



Nature based solutions for a sustainable and safe coast

A coastal oriented Policy Brief from the Interreg North Sea Region Building with Nature project by the Coastal Division of the Agency for Maritime Services and Coast, Belgium.

Key messages

- The Belgian coast is vulnerable for coastal flooding. Climate change, and especially sea level rise, will increase the risk.
- Building with Nature (BwN) solutions, such as beach nourishments, are very efficient methods to increase the safety level of the existing coastal defense system
- BwN solutions require often more maintenance than “grey” solutions, such as seawalls. It can be challenging to communicate the natural behavior of BwN solutions to a broad public.

Sense of Urgency

The Belgian coast is vulnerable for coastal floodings. That is why the Flemish Government has approved the Masterplan for Coastal Safety in 2011. This masterplan aims to upgrade the safety level of the Belgian coast up to a level of a 1000-year storm surge event. It will protect the low lying hinterland up to at least the year 2050, taking into account sea level rise. However, sea level will continue to rise after 2050. This will increase the flood risk at the coast and additional measures will be needed to protect the hinterland after 2050.

Building with Nature project

- Partners from the Netherlands, Belgium, Germany, Denmark, Sweden, Scotland and Norway work together.
- The project demonstrates BwN solutions at 7 coastal sites and at 6 catchment scale sites.
- The project is part of the Interreg VB North Sea Region programme.
- Project period: 2015 – 2020.



A solution: nourishment of the coast

The Belgian coast has a long tradition of building coastal protection infrastructure as seawalls, groins and concrete reinforcements of the dune foot, the so called “grey infrastructure”. This infrastructure prevents erosion of the coast up to certain range and gives a large scale of opportunities for coastal tourism and recreation.

The disadvantages of this grey infrastructure is that they have limited flexibility towards sea level change and the construction can be expensive.

In 2009 a safety assessment of the entire Belgian coast showed that a major part of the seawalls that were constructed in the previous centuries were to low to fulfill the required safety standards, stated by the Masterplan for Coastal Safety.

After an extensive study of different solutions for upgrading the safety level, based on costs, benefits, environmental impacts and discussions with local stakeholders, the best solution at the low lying sea walls was a beach nourishment.

By breaking the waves at storm surge events, wide beaches limit the amount of overtopping water over the sea wall and prevents the sea wall of breaching. A wide beach creates also other opportunities for tourism and recreation. By adding more sand when required due to sea level rise, the beaches are capable of “growing with sea level rise”. Despite the higher maintenance need, beach nourishments are less expensive than reconstructing a new higher seawall. Rising sea walls isn’t an easy thing to do due the strong urbanization on top of the seawalls.

Most of the beach nourishments of the Masterplan for Coastal Safety are executed now and are subject of a frequent maintenance cycle (i.e. approximately 5 years).

In order to reduce maintenance costs and to reduce disturbance of the local environment due to the nourishment works, research is going on to optimize the nourishment strategy.

Shoreface nourishment in Ostend

Traditionally at the Belgian coast, beach nourishments are used to reinforce the upper part of the beach. This will break the storm waves in very efficient way and will create additional space for recreation.

However, other types of nourishments are also possible, like a shoreface nourishment. By feeding the shoreface, the underwater part of the beach, an additional sand buffer is created that can be transported towards the upper beach by the natural dynamics of the system. The advantage of a shoreface nourishment is that it is less expensive than a traditional beach nourishment.

The disadvantage of shore face nourishments at the Belgian coast is that knowledge of the natural behavior of such a type of nourishment is limited.

That is why the Coastal Division of the Agency for Maritime and Coastal Services has executed in 2014 a shoreface nourishment in Ostend, in the area of Mariakerke, which has been extensively monitored. The monitoring campaign provided a large dataset that can be used for different research topics.



Lessons learned from the interreg BwN project

Working together with several partners and share experiences and knowledge about BwN measures at the coast provides a great opportunity to learn about the global scale of the coastal defense system of the North Sea Region and our own coast. It is also very important to understand that the problem of coastal flooding and erosion doesn't stop at the borders.

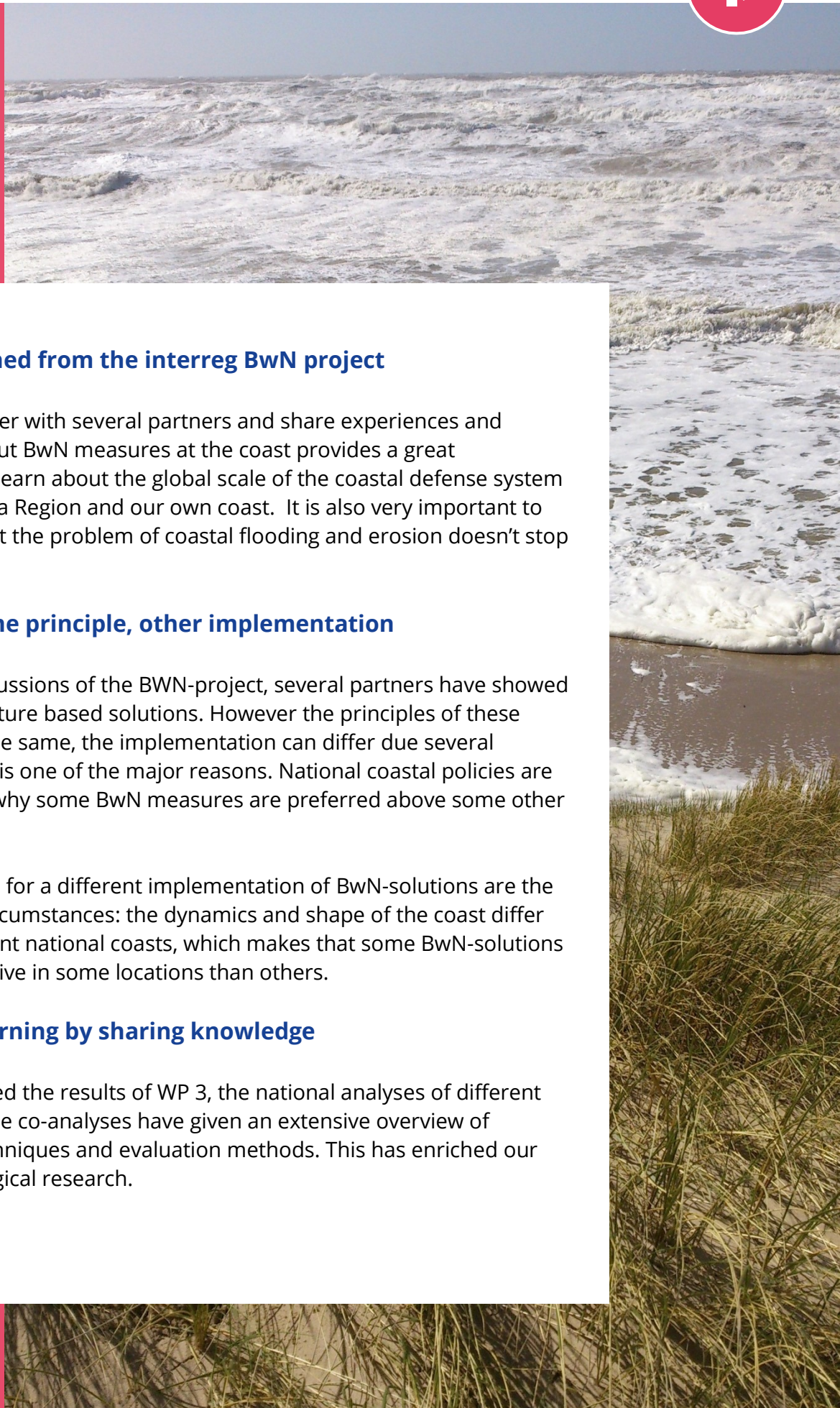
Lesson 1: same principle, other implementation

During the discussions of the BwN-project, several partners have showed examples of nature based solutions. However the principles of these solutions are the same, the implementation can differ due several reasons. Policy is one of the major reasons. National coastal policies are ta main driver why some BwN measures are preferred above some other BwN measures.

Another reason for a different implementation of BwN-solutions are the local natural circumstances: the dynamics and shape of the coast differ over the different national coasts, which makes that some BwN-solutions are more effective in some locations than others.

Lesson 2: Learning by sharing knowledge

Having discussed the results of WP 3, the national analyses of different partners and the co-analyses have given an extensive overview of monitoring techniques and evaluation methods. This has enriched our own morphological research.





Challenges

- a) Challenge of communication. The natural behavior and the benefits of BwN solutions are still not well understood by the public. Especially the dynamics of the beaches at the Belgian coast: after storm cliffs often appear in the beach profile and the sand seems to be “disappeared”. In reality the sand is redistributed alongshore and in the more deeper part of the beach profile.
- b) Challenge of quantifying natural recovery of beaches. During calm conditions beaches are able to recover in a certain way. This process is not quantified in a good way. More knowledge about the natural recovery of beaches will help to optimize the nourishment maintenance strategy.
- c) Challenge of sea level rise: sea level rise is one the major challenges for the coastal defense system in Flanders. How the coastal system and BwN solutions will respond to this major challenge is still unclear.

Policy recommendations

- i. Challenge of communication. Explain how a beach nourishment provides the required safety level and explain how the natural dynamics works: during stormy conditions the beaches erode and during calm conditions beaches grow. Use the results of morphological research to strengthen your story.
- ii. Challenge of quantifying natural recovery of beaches: invest in monitoring techniques to measure the beaches and the shorefaces in a fast way. Use the monitoring results to get more insights into the natural recovery of beaches.
- iii. Challenge of sea level rise: Keep doing research about sea level rise and the impact on the coastal defense system. Explore different strategies for future coastal protection.