APPLICATION OF COMPOSITE GROYNES IN STABILIZING DUBAI BEACHES

Ibrahim Mohammad Juma, Environment Department, Dubai Municipality, imiali@dm.gov.ae
Sankarbabu Karanam, Environment Department, Dubai Municipality, sbkaranam@dm.gov.ae
Alya Abdulrahim Al Harmoudi, Environment Department, Dubai Municipality, aaaamin@dm.gov.ae

INTRODUCTION

The increase in demand for waterfront living has led to the development of large-scale offshore reclamation projects - The Palm Jumeirah, The World etc., rapidly transforming the coastal zone of Dubai. Development of such offshore islands have interfered with the coastal processes causing reorientation of shorelines at several stretches of Dubai coast (Mangor et al 2008). Regular beach nourishment programs to maintain the required minimum beach width for recreational activities was found to be ineffective due to non-availability of beach quality sand and environmental impacts of dredging and sand shifting operations.

STABILIZATION OPTIONS

The presence of fishing harbours and other coastal structures have segmented the coastline of Dubai into several littoral cells. A desk study of available hard solutions for coastal stabilization has ruled out the application of revetment structures due to already limited recreational beaches. Groynes have been favoured considering the predominant longshore sediment transport due to the oblique wave climate resulted by the offshore reclamation projects.

As conventional rubble mound type of construction requires a wider footprint on the seabed, slender structures with aesthetic appearance have been investigated leading to innovative composite groynes.

COMPOSITE GROYNES

The composite groynes (Fig. 1) are made of timber logs (hard wood species - viz. Yellow Balau) fixed to continuously driven steel tubular piles filled with concrete. The groynes are impermeable due to the closely driven steel tubular piles. The penetration depths for the steel piles are calculated taking in to account the wave forces estimated using Goda's method (Goda, 2000).

Figure 1 - Composite Groynes at Umm Suqeim Beach

PERFORMANCE OF COMPOSITE GROYNES

In this paper, the performance of the implemented coastal stabilization schemes using composite groynes coupled with beach nourishment will be presented.

The numerical modeling studies conducted using LITLINE (DHI, 2011) to predict the long-term shoreline evolution with and without the proposed stabilization schemes will be discussed. Details of the model setup, boundary conditions and calibration will also be presented. The numerical model predicted shorelines are compared against measured shorelines obtained through regular beach monitoring surveys to assess the performance of the implemented stabilization schemes.

SUMMARY

Case studies on application and performance of innovative composite groynes coupled with beach nourishment for coastal stabilization are presented in this paper.

REFERENCES

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