Building with Nature for flood resilience: experiences from the North Sea Region

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Introduction

The negative ecological impacts and limitations of traditional and grey flood protection infrastructures are increasingly recognized around the globe. Climate change will impact many different disciplines, far beyond flood risk management alone, and are still very uncertain towards 2100 (Dottori et al., 2018; Vousdoukas et al., 2019). This urgently asks for a transition in flood risk management solutions, to bridge between different disciplines and reserve space to adapt to changing future climate scenarios. Nature-based solutions perfectly address this need and are therefore increasingly recognized to increase flood resilience along coasts and catchments. They moreover create significant additional co-benefits and are generally more flexible than grey infrastructures. However, the uptake of Building with Nature (BwN) in Europe remains relatively slow, due to a lack of performance understanding, maintenance and monitoring schemes and appropriate (flexible) finance mechanisms (UN-Water, 2018).

The North Sea Region (NSR) is naturally prone to coastal erosion and river and coastal flooding (Dottori et al., 2018). As the European Commission is increasingly recognizing nature-based solutions (e.g. European Commission, 2015), the Interreg VB North Sea Region Building with Nature project has been launched in 2015 to increase the uptake of BwN solutions for increasing flood resilience.

Background and Methodology

The project consists of 13 state-of-the-art laboratories: 6 catchment locations in The Netherlands, Belgium, Scotland, Germany and Sweden, and 7 coastal locations in Belgium, The Netherlands, Germany, Denmark and Sweden. The river catchment laboratories aim to reduce river flood risk and create recreational areas and restore natural habitats simultaneously. The coastal laboratories assess the effectiveness of foreshore and beach nourishments to reduce coastal erosion and flood risk along a crucial part of the coastline.

An example of one of the catchment laboratories is the Eddleston Water Project, which involves re-meandering, the planting of over 320,000 trees, more than 100 logjams and the creation of 28 new wetlands in the Eddleston catchment. Some early results from the monitoring indicate that certain measures lower and delay the flood peak, but it has also led to real improvements to instream and riparian habitat.

For each coastal laboratory, sand nourishments have been placed in the last decades. Through an assessment with a shared methodology, it is possible to show that nourishments compensate chronical erosion and thus stabilize the coastline. This allows the coast to remain a sandy system including the associated habitat, while preventing coastal retreat and providing flood risk management benefits.

Results

Effectiveness of beach nourishments along the Dutch and German coast

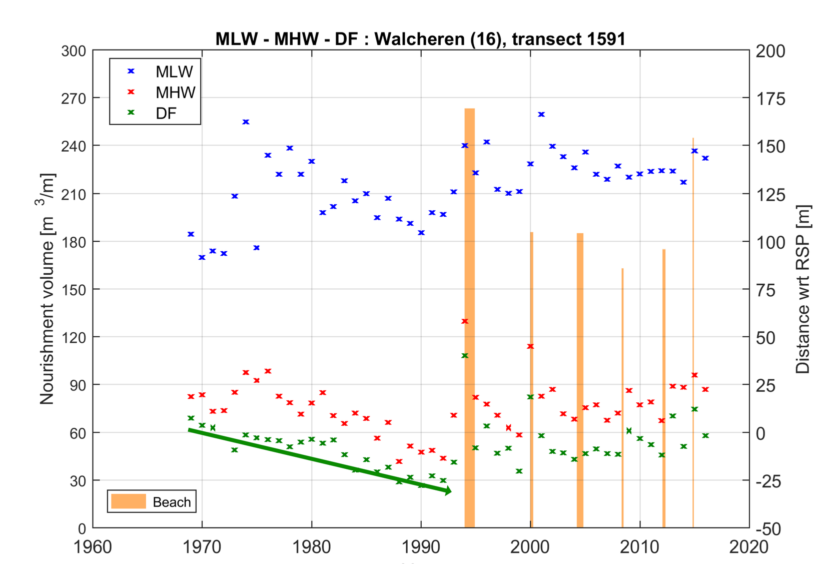

Figure 1 – Long term location dynamics of the MLW (Mean Low Water), MHW (Mean High Water) and the Dune Foot (DF) as a function of time for transect 1591 at Domburg, the Netherlands. The orange bars indicate beach nourishments, and the length of the bar the supplied volume (Vermaas et al., 2019).

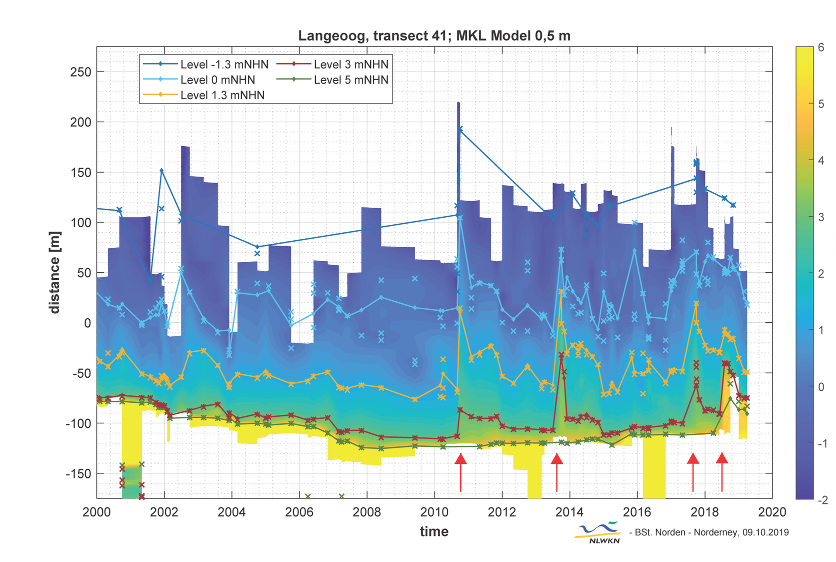

Figure 2 – Long term location of the MLW (Mean Low Water), MHW (Mean High Water) and the Dune Foot (DF) as a function of time for transect 41 at Langeoog, Germany. The arrows indicate nourishments (Hillmann et al. , 2019).

Mainstreaming Building with Nature

Transboundary learning by more than 40 experts over the different NSR countries resulted in the identification of 4 main barriers hampering further mainstreaming of BwN: (1) knowledge gap on long-term performance dynamics, (2) knowledge gap on the local situation and the stakeholders, (3) non-effective financing strategies, and (4) a sub-optimal governmental/institutional setting. These gaps will be used to set the scope of future projects in Northwest Europe.

Figure 3 – The different gaps hampering mainstreaming of BwN, identified by the 13 coastal and catchment laboratories.

Conclusion and Recommendations

BwN solutions showed to be very effective in increasing flood resilience across the North Sea Region. Coastal nourishments compensate for chronical erosion and therefore stop coastal retreat, while the landscape of sandy dunes enhance coastal safety and create additional co-benefits. The same co-benefits are seen for catchments, where biodiversity, natural habitat area and air quality is improved.

However, major barriers hamper mainstreaming BwN in Europe. To further accelerate the uptake of BwN, the following recommendations are given on a European level:

- ✓ Create a solid performance evidence base and a NBS assessment framework
- ✓ Get to know the local setting and the stakeholders involved
- ✓ Learn how to make a compelling business case
- ✓ Take up BwN in local and national legislation

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