

Shoreline Dynamics of the Indian Coast

P. CHANDRAMOHAN

National Institute of Oceanography, Goa

India has a long coastline of over 6000 kms along the mainland in addition to that of the Andaman and Nicobar Islands in the Bay of Bengal and the Lakshadweep Islands in the Arabian Sea. The vast coastal zone has been playing a major role in the economic development of the country since ancient times by its contribution to sea trade, fishing, ocean industry and human settlement. Scientific assessment of the coastal processes is a prerequisite in projects like ports and harbours, fisheries, coastal protection, marine recreation, pollution control and land reclamation. Erosion and siltation problems are frequently faced near harbours and close to existing coastal structures. The important factor governing the beach erosion is the coastal process which is controlled mainly by the wave characteristics and the nearshore sediment transport. Information on longshore sediment transport is essential for studies pertaining to shoreline erosion, harbour development, sedimentation, dredging, tidal inlets, design of coastal structures, development of marinas and tourist resorts etc.

Coastal geomorphological features of the east and west coasts of India are complex. Long sandy beaches with dunes along the almost straight and low-lying east coast and the pocket beaches between the headlands and promontories along the highly indented west coast are the main features. The West Bengal coast is characterised by the existence of shoals, sand spits, mud flats and tidal swamps. The coast of Orissa is marked by long sandy beaches with high and wide backshore. The Andhra coast is marked by long sandy beaches backed by rows of high sand dunes, while the Tamil Nadu coast comprises of long sandy beaches. The coast between Point Calimere and Tuticorin is protected from the monsoon waves due to the proximity of the island of Sri Lanka. A sandy beach appears

in Trivandrum region, but further north till Cochin the coast consists of rocky cliffs and spits with intermittent pocket beaches. Long beaches are found from Cochin to Calicut. Low cliffs, pocket beaches and bays are found from Calicut to Mangalore. Formation of offshore mud banks during the monsoon season is a unique phenomenon along the Kerala coast. The Karnataka coast is marked by creeks, bays, headlands, spits and barriers. The Goa coast consists of long, beautiful and sandy beaches with few headlands and pocket beaches. The Maharashtra coast consists of pocket beaches with rocky corals, pebbles and sands. Rocky shores with intermittent sandy beaches and marshy tracks are found between Daman and Hazira. Sandy beaches are found along the Gulf of Khambhat. The Gulf of Kachchh is dominated by deep inlets, offshore islands and marshes. The Rann of Kachchh gets flooded during the south-west monsoon and becomes a dry and barren mudflat during the rest of the year.

Scientific assessment of the coastal processes is a prerequisite in projects like ports and harbours, fisheries, coastal protection, marine recreation, pollution control and land reclamation.

Information on waves are very essential for the studies on coastal processes. Waves are random in nature and the longer the duration of observation, the more realistic would be the evaluation of the wave climate. Wave measurements using instruments are being carried out by the National Institute of Oceanography, Goa for various agencies in India. The wave measure-



ments being carried out in India do not normally cover more than a year.

Comprehensive studies are needed to evaluate the seasonal longshore and onshore-offshore sediment transport. Onshore-offshore transport is initiated by the high and short period waves resulting from a storm removing the sand from the beach and transporting it into the sea to form offshore sand bars. During the ensuing fair weather period, the sediments formed as offshore bar tend to migrate onshore and build

up the beach. This cycle is linked to the climatic season in which offshore transport dominates during the monsoon season while onshore transport dominates during the fair weather season. Longshore sediment transport is more dominant than onshore-offshore transport and of great significance to coastal engineers who are interested in annual changes rather than seasonal variations. Further, formulating computer models to study the behaviour of sediment movement along Indian coast is very essential.

