SOIL MACROINVERTEBRATE COMMUNITY DEVELOPMENT IN THE FIRST CRT

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Densely populated and industrialized, the Schelde Estuary (Belgium) has been highly impacted for a long time. Embankment, navigation, toxicant and habitats reduction have severely modified the integrity of the estuary. Embankment engendering tidal compression has led to a drastic reduction in tidal flats and other shallow habitats, and the remaining ones undergo a severe physical stress. However, some large projects aiming at restoring wetlands and estuarine habitats are ongoing. So far, among several restoration techniques, CRT (Controlled Reduced Tide area) was proved to be the sole for restoring an integral neap / spring tide cycle. It consists in a former agricultural polder reclaimed for estuarine habitats compensation. By extending the river flood bed, CRT's give rise to new habitats which are expected to compensate for the loss and degradation of river habitats.

The 'Lippenbroek project' is an interdisciplinary research focusing on different aspects of these newly-created zones. As part of this project, a three-year monitoring was conducted on macroinvertebrate community development, each season from April 2006 to February 2008; an additional sampling was realized in July 2009. Four sites were selected prior to tidal characteristics: three ones on the flooding gradient (high, medium and low elevation), and one characterized by the water permanency but also exposed to the tide (tidal pool). Samples were extracted with a core from the top-soil to fifteen centimetres depth. Concurrently, three reference habitats in river were monitored according to the same framework: high marsh, reed bed and tidal flat.

Community pattern in the reference habitats exhibited a simple opposition between high marsh and both reed bed and tidal flat. These habitats were found to be still characterized by species-poor communities, more than ten years after a first sampling. Despite an improvement of the water quality in the Schelde Estuary over this period, other abiotic parameters were hypothesized to be responsible for the lack of taxa recovering. In the CRT, a rapid extirpation of the terrestrial fauna happened during the first months, interactively with the flooding frequency. In low elevation, the deposition of fresh and fine sediments gave rise to the settlement of an estuarine fauna in less than 6 months. The second year, the community development was still ongoing with an increase in densities and a taxa enrichment. In high elevation, terrestrial features persisted without significant species turnover. In July 2009, changes appeared only in top-soil with an expansion of Gastropoda at all elevations. The tidal pool was rapidly colonized by an aquatic fauna, still enriched in Chironomidae in July 2009.

Globally, macroinvertebrate communities in the newly-created tidal flats in the CRT appeared to contrast the most with the reference ones, with a more diversified fauna and higher densities in Tubificidae. However, high CRT elevation kept taxa richer than high riverine marsh. Intermediate CRT elevation, without riverine counterpart, experienced the development of an impoverished and stress-tolerant fauna.

Designed for restoring a progressive tidal gradient, the newly-created CRT habitats were found to be more physically suitable than river references for recovering the pool of macroinvertebrate functions.