CHAPTER 6

OBSERVATIONS AND CONCLUSIONS
CHAPTER 6

OBSERVATIONS AND CONCLUSIONS

The geoenvironmental study of any area 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.

Ridges of detrital sediments, islands, sand bars and sand lenses are important geomorphic features 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 forms, which are not stable, are swept away by strong waves in monsoons. They are essentially sandbars in creeks. The islands are relatively stable and covered by vegetation, especially mangroves.

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 current usually induces 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 (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 change. Now a days these changes can be easily detected on IRS images of tidal inlets.
Study area is a tidal stretch of river ‘Kundalika’ between Kopri and Bahe. It is a 26.5 km. stretch characterized by about 17 islands of varying sizes and shapes. They are comprised by mud, sand and silt.

The channel under study is divided into three sectors as lower, middle and upper. The lower sector is dominated by tides and has maximum period of tidal inundation. This period slowly goes on decreasing in the upstream direction, where the influence of daily tides decreases. The sector beyond 25 km is called the upper sector. The sector in between these two ends is identified as a middle sector. Island, ‘A’ which is a mud island, lies in the lower sector. Island 1 to 14 are in the middle sector and remaining in the upper sector of the channel.

All these islands are basically very low in height. The height of any island hardly exceeds 4 m ASL. The elevation range of most of these islands is between 1 to 4 meters only. The island morphology and relief has specific pattern in longitudinal direction and not across their edges facing left or right bank. This is because these islands are mainly shaped by tidal incursion and excursion in the creek. The longitudinal component of tidal flow is more influential than the circulation across the channel.

Between 1927 and 2007 the very first island from the creek has shifted inside the creek by a distance of 161 m, whereas the second island has shifted closer to the first island by a distance of 45 m. Although, the Island 3, 4 and 5 have drifted inside the creek, island 6 has drifted towards the mouth. Overall tendency of forming clusters seems to have prevailed till 2007. All these islands are pushed in the creek towards the upstream direction. The islands especially in the lower and middle sector have moved upstream, whereas islands in the upper sector have moved in the downward direction towards the mouth of the creek. Islands 1,3,4 and 5 in lower part of the middle sector show landward shift. Whereas Islands in the upper part of middle sector, Islands 9,10,11,12,13,14 and upper sector islands 15 and 16 show downward (seaward) shift.
The creek islands in the area show tendency of cutting and growth especially, along their cross sectional axis. This has resulted in the increase or decrease in distance from left and right bank of the tidal creek.

There is a pronounced extension of right margins of islands in the upper part of the middle sector, which shows a downstream shift. Although extension due to filling is a dominant tendency seen in all islands, it is less pronounced in islands in lower sector, which are shifting upstream. Right bank of upper sector islands seems more prone to filling than the left bank. Cutting and extension tendencies are relatively more balanced in Middle Islands 3,4,5,6 and 9. Maximum extension by 880 m in case of island 11 in last 80 years indicates an extension rate of around 11 meters per year towards northern bank of the creek. Extension due to filling is clearly a dominant process in most of the islands.

The islands in-group ‘D’ at 23 km (22.62 km) distance are more clayey, where clay is less consistently distributed. Clay distribution in these islands is highly positively skewed. Islands in group ‘B’ and ‘C’ are sandy. Here also sand is irregularly distributed on the islands. The middle zone is an ideal sink for suspended matter. And therefore between 40 years of span from 1967 to 2007 development of conspicuous island in the creek is found at this distance and some distance upstream (Island group B, C and D) also.

Out of 17 islands, islands 9 to 11 located in middle sector of the creek are at a critical distance and at an inflection point. They show a totally different pattern of sedimentation, morphology and vegetation growth. Vegetation found on these islands tolerates high salt concentrations, periodical submersion and experience low and dry nutrient conditions.

A variety of plants are found on the islands in study area, but mangroves are one of the most frequent forms of vegetation occurring in intertidal zones along Kundalika River up to Roha.
The vegetation cover on the islands has strong association between the substratum and terrain. Terrain and substratum are the determinants in the type and density of vegetation on the islands in study area. Along 30 km tidal stretch of the river, the stretch between 15 and 25 km distance inland from mouth has all the characteristics of a sediment sink. Sand, that too, coarse sand is a major sediment size on most of the islands. Clay found on these islands shows patchy distribution and is less consistently distributed, except in case of a mud island 8.5 km inland from the mouth of the creek.

Channel bank shows thick mud deposits at a few places but the islands within the channel are sandy. The sediment distribution pattern and profile for all islands suggest winnowing of finer sand and clay particles by tidal currents. Preferred locations for the deposition of various size particles are also decided by tidal currents. The landward and seaward shift of islands may be attributed to fluctuations in sea level.

Luxurious growth of the vegetation is found on the lower part of the middle sector islands near Kumboshi 20-22 km inland. Anthropogenic activities like dredging (sand mining) is observed near Kumboshi through out the year within the channel, which disturbs the natural geomorphic processes within the channel.

The islands in Kundalika creek are thus peculiar as regards their geoenvironment, as well as sedimentary environment and are unlike sandbars and islands in other creek and estuaries of konkan. They preserve many bio and geo indicators of environment and need more detailed investigation to understand Holocene sea levels in the area.

* * * * * * *
PHOTO PLATE : 9
THICK VEGETATION ON ISLAND NEAR KUMBOSHI

PHOTO PLATE : 10
DREDGING ACTIVITY WITHIN THE CHANNEL NEAR KUMBOSHI