CHAPTER 1

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Islands in the tidal creeks and river channels are unique aquatic ecosystems. Their geoenvironment is peculiar to their location in the tidal channel and non-tidal stretch of the river. The factors, “distance from main land” and “size” suggested in the theory of Island biogeography by Arthur and Wilson 1967 is also significant in the river islands. The distance from both the banks of the river, their size, tidal velocities, tidal current pattern, quantum of sediment in the tidal water, tidal range, limit of tidal incursion are the factors that influence the geoenvironment of creek islands. The non-tidal river islands are mainly influenced by nature of fluvial process, river discharge, suspended load and flood tendencies. The geoenvironmental study of any area or feature normally includes the identification of major land facets in the area e.g. relief, slope, soils, sediment composition, regolith, weathering and biotic aspects, mainly vegetation, associated with it (Dhavalikar, 2001). The geoenvironmental study of creek and river islands is also focused on terrain levels, slopes, type of substratum, vegetated areas and other land use types.

Aquatic ecosystems are classified on the basis of salinity (Miller, 2004). They are fresh water (rivers), brackish water (Mid Creek Islands) and salt water (Islands in mouth of estuaries and creeks). Biogeoenvironmental study of such islands gives more emphasis on the floral composition, sediments and morphology. A geoenvironmental study pertains only to morphological, geological and sedimentological aspects of these islands.

An estuary or tidal creek of a river essentially has salt water, brackish water and fresh water zones with an increasing distance from the mouth of an estuary. Estuary is a high productive area in the coastal zone.
It is a partially enclosed, funnel shaped area of coastal water, where seawater mixes with fresh water and nutrients from rivers and runoff from land enriches the area. The coastal wetlands associated with estuary are creek and estuarine islands, covered with mangrove swamps or other halophytic (salt tolerant) varieties of plants (Miller, 2004).

The length up to which the tidal water penetrates in the estuary or creek is the inter tidal zone. This zone or river stretch experiences daily incursion and excursion of sea water.

Lower reaches of rivers on konkan coast of Maharashtra are submerged and exposed daily due to semidiurnal tidal cycle (Karlekar, 1993). The length of tidal ingress varies from north to south due to changing tidal range and coastal configuration.

The estuaries and creeks on konkan coast show a distinct tidal and fresh water regime (Karlekar, 1996). The tidal inlets to the south of 18 degree north parallel are generally wave dominated. Estuaries to the north of 18 degree parallel have a strong tidal control.

Many of the Konkan estuaries show a structural control in their tidal sectors and have a NW-SE orientation. The major sedimentary environments developed in these creeks are high and low tide flats, sand bars, sand islands and mangrove swamps (Keskar et al, 1993). The islands and bars are produced by specific hydrodynamic conditions like wave and tide action, flow velocities, turbulence, mixing and scouring. The mid estuarine areas in konkan are invariably the areas of sand bars and islands (Karlekar, 1996).

The depth of these tidal inlets varies from more than 4 meters near the entrance to about 1 meter near its head. Fresh water flow in monsoon is one of the fundamental control on the salinity structure of these estuaries. During monsoon due to high fresh water flow all traces of seawater in creeks are flushed out. In post monsoon the salt wedge is re-established rapidly. In monsoon, some amount of salinity stratification remains in the lower column of creek water.
Several areas of salinity and sediment concentration exist in most of the konkan estuaries. The deeper areas in creeks and estuaries act as sediment traps. A large amount of sediment settles on the mud flats and other areas outside the main tidal channel. The overall character of suspended sediment changes along the length of estuary.

The shallowness of the intertidal areas in these estuaries allows the growth of swamps and marshes on sand islands and margins of tidal flats. The lower reaches of rivers, especially the tidal sectors of Konkan rivers show many islands, sand bars and sand lenses. The islands in the tidal sector of the rivers are submerged partially or fully in every high tide depending on their height above tidal level and are exposed during low tide. They are the breeding grounds of many tidal water organisms. The mangroves are the common plants which grow plentifully in the creek on substratum comprised of silt and clay. (Davies 1977, Pethic 1984). They are also the home to many shorebirds.

A few konkan rivers such as Vashishthi, Terekhol, Savitri, Kajali show small to moderate size islands in their tidal sector. These islands in konkan creeks comprise of sand, silt and clay. Few are rock islands that are covered with sand and silt material.

Most of the sand islands are detrital accumulation forms. They occupy lower sectors of the tidal creeks whereas rock islands in general are seen in the upper sectors of the tidal creeks.

The availability of sediment and fluctuations in sea level exert a strong control on the morphology and sedimentology of creek islands (Karlekar, 1997). As sea level rises there is an overall change in the tidal structure (Carter, 1989). If there is an infilling and redistribution of sediments, tidal friction increases due to shallowing of the creek. Such changes have long-term effects on the vegetation of islands and their overall morphology. (Karlekar, 1997), has identified a distinct erosional trend along mudflats of Shrivardhan Bay. Here Silt clay accumulation forms show a distinct landward shift. Reduction in fresh water and...
sediment supply and redistribution of available sediment are the major trends observed in konkan creeks in last decade or so.

Ridges of detrital sediments, sand bars and sand lenses are an important geomorphic feature of modern tidal sectors of konkan rivers (Karlekar, 2009). Reduction in size, change in shape, linear growth in upstream and downstream direction are the salient features of these forms. The accumulation forms, which are not stable, are swept away by strong waves in monsoons. They are essentially sand bars in creeks. The islands are relatively stable and covered by vegetation, especially mangroves. Their vertical growth by accretion however hinders the inland navigation through creeks. Sand islands in Terekhol River are studied in detail by (Roy, 2008). Her observations suggest that the bars and islands near Terekhol creek mouth are made up of medium to coarse sand.

Dense mangroves are found on the islands where recent sand is deposited in Terekhol creek. Bars well inside the creek comprise of fine sand deposits. She also observes that the old islands act as nucleus for recent accretion of sand.

Detrital material giving rise to sand islands, bars and ridges is largely drawn from immediate terrigeneous sources. In many cases it is a coarse grained sand with good sorting. Tidal currents can induce poor grading. The material becomes fined grained away from the source. In konkan, at majority of places these islands and bars are reduced in size or totally swept away in monsoon (Karlekar, 2009). They have started showing tendencies of shifting within inlets since last decade or so. Reduction in size, change in shape, elongated growth in upstream or downstream direction are some of the features of this change. Now a days these changes can be easily detected on IRS images of tidal inlets.

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