

BAR BEACH EROSION PROBLEM: AVAILABLE OPTIONS TOWARDS A LASTING SOLUTION TO THE EROSION PROBLEM

BY

Larry Awosika, C. O. Dublin Green and R. Folorunsho
Nigerian Institute for Oceanography and Marine Research
Lagos

Several methods are available and are presently been used to combat coastal erosion. The type of structure used however is site specific because of the fact that environments vary from place to place and they react differently to several changes. The following briefly describe some of the viable solution, some of which have been used in the past.

1. BEACH NOURISHMENT:

Beach nourishment is the process of dumping sand on the beach to increase the width or the height of the beach. For along time this had been the most widely used on the beach. Table shows the many beach nourishment programs that have been implemented on the beach. While beach nourishment is regarded as soft and environmentally friendly method of combating coastal erosion it is a stopgap temporary measure. It requires periodic implementation. The return period of the nourishment programs since 1982 averages two years. This option is only a stopgap measure and not permanent. Hence this option cannot be viewed as a lasting solution to the problem.

2. SAND BYPASSING:

The concept of sediment bypassing was developed in response to problems associated with tidal inlets. These problems include excessive accretion updrift of an inlet jetty, unwanted sedimentation seawards of the inlet and often acute erosion downdrift. Current techniques for sediment transfer include mechanical bypassing, hydraulic bypassing, bed fluidization, sediment traps and variations including one or more of these techniques. In the case of the Bar beach sand could be pumped from the accreting Lighthouse beach to the eroding Victoria beach. This pumping could be done by installing a pumping station on the beach and laying of pipes. While this method was used in the late sixties to pump sand on the beach it was abandoned in the early seventies because of the technology, cost of maintenance and the logistics involved.

Today, such a method would be very expensive, cumbersome and lead to environmental degradation of the pristine Lighthouse beach. The cost of maintaining the pumping station and other accessories could also be staggering over a long time. Considering these reservations this option is not sustainable and hence should not be used.

3. SEA WALL BULLHEADS AND REVETMENTS:

Sea walls, bulkheads are structures placed parallel or nearly parallel to the shoreline to separate land area from water area. The primary purpose of a bullhead is to retain or

prevent sliding of the land with the secondary purpose of affording protection to the upland against damage by wave action. The primary purpose of a sea wall or revetment is to protect the land and upland property from damage by waves, with incidental functions as a retaining wall or bulkhead. There is not precise distinction between the three structures and often the same type of structure in different localities bears a different name.

These structures are generally used where it is necessary to maintain the shore in an advanced position relative to that of adjacent shores, where there is a scanty supply of littoral material and little or no protective beach, as along an eroding bluff, or where it is desired to maintain a dept of water along the shoreline, as for a wharf.

While this structure afford protection only to the land immediately behind them and none to the adjacent areas up or down coast is not environmentally friendly and often do not last as continuous pounding of waves and scouring often cause failure. Such structures also reduce the beauty of the beach and hence have negative effects on the tourism.

Considering these negative impacts and experience from other sites this option is not recommended.

4. GROYNES

Groins are long, narrow structures built approximately normal to the shoreline. They extend across part. Or all, of the intertidal zone and may have small lateral extensions to the seaward end or head. Groins are normally built in-groups, known as groin systems or fields, which are designed to allow continued longshore transport. They can also be single structure designed as total barriers to transport (i.e. terminal groins). The main purpose is to interrupt longshore transport causing a build up of beach material on the updrift side, until transport can resume over or around the structure. If down drift erosion is a potential problem, then a recharge scheme should always accompany groin construction.

In general, groins are generally effective as beach erosion control measure on sandy beaches in micro-tidal, low wave energy environment where the spatial distribution wave and tidal current transport across the foreshore is limited.

This option offers some merit since this structure could help retain sand insitu. Some groins had been built in the past but they failed to solve the problem. This was because the groins were no constructed with proper engineering details and were not tested numerically not physically on the laboratory.

5. BREAKWATERS:

Breakwaters are shore parallel structures that provide coastal protection by reflecting, dissipating and diffracting and refracting incident waves and therefore reducing wave energy and lateral transport in their lee. Material deposited in the zone of reduced wave

energy forms a bulge in the shoreline, known as salient. Breakwaters may be detached or shore connected.

Detached breakwater on an open beach are intended to reduce, rather than halt the local potential rate of longshore drift. Detached breakwater allows for variable levels of protection along frontage. However large visual impacts particularly with macro tides may cause leeward strong currents tidal currents.

Design of breakwaters on an open beach must endeavor to achieve a satisfactory compromise between the (sometimes conflicting) criteria regarding requirements of storm protection and long term beach stability between the responses of shingle and sandy. Detached breakwater while visually intrusive can also be used to enhance the amenity value of the beach and the sea front. Beach users are not obstructed by cross-shore structures and protected water is available for swimming or launching and mooring of small boats. The salient provides a stable area of beach that can be used for seasonal parking or the setting up of beach huts and kiosks to service beach users.

BEST APPROACH TO THE SOLUTION.

The combination of groin and breakwater is probably the option that could be more effective. This is because this option could address the inadequacies of groins alone and breakwaters alone. For example, the use of groins alone result in the deficit of sand on the down drift side. The use of detached breakwater to control drift overcomes this latter problem and also provides a measure of protection to the beach face against direct wave attack, especially if the breakwaters are situated on the upper part of the beach. Care is however needed to ensure the potential shoe erosion either in the gaps between breakwaters or at the end of the breakwater system.

Before contemplating on any large scale beach erosion control structures it is important to consider the likely future response of the beach (downdrift and updrift) in both long term and under extreme conditions. The two questions to be asked about this are:

- What will happen to the beach and the defenses behind if they experience severe storm?
- How will the beach respond in the long term?
- What will happen to the downdrift beach?

These questions are better answered through numerical and physical modeling of the beach and the erosion control measure.

Numerical and physical models are important tools for assessing the future response of a beach or effectiveness of beach erosion control measure. When trying to predict the effects of proposed new beach structure it is better to use either numerical or physical or a combination of both methods where there is no corresponding historical records of the prototype situation.

CONCLUSION

Now that the nourishment has been successfully completed, the Federal Government should without delay embark on the recommendations of the Interministerial Committee on the Bar Beach set in 1999 up by the President Chief Olusegun Obasanjo. The Committee recommended the use of a combination of groins and breakwaters. Details of this option are already in place. Immediate commencement of this option will ensure that the huge sums of money spent on the latest nourishment do not end up in the ocean depths through erosion of the beach. The implementation such a lasting solution to the erosion problem will return the Bar Beach again to its old glory as the prime beach holiday resort in Nigeria. The resort would undoubtedly add to Nigeria's economic situation and improve our international standing as a tourist country.