution of ES delivery due to ecological succession could be evaluated. In former ES assessments of tidal marsh restoration projects only the final stage of a marsh was considered. Our study shows that benefits during successional marsh stages could actually be higher than for marshes in equilibrium. This finding does not suggest that ecosystems in transition always have a higher value than systems in equilibrium. Nonetheless, it emphasizes the need to consider long-term ecological dynamics, such as succession, in a benefit assessment for restoration projects as current assessments might underestimate the net benefits.