

Geosynthetic Containment Systems for Coastal Protection: An Indian Perspective

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Abstract : Coastal erosion is one of the major issue faced by maritime countries, globally. More than 1200 km stretch of Indian coastline is marked eroding. There have been numerous attempts to impede the erosion rate and to attain equilibrium beach profiles. High cost and unavailability of natural rocks forced coastal engineers to find alternatives for conventional hard options like seawalls and groynes. Geosynthetic containment systems, emerged in the mid 20th century proved promising in catering coastal protection in countries like Australia, Germany and United States. The present study aims at reviewing Indian timeline of protection works that uses geosynthetic containment systems. Indian exploration regarding geosynthetic containment system dates back to early 2000s. Generally, protection structures use geosynthetics in the form of Geotubes, Geocontainers, and Geobags with Geotubes being most widely used in the form of submerged reefs, seawalls, groynes and breakwaters. Sand and dredged waste are used to fill these containment systems with calculated sand fill ratio. Reviewing the prominent protection works constructed in the east and west coast of India provides an insight into benefits and the difficulties faced by the practical installation. Initially, geosynthetic structures were considered as a temporary protection method prior to the construction of some other hard structure. Later Dahanu, Hamala and Penth experiences helped in establishing geotubes as an alternative to conventional structures. Nearshore geotubes reefs aimed to attain equilibrium beach served its purpose in Hamala and Dahanu, Maharashtra, while reef constructed at Candolim, Goa underwent serious damage due to Toe Scour. In situ filling by pumping of sand slurry as in case of Shankarpur Seawall, West Bengal remains as a major concern. Geosynthetic systems supplemented by gabions and rock armours improves the wave dissipation, stability and reflection characteristics as implied in Penth Coast, Odisha, Hazira, Gujarat and Uppada, Andhra Pradesh. Keeping improper design and deliberate destruction by vandals apart, geosynthetic containment systems offer a cost-effective alternative to conventional coastal protection methods in India. Additionally, geosynthetics supports marine growth in its surface which enhances its demand as an eco-friendly material and encourages usage.

Keywords : coastal protection, geotubes, geobags, geocontainers

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