

PROJECT SHEET

CROSS-BORDER COASTAL PROTECTION, TOGO - BENIN
 HYBRID COASTAL PROTECTION BY MEANS OF A SAND ENGINE AND ROCK CONSTRUCTIONS

BOSKALIS

Boskalis is a leading global marine contractor and services provider. With safety as our core value, we offer a wide variety of specialist activities to the oil & gas and renewables sectors. These activities include marine installation and decommissioning, seabed intervention, marine transport and services, subsea services and marine survey. In addition, Boskalis is a global dredging contractor, provides towage and terminal services across the globe and delivers marine salvage solutions.

By understanding what drives our clients we are able to provide the solutions that enable them to meet their specific business goals. For this reason we are constantly looking for new ways to broaden and optimize our offering and are committed to expanding our proposition, supported by our financial strength. With our committed professionals in engineering, project management and operations, 500 specialized vessels and an unprecedented breadth of activities in 90 countries across six continents we help our clients push boundaries and create new horizons.

INTRODUCTION

All along West Africa's coast, rising seas, heavy flooding and erosion are destroying dozens of villages, displacing thousands of families and taking away people's homes and jobs. A third of West Africa's people live in coastal areas and their lives are increasingly threatened by the impact of climate change. As nearly half of West Africa's GDP comes from coastal activities, saving the coastline is crucial for the region's economy and its people. This project is part of the West Africa Coastal Areas Management Program (WACA), which is managed and financed by the World Bank. Through an integrated approach that combines innovative coastal protection measures, we aimed to mitigate erosion impacts.

FEATURES

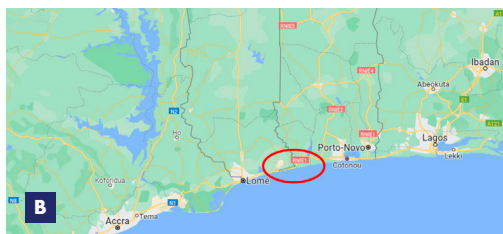
Client	Government of Togo and Benin - Ministère du Cadre de Vie et du Développement Durable du Benin (MCVDD) et Ministère de l'Environnement et des Ressources Forestières du Togo (MERF)
Engineer	Groupement Inros Lackner / Antea Belgium / Antea Benin
Location	Coastline from Grand Popo, Benin to Aneho & Agbodrafo, Togo
Period	February 2022 - September 2023
Contractor	Boskalis International BV



SCOPE OF WORK

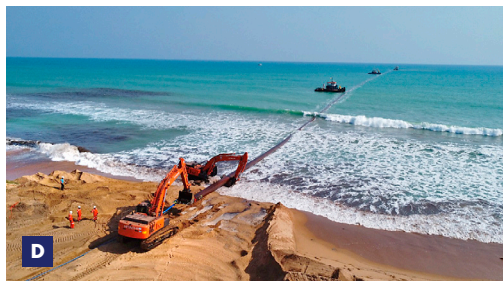
The project scope included a hybrid coastal protection format, a combination of traditional hard- (rock) and soft (sand) coastal protection constructions to protect a 14 km long cross-border section of coastline in Togo and Benin. Here below a summary of the various constructions which were realised:

- (Hard) Rock constructions (± 250,000 tons):
 - 15 new groynes varying in length 65 - 75 m (7 in Togo, 8 in Benin)
 - Rehabilitation of 6 existing groynes in Togo
 - Longitudinal protection in Togo
- (Soft) Sand injections (± 7,000,000 m³):
 - 6,400,000 m³ sand for a Sand Engine in Benin
 - 620,000 m³ sand filled between the groynes (of which 55% in Togo and 45% in Benin)
 - 100,000 m³ sand to fill a former lagoon in Benin.



- A** TSHD Willem van Oranje working in front of Togo
B Location map in Togo/Benin
C Release of recently hatched sea turtles





A socio economical scope was also included which consisted of the construction of bicycle paths and toilets, and planting of vegetation.

After contract award, preparations on site commenced in February-2022 by performing geotechnical onshore and offshore investigations including topographic and bathymetric surveys. In June-2022, they were followed by a 3D model test of a typical rock construction, conducted by Artelia in their hydraulics laboratory in Grenoble.

After these preparatory works, the rock production commenced in local quarries. Transport of the rock to site commenced in August-2022 followed by its installation. The sand injection commenced in December 2022 and in September-2023 all constructions, including the socio economical scope, were completed.



SAND ENGINE CONCEPT

The Sand Engine is a remarkable example of the 'building with nature' concept. With the application of this innovative approach, 6,400,000 m³ of sand were deposited in a single operation at a specific location. Inspired by previous successful projects in the Netherlands (The Hague) and Nigeria (Ibeju Lekki), this approach aims to leverage natural forces such as waves, tides, and wind to naturally transport and distribute the sand along the coast. This method not only reduces the need for regular sand replenishment but also minimizes the disturbance to the vulnerable seabed.

- D** Installation of pipelines for sand replenishment
- E** Sand Engine in Benin
- F** Construction of groyne
- G** Finalised groynes in Togo
- H** Construction of groyne

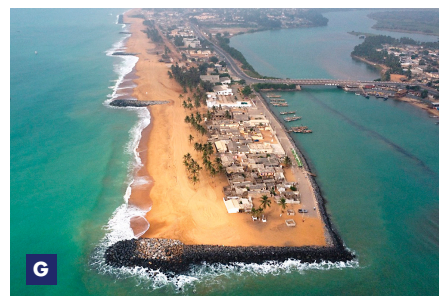


The implementation of the Sand Engine is a significant step towards sustainable coastal management. The future progress and transformations will be closely monitored to provide valuable insights.

LOCAL COMMUNITY

In addition to the scope of work, additional measures were implemented to ensure effective community engagement. The project partnered with NGOs to protect and monitor the local turtle population within the project site.

Furthermore, dedicated Community Liaison Officers were appointed as direct points of contact between the project team and the community. They actively engaged in meetings and discussions with stakeholders, gathering feedback and addressing concerns. A robust grievance mechanism was also established to provide an official channel for community members to voice concerns and seek resolution. These measures demonstrate the project's adherence to World Bank standards for community engagement and sustainable development.



SHE-Q

Environmental compliance was of utmost importance, with measures in place to control dust and noise, manage waste effectively, and protect local fauna such as whales, dolphins and sea turtles. Boskalis executed the rock and reclamation works by reducing the various "foreseen" site working limits saving





hundreds of palm trees and leaving farmland, beach restaurants, voodoo structures and a world heritage church accessible to the communities. Rigorous surveying and monitoring activities were undertaken to uphold regulatory standards.

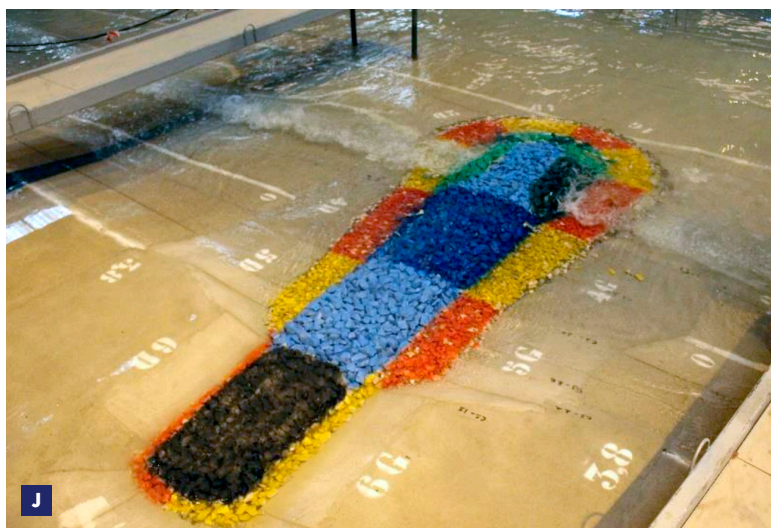
Furthermore, safety performance was a top priority throughout the project, with a strong emphasis on adhering to the Boskalis NINA safety program. Regular safety training sessions and active involvement of local employees and subcontractors ensured a safe working environment aligned with NINA principles.

CHALLENGES

The project faced specific challenges, including executing the work within one seasonal weather window due to coastal wave impacts and erosion. This necessitated meticulous coordination of logistics, cross-border requirements, and stakeholder communication.

CONCLUSION

The project was successfully completed as per the contract’s planning, showcasing the achievement of goals. In conclusion, the successful completion of this project through the integration of sustainable techniques and nature-based solutions demonstrates the effectiveness of building with nature principles in coastal protection. By harmonizing infrastructure development with ecological balance, the project not only created a safe and sustainable coastline but also contributed to the enhancement of the surrounding ecosystem. The adherence to best practices, effective management of challenges, and the engagement of stakeholders set a strong example for future clients in similar projects. By incorporating these approaches, clients can achieve successful outcomes while promoting environmental preservation and sustainability in their coastal protection endeavours.



- I Community engagement
- J 3D model testing in hydraulics laboratory