



Embracing nature based solutions

A coastal oriented Policy Brief from the Interreg North Sea Region Building with Nature project by Rijkswaterstaat, The Netherlands

Key messages

- Building with Nature (BwN) solutions are flexible and efficient coastal flood risk management solutions that deliver multiple benefits for nature and human well being.
- BwN solutions need maintenance more frequent than hard infrastructure, in general. This poses challenges, when funding is only short-term available, because it is initially investment driven or when this results in relatively large future financial risks. This can be tackled by using adaptive management strategies, for example, as described below.
- In general, BwN solutions need natural resources such as sand, mud and clay. It is important that these resources are and will be made available for BwN solutions.
- It is uncertain until which level of climate

pressures, for example Sea Level Rise (SLR), coastal Nature Based Solutions (NBS), like nourishments are feasible and effective.

Sense of Urgency

The Dutch coastline is subject to structural erosion and lacks natural sedimentation. Sea level rise adds to the problems. Furthermore, the subsidence of soil is taking place in the hinterland, due to natural causes and human activities. Without intervention, the Dutch coastline would retreat by an average of one meter per year over the entire coastline. This has consequences for the safety of the hinterland, nature, recreation, drinking water extraction and other functions of the coast.

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 program.
- Project period: 2015 – 2020.



A solution: Dynamic coastal management

To prevent that from happening, we opted for the dynamic maintenance of the coastline in 1990. Our strategy is to preserve the coastline at a base line. If the base line is exceeded, we will check whether and how we intervene. At the same time, we also want to preserve the natural, dynamic character of the coast. We do this by applying dynamic coastal management.

Feeding the coastline with sand – sand nourishment – is the principal coastal flood risk management measure for the Dutch coast, even more, because goals for long-term safety and sustainable spatial development are being combined.

In coastal management, the national government places great emphasis on BwN – in this case, working with sand – and promotes this. Rijkswaterstaat uses the natural movement of sand as much as possible. Dynamic coastal management will be continued in cooperation with coastal and dune managers, supported by a dynamic coastal management guide. This creates more opportunities for the growth of the dunes behind the first row of dunes and for biodiversity.

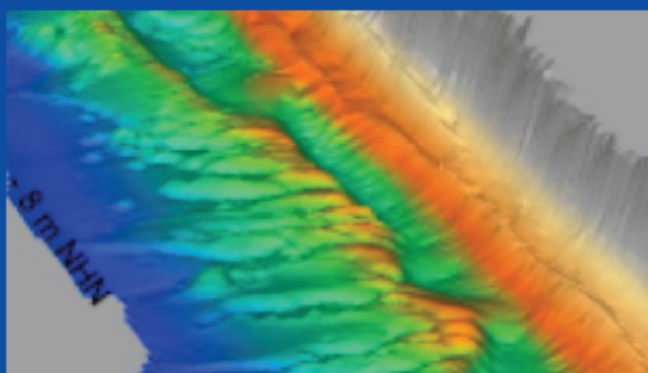
Thanks to the knowledge gained from research into the coast and the sand nourishments, Rijkswaterstaat has been able to stop the structural decline of the coast in a cost-efficient manner for more than 25 years. Together with the flood defense managers, Rijkswaterstaat guarantees the safety of the hinterland, keeping the coastline and the dunes in their places, disrupting nature as little as possible and maintaining the coastal functions in a dynamic manner.

Lessons learned from the Interreg BwN project

Rijkswaterstaat has gained a lot of experience with sand nourishments and has been working together with partners in the North Sea Region for many years. Working together with coastal neighbors and longer distance partners, like the US Army Corps of Engineers, has proven to be essential. The BwN project provided a great opportunity to enhance and strengthen this cooperation. We have been able to research, study and monitor long stretches of the coast together. We want to point out some of the lessons learned in the project, before heading to the challenges and policy recommendations.

Innovative techniques

The Agency for Coastal Defence, National Park and Marine Conservation in Schleswig-Holstein, Germany (LKN.SH), innovated their way of mapping shallow areas of the seafloor. Conventionally this



had to be done by vessel or by hand in a very short period of the tidal cycle, which was extremely sensitive to weather conditions. That is why mapping this shallow area was very time-consuming, but important for understanding the system. The LKN.SH searched and innovated the way in which they map the seabed using an airborne green laser. LKN.SH could almost measure all their shallow areas with the help of this laser.

Given that the environmental conditions of the Waddensea are to some extent comparable to the Dutch Waddensea, Rijkswaterstaat decided to start a pilot to explore the possibilities of the green laser technique in the Netherlands (for both coastal and inland water) based on the German expertise.



Lessons learned from the NSR Interreg BwN Project:

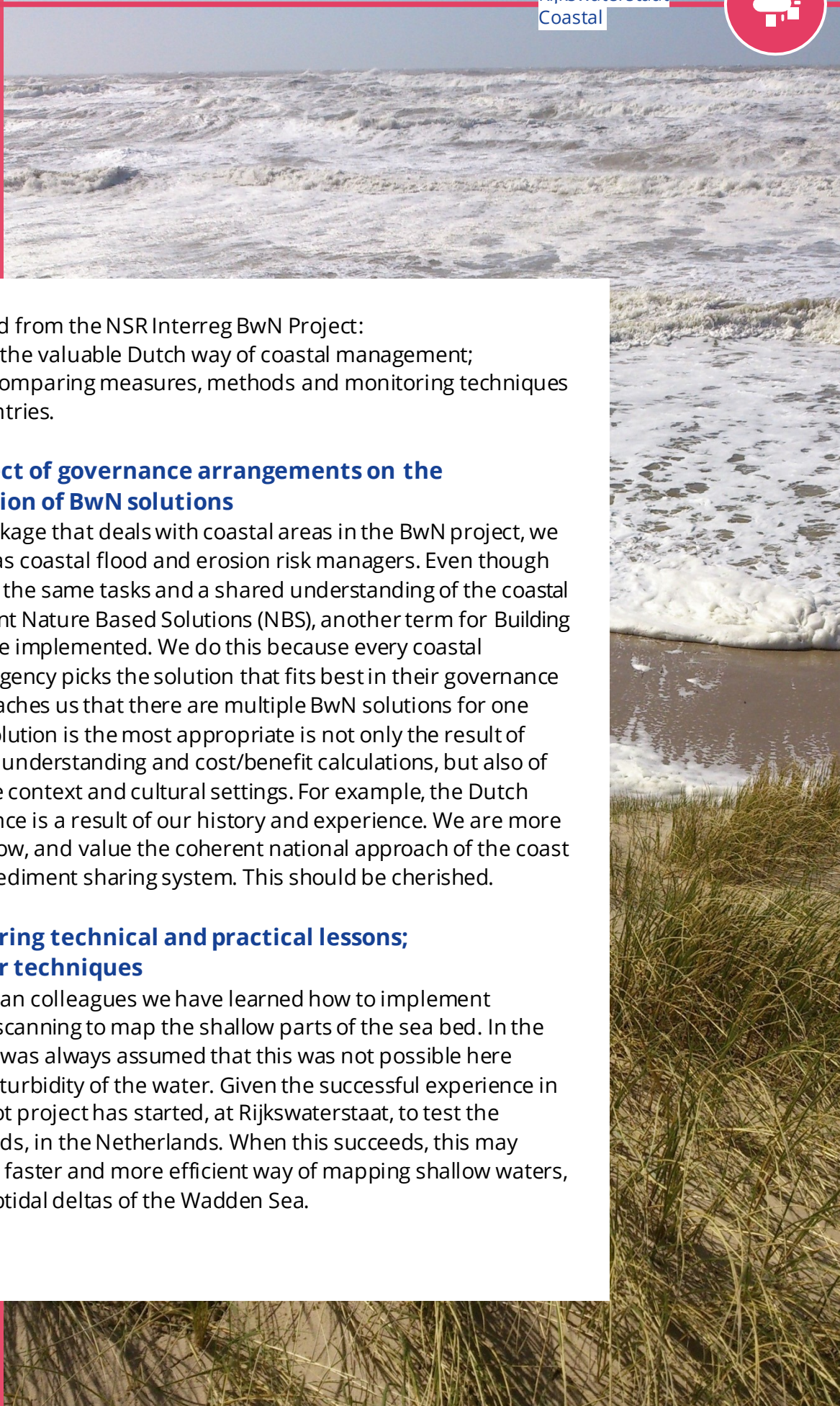
- Awareness of the valuable Dutch way of coastal management;
- The value of comparing measures, methods and monitoring techniques with other countries.

Lesson 1: Effect of governance arrangements on the implementation of BwN solutions

In the work package that deals with coastal areas in the BwN project, we work together as coastal flood and erosion risk managers. Even though we have nearly the same tasks and a shared understanding of the coastal system, different Nature Based Solutions (NBS), another term for Building with Nature, are implemented. We do this because every coastal management agency picks the solution that fits best in their governance setting. This teaches us that there are multiple BwN solutions for one issue. Which solution is the most appropriate is not only the result of natural system understanding and cost/benefit calculations, but also of the governance context and cultural settings. For example, the Dutch water governance is a result of our history and experience. We are more aware of this now, and value the coherent national approach of the coast as one linked sediment sharing system. This should be cherished.

Lesson 2: Sharing technical and practical lessons; airborne laser techniques

From our German colleagues we have learned how to implement airborne laser scanning to map the shallow parts of the sea bed. In the Netherlands, it was always assumed that this was not possible here because of the turbidity of the water. Given the successful experience in Germany, a pilot project has started, at Rijkswaterstaat, to test the German methods, in the Netherlands. When this succeeds, this may result in a new, faster and more efficient way of mapping shallow waters, such as the ebbtidal deltas of the Wadden Sea.





Challenges

- a) Challenge of maintenance costs. It remains a challenge to quantify the extra benefits of BwN in a quantitative financial way. This might hamper future uptake of BwN solutions. Furthermore, most of the budget, in The Netherlands, is allocated to construction, not maintenance. In general, BwN solutions need more frequent regular maintenance than hard infrastructure. This can result in a preference for low-maintenance solutions, with higher costs in advance, but less costs, during the lifetime.
- b) Lack of sand challenge. In general, BwN solutions need natural resources, such as sand, mud and clay. It is important that these resources are seen as valuable assets that should be managed in the long term. For example, in the following centuries, the Dutch coast will need many hundreds of millions to billions of cubic meters of sand to grow with rising sea levels.
- c) Challenge of Sea Level Rise (SLR). It is uncertain to which level of climate pressures (like SLR) coastal BwN solutions like nourishments are feasible and effective. Current insights (outside Interreg BwN) are that at least a meter of SLR can be mitigated. More is uncertain.

Policy recommendations

- i. Challenge of maintenance costs. Look (further) into the multiple benefits of BwN solutions and find ways to quantify these extra benefits. Explore how to deal with higher maintenance costs of BwN in investment driven financing programs, like the Flood Protection Program (HWBP).
- ii. Lack of sand challenge. Integrate BwN in spatial planning for the coast and the sea. Designate areas for sand mining, and bear in mind that this area needs to be larger in the future, since needed sand volumes increase. Connect this with initiatives like the Dutch North Sea Agreement. If possible create areas where room is available for BwN solutions to be implemented. A way to do this is to be conservative in the build-up of the coastal area.
- iii. Challenge of sea level rise. Initiate studies to evaluate the future implementation of BwN strategies given possible sea level rise projections.

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