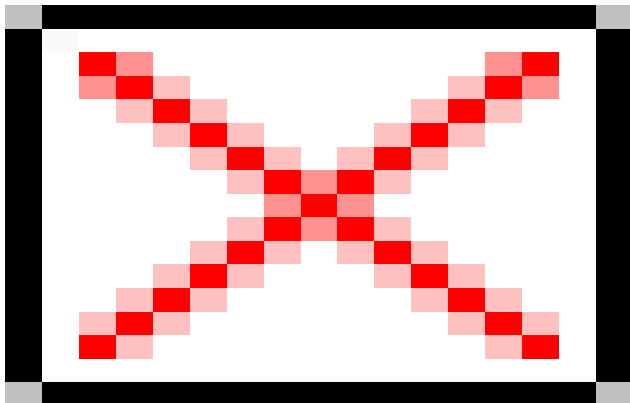


IMDC
Metocean monitoring
Coastal infrastructures
Location:
Ada, Ghana
Client:
Ministry of Works and Housing



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Design of a coastal protection scheme for Ada at the Volta-river mouth

Project description

Ada is a coastal town located in the Dangbe East District of the Greater Accra Region of Ghana, about 100km from Accra, the capital city of Ghana. Ada is situated near the Volta River estuary and it is bordered in the east by the Volta River and in the south by the Atlantic Ocean.

Due to beach erosion loss of property and high inundation risks immediate action was required to reduce the risk of further damage. Before the construction of the Akosombo Dam in 1963, the Volta River transported 1 million m³ sand per year to the coast, resulting in a dynamic river delta. However, since the closure the coastline eroded more than 150m and the river mouth tends to close (with all negative human and ecological consequences) since no high river discharges occur anymore.

The project aims to give the coastal stretch an appropriate coastal protection and in the same time to stop or slow down the closure of the river mouth.

Modelling

4 numerical models are used to optimise the protection scheme:

1. Delft3D for the currents (nearshore and in the Volta), morphological evolution of the sand spit in the river mouth and evolution of currents and salinity in the river mouth
2. SWAN in order to obtain a wave climate and design wave conditions for structures
3. Litpack in order to evaluate and optimise the groyne system and to estimate the remaining erosion
4. Xbeach in order to evaluate the profile evolution (e.g. sand losses due to cross-shore transport to deeper water and evaluation of inundation risks during storms)

An important aspect during the design is the evolution of the sand spit on which turtles have nests and the possible relocation of these turtles. For the possible relocation it was important to avoid erosion cliffs on the nourished beach.

Design of structures

The proposed structures and beach nourishments are shown in figure 2.

For the design of the groynes, beside theoretical rules, following practical aspects had to be considered:

- Availability of sufficient big stones (3-6 ton), taking into account the high abrasion values of the material in nearby quarries which are normally working only for building industry
- The very long swell (wave periods up to 15s) which makes working at sea very difficult
- Occurrence of high waves and undertow which results in high losses during the construction of the core

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