Managed Realignment of Lillo's Potpolder

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Project

Lillo's Potpolder, located along the Scheldt River downstream of Antwerp (Belgium), was depoldered in September 2012 using two managed realignment designs. In Lillo-East, a dike remnant was retained, while in Lillo-West, the dike was fully removed to the level of the adjacent mudflat. Elevation level in both compartments ranged from 0.5 to 1 m below MHW, with each featuring a 10–15 m wide creek precursor.

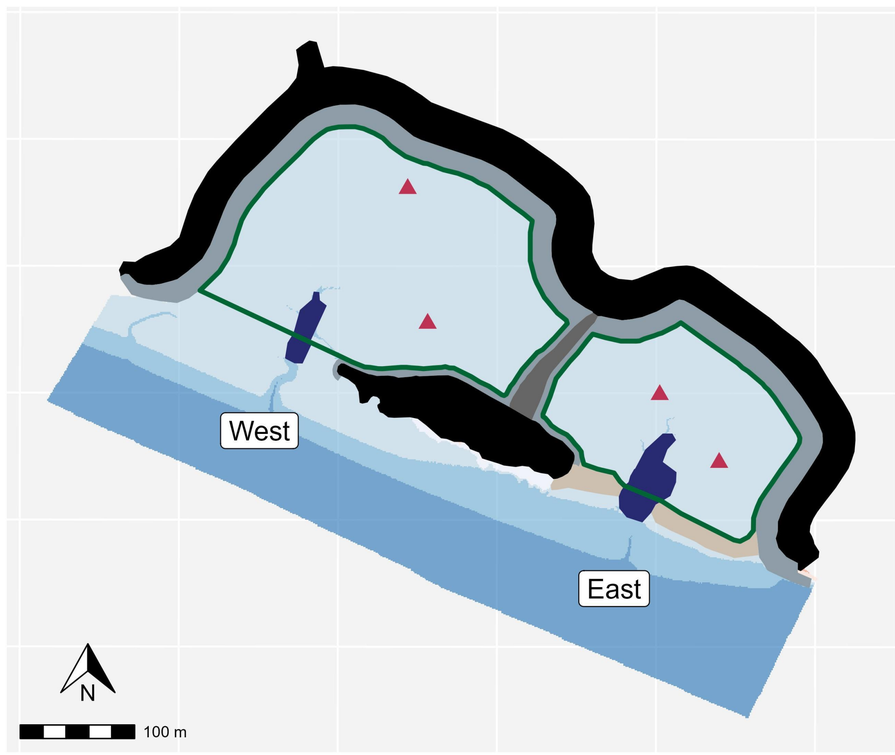


Figure 1: Design of the managed realignement of Lillo's Potpolder. The green line enclosing the compartments highlights the study area.

Sedimentation & Tidal Channel Network

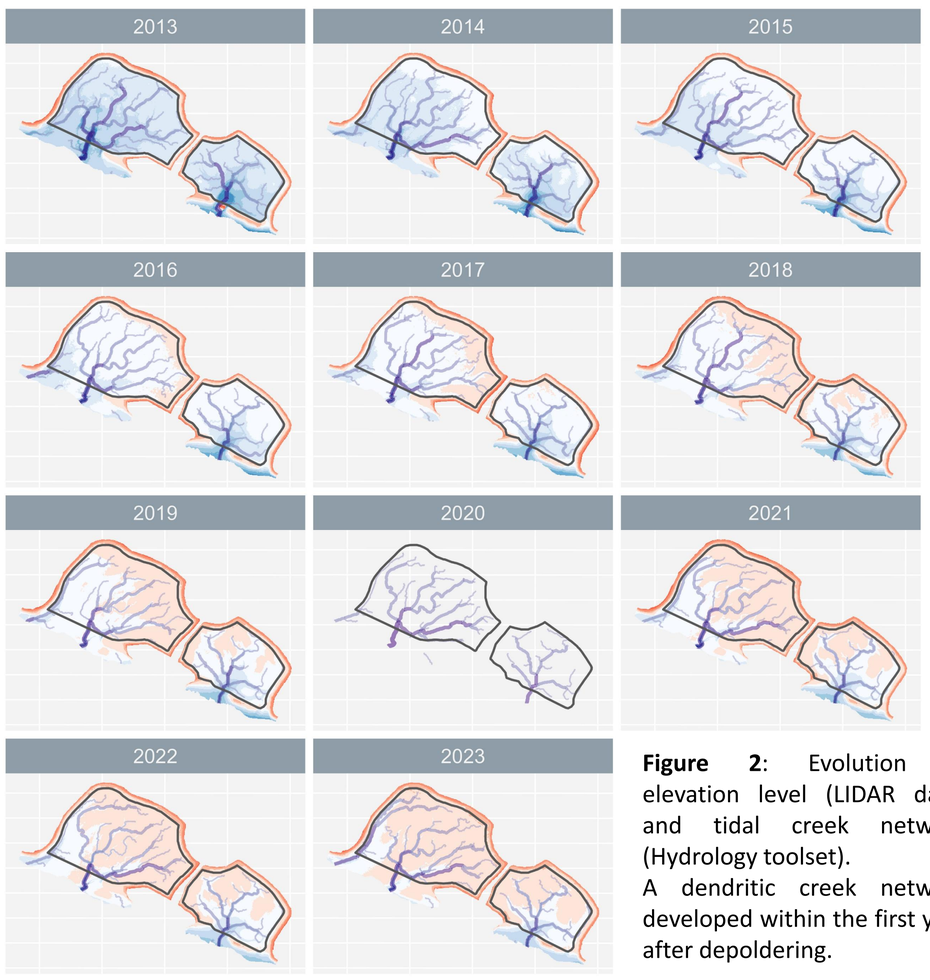


Figure 2: Evolution of elevation level (LIDAR data) and tidal creek network (Hydrology toolset).
A dendritic creek network developed within the first year after depoldering.

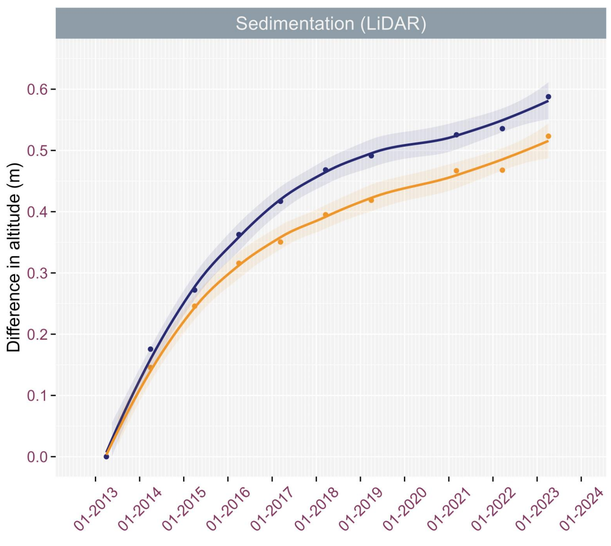


Figure 3: Annual LiDAR data, as well as RTK-GPS and SED data (not shown), were used to analyze elevation changes. A LOESS curve fitted to the median altitude change since 2013 revealed a higher elevation gain in the western compartment. In general, sedimentation was higher in the initial years. In recent years, biogeomorphic feedback has led to a renewed increase in elevation.

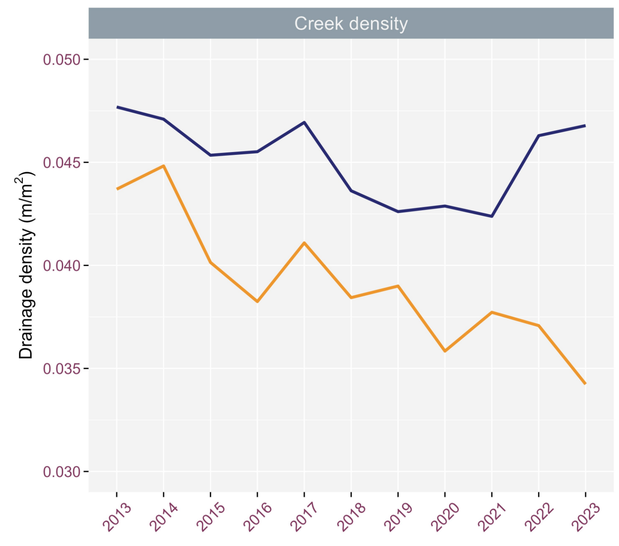
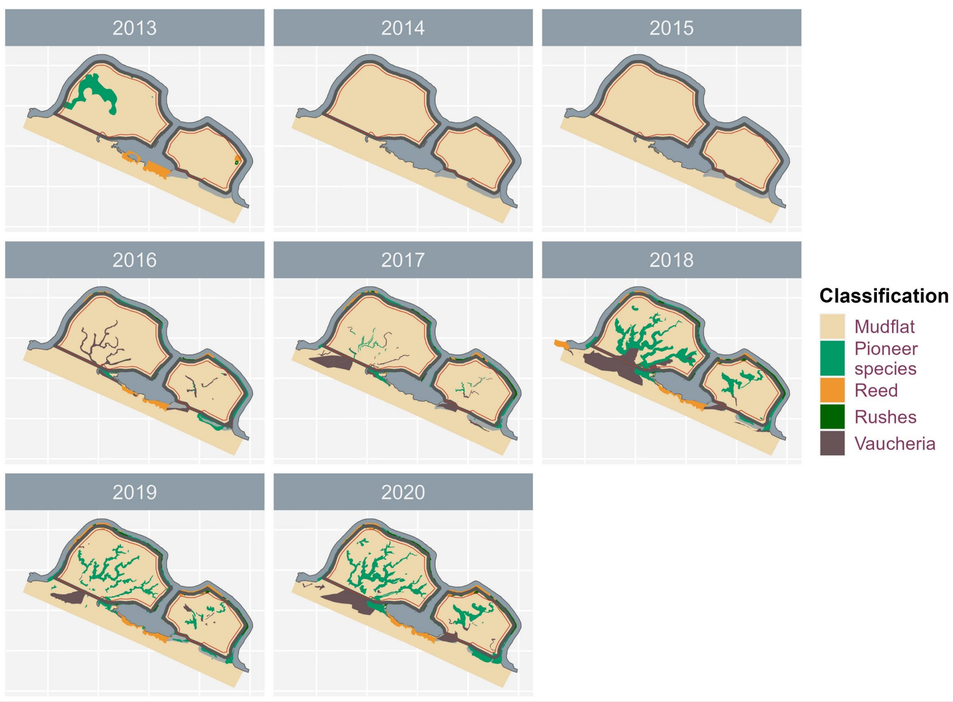


Figure 4: Creek density is higher in Lillo-West and fluctuates over time, with periods of decrease and increase. In Lillo-East, similar fluctuations occur, but with an overall net decline.

Vegetation Development

Figure 5: Vegetation mapping. We observed two processes in vegetation establishment.

1. **Clonal Colonization:** Common Reed and Sea Club-rush settled between the rubble stones at the dike toe, expanding clonally onto mudflats after four years. This process was faster in Lillo-East.
2. **Window of Opportunity**: Four years after the breach, creek banks became covered by the algae *Vaucheria*. The following year, pioneer species such as Sea Aster and Spear-leaved Orache germinated on the creek banks, rapidly expanding in the subsequent years. This succession process progresses more quickly in Lillo-West.



Benthos

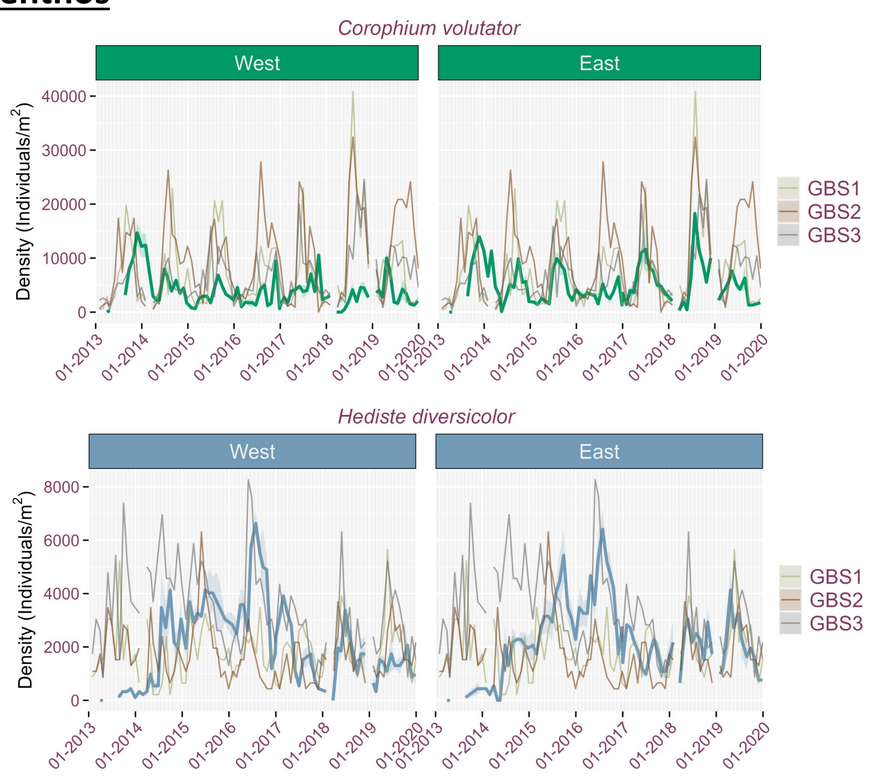


Figure 6: Two dominant benthic pioneer species reached similar mean densities as those at a nearby reference site (Groot Buitenschoor (GBS)) within the first two years. Afterwards, annual population fluctuations occurred without significant differences between the compartments.

Conclusion

- In the case of Lillo's Potpolder: complete excavation of the dike results in faster estuarine development compared to retaining the dike.
- Hypothesis: maximizing tidal exchange through sheet flow over a larger area enhances sedimentation, creek formation and vegetation development.
- Both compartments have evolved into functional estuarine ecosystems.

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