Self-organised shoreline protection: mutual feedbacks between plant traits and hydrodynamics

Schoutens Ken, Alexandra Silinski and Stijn Temmerman

Ecosystem Management Research Group, Deperatement of Biology, University of Antwerp, University of Antwerp, Campus Drie Eiken, Universiteitsplein 1, B-2610 Wilrijk (Antwerp), Belgium
E-mail: ken.schoutens@uantwerpen.be

Nature-based shoreline protection strategies such as the use of tidal marshes are a necessity in order to protect coastal societies against today's challenges such as sea level rise and the increase in severity of storm surges. Local hydrodynamic conditions seem to create spatial variation in morphological plant traits on different scales in tidal marshes (individual, population and community level). The notion that morphological plant traits form an important determinant for the capacity of a tidal marsh to dissipate hydrodynamic energy is more and more emphasized in recent literature. Nevertheless, the mutual feedbacks between morphological plant traits and hydrodynamics which ultimately control the shoreline protection function of tidal marshes are poorly understood.

Field measurements among different locations in the brackish part of the Elbe Estuary (Germany) will be conducted during a one year time period (2016). Hydrodynamics (e.g. wave heights and current velocities), sediment dynamics (i.e. bed elevation change) as well as plant morphological traits (e.g. aboveground and belowground morphology) of different pioneer species (*Bolboschoenus maritimus* and *Schoenoplectus tabernaemontani*) will be measured monthly. We expect that local incoming hydrodynamics determine morphological plant traits of different species and that this affects the local hydrodynamics. We hypothesize that this will enable us to determine how the shoreline protection capacity of tidal marshes varies spatially due to the mutual feedbacks between local hydrodynamics and morphological plant traits.

Keywords: tidal marshes; plant traits; hydrodynamics; shoreline protection