SAND MOTOR

protecting coastal communities in Togo and Benin

The coastline of Togo and Benin moves between 1 and, in some places, even 10 metres every year. Land inwards, of course. Climate change is the cause: sea level rise leads to coastal erosion and that poses a direct threat to economic activities and life on the West African coast. “The inhabitants of this region depend primarily on fishing and tourism for their incomes and livelihoods. Thanks to this coastal protection project, they can benefit from the opportunities the beach and coastal environment offer them, now and in the future,” says Boskalis regional manager Pieter Boer.

Just imagine, you open the door of your home and your entire living room is covered with a metre of sand. Before the summer of 2022, this was the harsh reality for hundreds of coastal residents in Togo and Benin. Calculations by the World Bank, among others, show that coastal erosion amounts to more than 2.5 metres a year in Togo and as much as 4 metres in Benin. Locally, even more serious cases of up to 10 metres a year have been observed. In addition, along the entire West African coast, the number of flash floods due to increasingly turbulent weather, which in turn is caused by climate change, is rising drastically, affecting half a million people annually.

A total of some 200,000 people live on the coast of Togo and Benin. Most of them by far depend on fishing and, to a lesser extent, on arable farming. With long nets attached to their boats, fishermen sail out to reel them back in a few hundred metres away in the South Atlantic, hoping for a catch. But can the thousands of fishermen in the coastal region continue to do that work, and support themselves and their families, when their homes are being devoured by the rising seawater? No. In other words, coastal erosion has catastrophic consequences for their way of life and their survival in the places where they have lived and traded for generations.

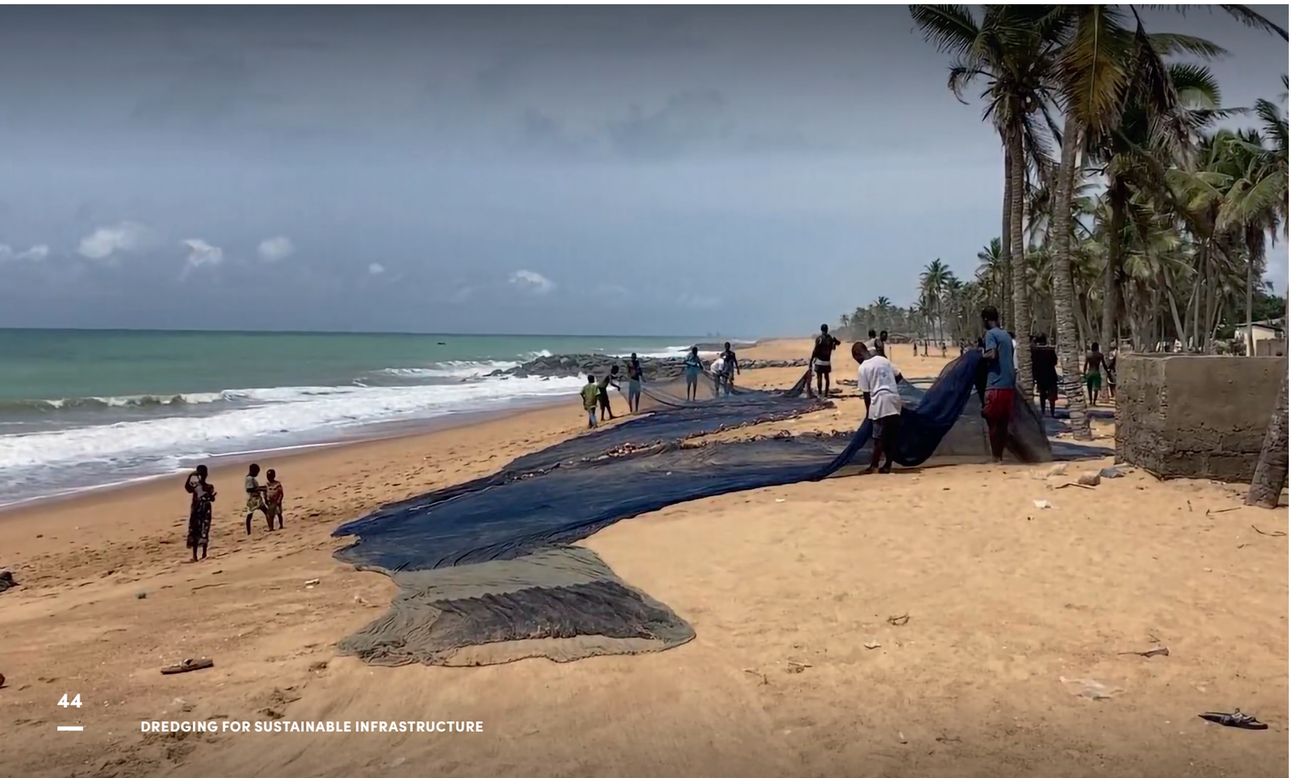
Sand motor

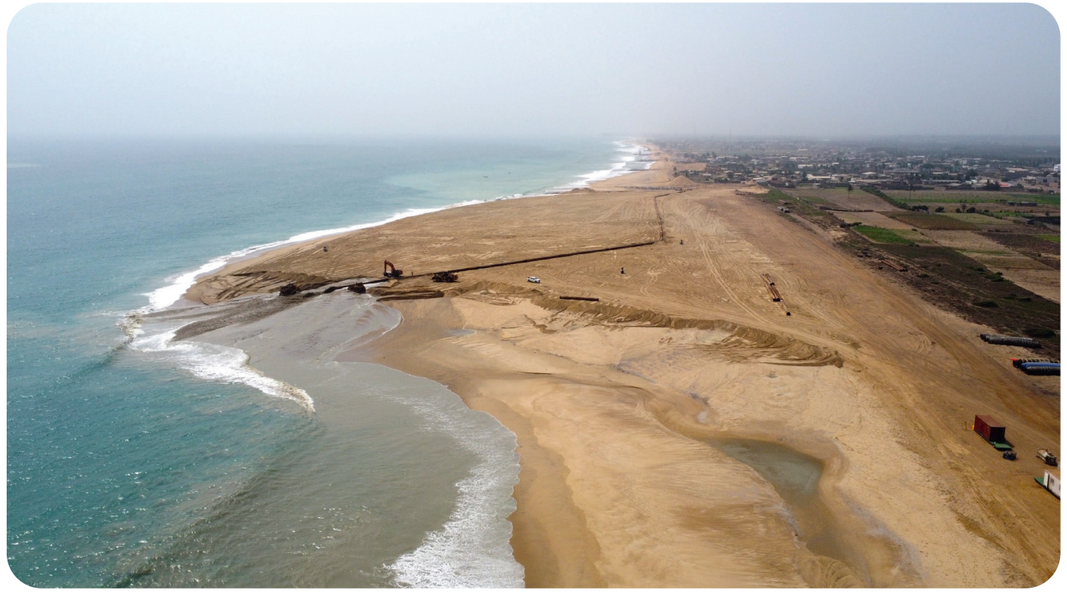
The dredging work that has been executed will preserve living conditions on a part of the Togolese and Benin coasts for decades to come. Even though that may sound unlikely, this is an accurate picture. With the construction of 15 new groynes, and the reinforcement of another six that were already in place, the project means that all the sand on the beach will be kept in place. In addition, the rock structures built at right angles to the beach mean that erosion will be less severe than in recent years.

Furthermore, with the help of Boskalis' trailing suction hopper dredger Willem van Oranje, the beaches have been raised with more than a million cubic metres of sand. Not only that, a sand motor consisting of 6.4 million cubic metres of sand has been created on the Benin side of the border, and that sand will be spread along the coastline by the currents in a natural way. The Willem van Oranje made exactly 790 trips from the offshore sand borrow area to the coast for this nature-based solution.

Boskalis was awarded the contract by the governments of Togo and Benin, with funding coming from the World Bank. Discussions with Boskalis convinced both West African countries of the potential of the proposed dredging solution. Because strengthening this section of the coast by implementing a dredging solution means that coastal residents can rest assured that their homes will be protected for the next 50 years. Since only part of the beach was closed off during the work at any given time, and completed sections were immediately returned to the community, the social impact of the far-reaching work on the coast was limited. And the regular base for fishing, and therefore economic activity, was kept intact throughout the operation.

Fishermen on the beach in Togo.





The sand motor under construction.

The coastal protection project has given the region a huge boost.

Sand motor

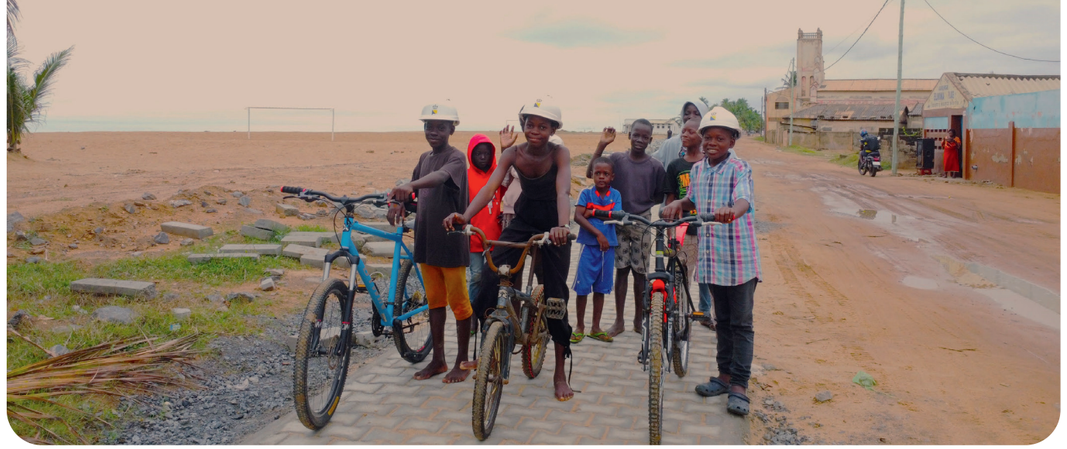
The sand motor is a hydraulic engineering concept developed by Dutch dredgers Boskalis and Van Oord in collaboration with the Dutch government, universities and research institutes. It was introduced successfully on the Dutch coast between the Hook of Holland and Scheveningen 10 years ago. In Africa, it was used for the first time on a large scale in Benin. The idea behind it is relatively simple. A huge amount of sand is deposited with trailing suction hopper dredgers in a strategic location and the natural movement induced by the wind, waves and currents spreads it along the coast over time. That counteracts the coastal erosion resulting from the impact of the same elements. In short, it is a nature-based solution to a major societal problem.

Research has shown that nature-based solutions of this kind are increasingly seen as an effective solution for these and similar challenges. Because a sand motor not only preserves the natural environment, it also supports the local communities and economies that depend on protection for the coastline. However, one of the major challenges facing countries on the West African coast is funding. Working with an organisation like the West African Coastal Areas Management (WACA), supported by the World Bank, proves that governments, industry and international organisations can get together to implement climate-adaptive solutions and protect vulnerable coastal areas from the impact of the rising waters. The coastal protection project in Togo and Benin provides a forceful demonstration.

WACA

The coastal protection project in Togo and Benin is part of the West African Coastal Areas Management (WACA) programme. This programme was developed in collaboration with local communities on the coast, who depend on the region for their livelihood, food security and well-being. Thanks to the World Bank, WACA can support the efforts of several countries to improve coastal management and mitigate natural and human-made risks to coastal areas.

Because coastal erosion leads not only to the loss of homes and beaches – as well as the region's most lucrative working area – but also to damage to existing infrastructure such as roads. Nevertheless, Togo and Benin are not the only countries in West Africa suffering from coastal erosion. The World Bank has designated seven countries around the Gulf of Guinea where this is a problem. In addition to Togo and Benin, they are Senegal, Ghana, Nigeria and the islands of São Tomé and Príncipe.



Local children with their bikes on the new cycling path.

Indeed, now the work has been completed in this part of West Africa, that base is now even stronger. And that is precisely one of the goals of the West African Coastal Areas Management (WACA) programme, which includes the coastal protection project. "The inhabitants of this region depend primarily on fishing and tourism for their incomes and livelihoods. Thanks to this coastal protection project, they can benefit from the opportunities the beach and coastal environment offer them, now and in the future," says Boskalis regional manager Pieter Boer.

Soccer pitch, drones and jet skis

Indeed, the coastal protection project has given the region a huge boost. And not just socially and economically. The number of tourists visiting the region has also increased significantly, in part due to the planting of an urban forest and trees, and the construction of cycle paths. In addition, an existing soccer pitch was re-laid. The pitch was in danger of being lost to coastal erosion but dredging work was done to stop that happening. In a joint effort with local residents, the pitch was actually overhauled to create a fully-fledged sand pitch where, for example, schools can organise sports lessons. A not unimportant detail here is that the young people no longer have to cross a busy road to get to the sports field, making things safer for the inhabitants, young and old.

But let's return to the dredging work itself. Here too, the local community was emphatically involved and local materials were used whenever possible. For example, much of the rock in the existing groynes was reused and other rock was mined from an inland Togolese quarry. Moreover, from the outset of the project, local residents were involved in the onshore project organisation. They were trained as surveyors, for example, which allowed them to use theodolites, specially equipped drones and even a jet ski to see firsthand how their "defence sand" was applied and how it held up in the occasionally turbulent conditions of the South Atlantic.

Idea embraced by government

The final cubic metre of sand was applied to the beach in the summer of 2023. A few months later, the entire project was completed, including some additional community initiatives in both countries. On the beach in Benin, for example, there are now several concrete toilet blocks equipped with septic tanks. In addition, rainwater is collected that visitors can use to wash their hands. This prevents the beach being polluted by people using it as a toilet. The government has now embraced this initiative, with plans to extend it along the entire coast of Benin.

Bas Boerma

Communications Advisor, Royal Boskalis, the Netherlands.

Community engagement.

Trailing suction hopper dredger Willem van Oranje.

Key figures for the Togo and Benin coastal defence project

- Project duration: 19 months
- Deployed trailing suction hopper dredger: Willem van Oranje (Boskalis)
- Number of hopper trips: 790
- Dredged volume: 7.0 million m^3
- Volume sand motor: 6.4 million m^3
- Coastline covered by sand motor: approx. 30 kilometres
- Number of new groynes: 15
- Number of rehabilitated groynes: 6
- Amount of rock: 250,000 tonnes
- Project staff: 250 people

Boskalis also constructed a 5-kilometer-long cycle path along the beaches and four public toilet facilities.