

The Relationship Between Changing Coastal Physical Condition and Cultural Aspect- A Case Study of the Coastal Stretch of Digha-Sankarpur, West Bengal, India

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Abstract: *To harness the scenic beauty of coastal belt eco-tourism industry has developed at Digha –Sankarpur with enormous potential and economic, socio-cultural process of this place and its surroundings (Mondal et al... 2013). Digha –Sankarpur is twins small sea side resort in the state of West Bengal, India. Beginning a transitional track between land and tor water, coastal are considered to be one of the most complex, dynamic & sensitive geomorphic units that need to be a under costant observation to follow & monitor the continious changes , accuring their (yauli- 2002 Alesheikh et al... 2007). Even more, the historical & functional approaches to monitor shore line changes help the geomorphologist in deciphering the coastal process operating in the area (De Silva, 2005). This paper scan the relationship between coastal physical condition (elements) and cultural aspect (elements). And also the present paper is an attempt to understand and searching the development natural resources of Digha- Sankarpur .In this paper possible biological interactions between sandmass of dunes and vegetation in different stage of development has allso been dealt. West Bengal coast which is an emerging industry and a wide scope of eco-tourism and natural resources along the coast of Digha- Sankarpur, W.B, India.*

Keywords: Sea level change , Saesonal change, Destructive wave

1. Introduction

India ios blessed by a long shoreline enclosing the state from three sides , i.e East , South and West compared to the western part , the eastern coast of the indian sub-continent, experience lots of dynamism in terms of the coastal stablity (Chatterjee, 1995).

Digha-Sankarpur is twine small sea side resort in the state of W.B. The coastal stretch of W.B with a length of about 350 km comprises the two districts- Purbo medinipur (East Midnapur) and Dakshin Chabbis Paragana(South 24 paraganas). This region (like –Digha, Sankarpur, Tajpur, Manderminy, Sagar Island, Bakkhali etc) is a transitional zone in between sea and land where the Casuarinas & Mangrove forest are whispering , sea are roaring, the flora and fauna are blooming and where visitors can rejuvenate yourself in the company of sand , sea and sun in the pristine open air which has kept her doors wide open to established the eco-tourism destination (Mandal et al... 2013). Being a transitional tract between land and water coastal areas are considered to be one of the most complex, dynamic and sensitive geomorphic units that need to be under constant observation to follow and monitor the continious changes , occurring there (Yauli, 2002, Alesheikh et al ... 2001).

Mainly the coastal area of West Bengal extends over 0.82 million hectors and 220 of coastal lines. Muddy coast accounts for 350 km, of which 90% are treated as marshy zone having halophytic vegetation and their associated flora and fauna only around 40 km is considered as sandy belts. It includes two coastal districts- the South 24 Pargana, supported by Sunderban Mangrove ecosystem and Medinipur coast having sand flats and degraded mangrove patch. Indian part Surdarban occupies mangrove area (4262 sq km). Slightly more than that (4109 sq km) of highly reclaimed counter part in Bangladesh (Chakraborty 2011).

The present geomorphic division like the beach, active dunes , mud flats etc of the present day study area has developed within last 6000 years with the last sea level fall after Holocene climatic optimum through sand deposite by Subarnarekha River (Bandopadhyay, 2000, p- 17). This area is very beautiful and various types landforms are filled.

2. Study Area

West Bengal has a substantially lone coast line of almost 100 km (including island) characterised by high flora and fauna biodiversity, diverse geomorphic features and anthropogenic intrusions (Bhattacharya, 2001). Digha-Sankarpur area is the part of Contai coastal area of Purba medinipur district, W.B , India. This area lies in the coastal tract of adjoining Bay of Bengal and border of West Bengal and Orissa. The coastal area of Digha –Sankarpur – Chandpur-Jaldha is located in the SOI toposheet no. 73 -o/6 and 73o/10. The extents of the study area is between latitudes- 21 36 50 N and 21 30 00 N and longitudes 87 29 40 E and 87 37 00 east. The width of the area is 2.5 to 3.0 km from the low tide level and length is 14 km from the Orissa border to the Jaldha Mouza. The Digha planning area are comprises of 42 mouzas under Contai sub-division of which 17 mouzas are in Ramnagar Police Station and 25 mouzas are in Digha Police Station. The area includes both of urban and rural areas .The urban area is situated along the coast in the western part , known as old and new Digha (Wikipedia, the free Encyclopedia).

3. Objectives

This study is oriented towards understanding the some specific aspects. These are:-

- 1) To find out the relationship between changing physical element and cultural aspects.
- 2) To study major geomorphic features of the study.
- 3) To study the geology of the area.

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- 4) To find out sub-surface geology of this coastal sector.
- 5) To study general causes of accretion and erosion of Medinipur coastal region.
- 6) To find out the life-style of the people in this area.
- 7) To find out urban problems.
- 8) To study the process of urbanization and assessment of the existing condition depending upon the existing landforms.

4. Methodology

This study has basically two characteristics:-

- 1) Physical characteristics
- 2) Cultural characteristics, and to do various statistical method (like slop gradient) are used and also applied various cartographical techniques for comparative study . And also applying remote sensing and GIS techniques on the satellite image and toposheets, shoreline extraction using water index, and erosional index.

5. Geology

The geological history of the coast is comparatively short and the coast is still in its formative state (Bhattacharya and Sarkar 1996). This area has three elements covering successively by beach. Those are –

- 1) Sand
- 2) Silt
- 3) Clay

This beach from linear coastal features usually developed along the shoreline buffer the absorb or diminish and to

reflect or trans from the wave energy which is generated over the large area of the Bay, both driven by winds and tides. Larger and flatter beach profiles of Medinipur coast are associated with beach berm, beach face, ridge and runnel, rip channels, low tide terrace, long shore trough, long shore bar and significant backwash ripples within the limits of backshore, foreshore, inshore and adjacent shallow water area offshore zones. The beach face is marked by various sedimentological structures and active bioturbations. The fine sand beaches of Medinipur coast have gentle foreshore slopes and provide a firmly packed hard sand surface north of Digha (Mandal et al...2013).

All motions on the sea surface are generated and controlled by a range of forces, viz. tides, waves and currents. Ripples and waves are generated by the wind and controlled by surface tension along or in conjunction with storm. The waves in turn may generate coastal currents which are responsible for the sediment drifts along the beaches i.e. long. Shore or littoral drift. Based on the nature of the nature of the tidal range, this coast is designated as macro tidal to mesotidal coast (Paul, 2002).

6. Sub-Surface Geology

This coastal area is underlain by unconsolidated sediments of sands, silt and clay. These sediments have been categorized into 7 different zones based on their physical, mineralogical and biological characteristics. The depositional environments indicate marine and non-marine conditions alternating with each other (Chakrabarty, 1991).

Table: Terrain Analysis and classification of Medinipur coastal Region

Particulars	Terrain Units	Geomorphological Units	Geological units
Marine Coastal and Fluvio-tidal Facies	<ul style="list-style-type: none"> • Beach face • Beach front dune complex • Present day mud/sand flat • Older beach ridge • Older dune complex • Older tidal pond • Ancient inter-tidal flat • Ancient dune complex • Ancient tidal pond • Ancient fluvio-tidal flat 	<ul style="list-style-type: none"> • Active marine coastal plain • Abandoned marine coastal plain • Inactive marine coastal plain • Inactive fluvio-tidal flat 	<ul style="list-style-type: none"> • Recent Medinipur coastal Deposit • Older medinipur coastal plain • Ancient Medinipur coastal plain

Source:-Chakraborty, P.-1994

Changing Physical Condition

This paper scan the development of coastal physical condition of Digha- Sankarpur coastal line. Generally some changing physical elements and their relation with local culture. The relationship between changing some coastal physical condition and cultural aspect are given below:-

Changing Pattern Of Sea-Beach And Effect Of Cultural Aspect

The beach of Digha-Sankarpuraera is known to be a marine erosion prone area. Beach in W.B coast are sandy or muddy. Sandy beaches are notice in the western part of estuary especially to the east of Bogkhali. Well- developed beach is found near Digha, Dattapur, Shaympur, Dadanpatar, Bagurranjalpai, Dariapur, Nijkasbaetc along Midnapur coast. In other parts beaches are narrow and it is almost absent on

Southeastern part of the coast. Exposition of older mudflat in Bogkhali coast and Sankarpur coast is the clear indication of beach erosion (Das, Rabin et al...2012).

Erosion of the sea beach is the most critical natural phenomenon on which the future of the resort depends. The measure of protecting the erosion of sea beach by laterite blondest was the reduce the pace of erosion from Old Digha to New Digha but the stench of beach from old digha to Mohana is not property perfect, though recently a number of wave breakers have been counteracted (Mondal et al...2013). Seasonal changes of tropical monsoon influence the width and angle of sea beach height and angle of typical coastal dunes and existence and extension of mud flats.

Chaning Pattern of Climate and Effects on Cultural Aspect

Mainly the climate of the coastal belt are depend on monsoon wind .Digha-Sankarpur coastal area normal temperature in summer (March- June) do not exceed 30 C, and winter(November – February) 10-20 C. During the summer moderate wind blows from the south-west and normally continues during the monsoon (June to October) and winter gentle brects from north to south-east.

Generally the Monsoon starts in the first week of June and normally condition up to September. On the some time its extended upto middle of October. Mainly the monsoon wind is associated with Cyclonic Strom. But now-a-days the impact of ELNINO, Global Warming and Environmental Degradation are changed the climate characteristic on Digha-sankarpur coastal region (W.B, India).

This coastal belts lies with in cyclonic porn zone and the frequently of cyclone formed over Bay-of Bengal nearly four time more then Arabian Sea. At last one cyclonic storm with server intensity has become a regular. Tell casuarinas tree one of the major attraction of this report are severally effected by the cyclones. The cyclone of vertical growth of report:-

- a. No local warning system has been introduced to the tourist, Fishman and local people well in advance to this type of natural hazards
- b. Through the truancy of the cyclones of floods is much on the higher side on provision has been made to remove the flood or cyclone affected population including the tourists to a safe shelter (Monjit ,Mondal et al ...2013).

Changing Pattern of Shoreline and Affect of Cultural Aspects

According to Santra and Mitra, 2013 has been constant and shows a continuous changing pattern. (Both spatial and temporal variations in the deposition and accretion have been observed in the study area.The temporal intervals (being 1950 to 1963,1963 to 1990, 1990 to 2000 and 2000 to 2005) used in the study for assessing the changes have not been uniform. However, the erosion and accretion patternclearly shows a nonstop geomorphic sculpturing over the coastal tract in temporal gap. Erosion mechanism as a constant factor for the coast line modification in the most of the areas, whereas a little segment near Pichhabani inlet shows deposition. In western the part of the study area erosion was prominent between1950 and 1963.However, it gets more distinct between the time intervals of the next 27 years. In the following 15 years, the coastline shows a gradual shift towards contiguous land as a consequence mainly of wave erosion. Analysis shows that the proportion of land and water has been continuously changing in the study area along the coastline. Excluding and contribution of inland water bodies, it has been estimated that between 1950 and 2005, almost 10% of the land has been engulfed by the water.

Table: Erosion-Accretion Rate

Time Gap	Gross Erosion (Area)		Gross Accretion(Area)	
	Ha	% of Total	Ha	% of Total
1950-1963	837.03	3.18	33.77	0.001
1963-1990	1356.43	5.16	20.9	0.001
1990-2000	158.59	0.01	13.57	0.001
2000-2005	167.26	0.01	8.92	0.0001

Source:-Santra and Mitra, IJGG, 2013.

Total accretion is considerably less with respect to erosion. Whereas between 1950 and 2005, 837.03 ha accretion has occurred. This pattern of erosion and accretion indicates that the equilibrium between erosional and accretional process in the special unit is towards negative which is rather indicative of relative isostatic in stability in near future.

7. Summary and Conclusion

The Geological survey of India in its report on the Digha coastal belt pointed out that the active process of erosion and accretion have been accelerated by several man made intervention including removal of sand dunes leading to mushrooming of construction near the coastline. The methodology of the study through has been tried to be framed as scientifically as possible, due to some data constraints there has been a trade of between the accuracy and approach of the research. As the study is supported by a database with irregular intervals, a definitive erosion rate was difficult to portray. Thepurpose of the study was to point out the geomorphological facts, which is causing a instability in the study area along with some quantitative explanation. The major prospect of the study is to carry out an extensive modelling upon the shoreline prediction for the future using some scientifically approved approaches. I also tried to prove the relationship between coastal physical condition their impact on local cultural aspects of Digha-Sankarpur coastal belts,West Bengal, India.

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