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BIO-GEOMORPHOLOGY OF JUVE ESTUARINE AREA, MAHARASHTRA

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ABSTRACT

Biogeomorphology is the study of interactions between organisms and the development of landforms. Organisms affect geomorphic processes in a variety of ways. For example, trees can reduce landslide potential where their roots penetrate to underlying rock, plants and their litter inhibit soil erosion, biochemical produced by plants accelerate the chemical weathering of bedrock and regolith, and marine animals cause the bioerosion of coral. The study of the interactions between marine biota and coastal landform processes is called coastal biogeomorphology.

KEYWORDS: Biogeomorphology, organisms, geomorphic processes.

INTRODUCTION

This can include not only microorganisms and plants, but animals as well. These interactions are very important factors in the development of certain environments like salt marsh, mangrove and other types of coastal wetlands as well as influencing coastal and shoreline stability (Reed, D.J. 2000). There are three main processes related to biogeomorphology; bioerosion, bioprotection, and bioconstruction (Naylor, Larissa A. 2005). Bioerosion refers to the erosion of ocean substrates by living organisms. Bioprotection refers to the protection of substrate from various forms erosion by the presence of organisms, and the structures they create (i.e. coral reefs). Finally bioconstruction refers to the physical construction of biological structures on ocean substrate (Naylor, Larissa A. 2005). Marine biota interact with landform processes by building structures, accumulating carbonate sediments, accelerating erosion by boring or bioturbation, and marine plant life contribute to shoreline stability. especially in marsh and wetland environments (Bernal P., and P.M. Holligan 1992). The interaction between marine biota and geologic processes is very important to shoreline stability, especially in soft sedimentary environments where sediments are more likely to erode away. Benthic, and planktonic organisms, as well as Shellfish filter, package, and even bind fine sediments together in tidal regions. This action reduces turbidity in the area by solidifying and protecting loose, soft sediments, and thus allowing for more colonization by other organisms. If disturbance of these soft sediments occurs,

particularly through human interaction like shellfish harvesting, dredging, or the introduction of toxins the environment may drastically change. If this occurs, and marine biota is removed from the environment, erosion can occur, or increase, especially in regions prone to wave action and tidal resuspension (Bernal P., and P.M. Holligan 1992).

STUDY AREA –

Rajapur creek (16° 37' N and 73° 20' E) on West coast of India, is a 30 km long tidal sector of river Kodavali (Fig 1). It has tidal range of 2.5 m and the tidal mouth covers an area of 5.5 square km. It has a typical funnel shape



governed by river flow and tides. The creek banks are bordered by Rhizophora mangroves and there are many mid creek sand silt bodies and similar accumulation forms within the tidal mouth. The tidal inlet is bordered by a narrow, elongated terraces backed by steep lateritic hills. Beaches and dunes, sand silt bars in the tidal stretch, tidal flats in sub creeks, terraces and mangrove swamps are the main sedimentary environments in and around the creek (Fig 2).

Island Juve is located 4km inland from the mouth of the creek and is surrounded by a mangrove swamp wetland admeasuring 26 sq. km (Fig 3). The wetland itself comprises of many clusters of thick mangroves (Fig.4). The silty sandy subsurface of wetland is most conducive for the growth of mangroves in tidal and partly fluvial environment of the creek.

METHODOLOGY -

The proposed work aims at assessing the resource base of a mid creek bar at Jamdul Achara on Konkan coast of Maharashtra, as a potential biosphere reserve. For any attempt of this kind involving resource survey, management and conservation, building up of relevant database is quite essential.

The study area is characterized by complex wave and tide processes. It is covered by thick mangroves and preserves a great amount of biodiversity. However, recently there are incidences of the degradation of its rich biodiversity. Maintaining the biodiversity can become an equally difficult task in near future if due care is not now.

DISCUSSION -

Mangroves represent a type of azonal vegetation confined to salt water of tidal regions along the creeks and estuaries of Konkan region of West Coast of India. The estuaries of small, swift streams and tidal creeks of major rivers are most conducive sites for the growth of these halophytes.

On Konkan coast mangroves grow in sheltered areas of tidal inlets in a narrow belt of land. Although limited in extent, they support a variety of marine life and serve as fodder and fuel sources. Rhizophora, Sonneratia, Avicennia and Acanthus are the most frequent types of mangroves on this coast.

The mangrove swamps on Maharashtra coast are under different biological stresses and are struggling for existence. They are endangered due to several activities in and around the habitats in creeks and estuaries.

Tidal range and the nature of substratum are the controlling factors of mangrove growth in the creeks. Dense mangroves as a rule are found in a macrotidal, silt clay environment. High tide water reaches to a horizontal distance of more than 200 m in the sheltered arms of the creek where mangroves can be found. Mid tide affects the area between 80 and 120 m and a lower 80 m horizontal stretch of mud flats is always under the influence of diurnal tides.

The measurements and the observations in creek have shown that the silty, clay high tide flats are sparsely covered with short mangroves. The mangrove cover has significantly reduced in last 10 to 15 years. The survival rate of new seedlings in this sector is very low (8 % to15 %). Grazing, breaking of pneumatophores, infestation by crabs and human interference has resulted in a considerable loss of mangroves in this part of the mud flat.

The mid tide flats have limited interference due to tidal submergence. High inundation frequency and protection from wave action has helped in growth and survival of new seedlings (70 % to 90 %). Mangroves on the low tide flats also show decrease in survival due to infestation by barnacles, chocking of seedlings by epiphytic green algae and seaweeds and movement of small boats along the shore.

The protection of mangrove swamps as biosphere reserve will go a long way in improving and restoring mangrove habitats at Jamdul Achara in particular and on Konkan coast in general.

It is necessary that the resources of the region be properly documented qualitatively as well as quantitatively. It is necessary to take up detailed study regarding the processes that are responsible for the thick growth of mangroves as well as those which are causing their degradation.

The zone of multiple use and cooperation is an area that contains settlements, croplands, managed forests, recreation areas, and other economic uses characteristic of the region. It is a concept to promote the establishment of cooperative programs and partnerships between the protected area managers and the surrounding community.

Biosphere reserves help to bring together the diverse regional aspirations so as to find practical strategies to deal with the complex and interrelated environmental, land use, and socioeconomic concerns affecting a particular region. The Biosphere Reserve concept serves as a means of exchanging information and ideas regarding the conservation, sustainable use and management of natural resources in harmony with the needs of local populations. Biosphere Reserves world over are providing a wide range of environmentally friendly products.

The demand of local people and the degree of their dependence on the mangroves have to be quantified if the resource based Biosphere Reserve Model has to be meaningful. Such a database can become support system for locals and various government agencies. Information now available can also be integrated into a single format. It is necessary that the study of the pattern of utilization of the resource by the locals be carried out in detail. The indigenous knowledge of the resource, which is usually undocumented, should be identified. It is necessary to identify areas that are prone to erosion, siltation and overall degradation. The main aim of the proposed work is to develop a sustainable model of biosphere reserve for the mangrove covered areas in and along the creeks and estuaries of Konkan coast of Maharashtra.

The mangroves far from being wastelands provide directly and indirectly for the livelihood of the people of the coastal area of the region. Obvious and hidden services and benefits provided by the mangrove ecosystem had always been taken for granted by the local people,

With time a multidisciplinary integrated approach for a better understanding of the structure and function of mangrove ecosystems for sustainable use and management gradually can emerge.

As knowledge of the significant role that mangrove ecosystems play in the tropical coastal zone grew worldwide, it also became clear that mangroves are marginal ecosystems, vulnerable to sudden or drastic changes in the environment. Mangroves do not recover spontaneously after the impact of natural or manmade catastrophic events such as cyclones or total felling of the mangrove forests.

Mangrove ecosystems throughout the world have in common only the fact that brackish or saline waters tidally inundate them at regular intervals. The tides may vary from twice daily to seasonal flooding in monsoonal areas. Practically all other ecological and socio-economic factors vary from place to place, and socio-economics can be regarded as a measure of human ecology. Only few species of higher plants have over the course of geologic time, become adapted to demanding conditions such as ample fluctuations of water and soil temperature and salinity, of air humidity and temperature, The system as a whole is marginal and fragile, vulnerable to sudden or drastic changes.

Benefits of mangrove ecosystems are sustainable over decades and centuries, if the swamp is left undisturbed or if it is appropriately managed according to local environmental determinants. Manmade engineering structures and aquacultural high energy input farms on the other hand, have a short life of a few years at most.

Obviously well developed, highly productive forests growing in suitable environmental conditions would produce much more than others growing under stress in extreme environmental conditions of temperature, dryness, lack of sediment input, pollution or other stressful conditions. Scrubby mangroves might produce nothing more than some fuel wood, some coastal stabilization or some fodder for cattle and camels, shelter for fish and crustaceans or even only some of this in a reduced quantity, sufficient or not to satisfy the needs of local men and animals. Nevertheless, because mangroves grow where nothing else grows, they are always useful, even where they cannot be managed as productive forests. The enrichment of brackish and coastal waters provided by the mangrove vegetation may be substantial and should not be overlooked.

Many people are now aware of the ecological significance of mangroves worldwide. Most of the projects try to achieve the improvement of local ecological and socio-economic conditions of the coastal people,

Mangroves play a significant role in the protection of estuarine ecosystems. These wetlands at the land and sea interface are very crucial as they help in keeping the shorelines intact, protect them from erosion by waves and tidal currents and provide habitats for several marine species including shrimps, fishes and even the birds. They are an important source of fuel wood and fodder. They are the nursery grounds for a great variety of marine organisms.

CONCLUSION

A biosphere reserve is a unique category of protected area, used to solve problems associated with human impacts on natural ecosystems. A model biosphere reserve consists of a protected (core) area, a controlled use area (buffer zone), and a zone of multiple use, cooperation area (transition area.)

Biosphere reserve status is awarded to those protected areas that combine scientific research and monitoring, conservation, education, and training. Together, the 352 biosphere reserves in 87 countries form an international network that represents the world's major eco-regions.

A protected area consists of examples of minimally disturbed ecosystems. Only activities that do not adversely affect the natural habitat are allowed in the identified area. The controlled use area is adjacent to the protected area. Here, activities such as fishing, hunting, camping and other activities are encouraged.

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