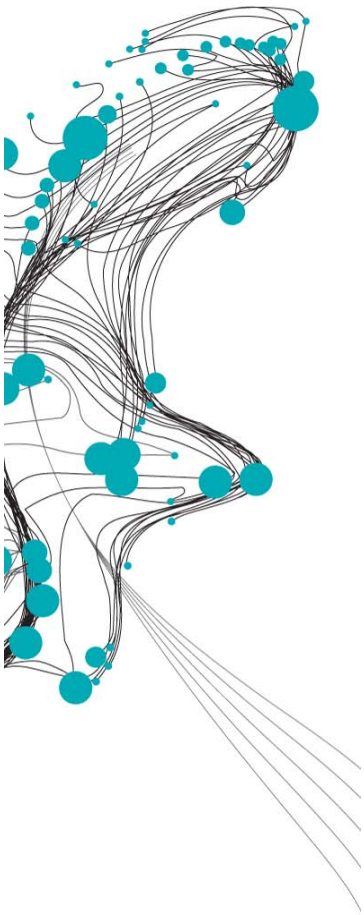

MODELLING INTERSPECIFIC COMPETITION BETWEEN THE *SALICORNIA* AND *SPARTINA* SPECIES AND ITS EFFECT ON THE BIO-GEOMORPHOLOGICAL DEVELOPMENT OF SALT MARSHES

Several studies have concluded that physical forces and the interspecific competition between salt marsh vegetation species influence the development of salt marsh vegetation. Furthermore, it is known that vegetation development and colonisation behaviour influences the bio-geomorphological development of salt marshes. Still, it is unknown how interspecific competition works and how it influences the bio-geomorphological development of salt marshes. Therefore, this study aims to examine the influence of the interspecific competition between two salt marsh vegetation species (the *Salicornia europaea* and the *Spartina angilica*) on the bio-geomorphological development of salt marshes.

In this research, the interspecific competition between the *Salicornia* species and the *Spartina* species is schematised with the Lotka-Volterra competition framework, which is included in the vegetation module. For the bio-geomorphological development of a multi-species salt marsh, three types of competition are tested: The development of a salt marsh without competition, with equal competition and with spatial competition. The actual simulations of ten years of the bio-geomorphological development of salt marshes are performed by including the Lotka-Volterra competition framework in the vegetation module in Python. This vegetation module is coupled to Delft3D Flexible Mesh.

From the different model simulations, it is concluded that the differences in the morphological development between the mono-species simulation and the multi-species simulation are relatively small. On the contrary, the influence of interspecific competition on vegetation development is large, especially on the vegetation density (Figure 1). When considering no competition, the vegetation density of both salt marsh vegetation species can grow towards their maximum carrying capacity. When considering equal competition, the *Spartina* species has an advantage caused by its higher maximum carrying capacity, which results in a decrease in the vegetation density for the *Salicornia* species compared to the mono-species simulation. When considering spatial competition, both salt marsh vegetation species grow till they meet their combined maximum carrying capacity, which results in a decrease in the mean vegetation density for both species compared to the mono-species simulation. When considering the vegetation cover, the *Salicornia* species proves to be more constant during the different simulations (i.e. the change in vegetation cover is limited). The vegetation cover of the *Spartina* species is more strongly affected by the competition.

This research gives insight into the interspecific competition between different salt marsh vegetation species and shows the importance of the inclusion of interspecific competition on the vegetation development. Likewise, it has set the foundation for (long-term) simulations of a multi-species salt marsh, which can contribute to the construction of artificial salt marshes.

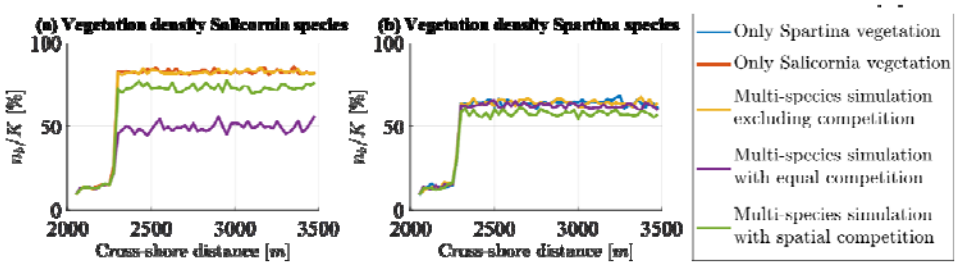

Figure 1: The along-shored averaged vegetation density (n_b) relative to the maximum carrying capacity (K) for (a) the Salicornia species and (b) the Spartina species after ten years.

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