



ESTIMATION OF BIOLOGICAL STRESS ON ACHARA – JAMDUL MANGROVES, MAHARASHTRA

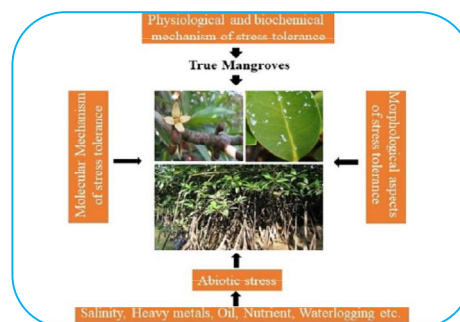
Prof. Surendra Thakurdesai

R P Gogate and R V Jogalekar College, Ratnagiri (Maharashtra)

ABSTRACT:

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. 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.

KEYWORDS: biological stresses, creeks and estuaries.



INTRODUCTION

Estuaries are partially enclosed water bodies formed near the coast where the freshwater from the rivers and streams meet the saline water from the oceans and the seas, making the water brackish. They are critical natural habitats and are of great economic value considering a variety of unique species of birds, mammals and fish depend on these habitats as places to live, feed and reproduce. They are covered with marshes and sea grasses that filter the river water flowing to the ocean and function as protective buffers against flood water and dissipating storm surges.

The freshwater flow regime, defined using the quality, quantity, and the flow timings, is a key variable used in defining Estuarine ecosystem processes. The result of major land use changes in the urban tracts and in agriculture to serve the urban areas coupled with the infrastructure development has resulted in increased runoff carrying sediments, nutrients, pollutants, pharmaceuticals, and toxins downstream to estuarine systems. These have impacted the functioning of the estuarine ecosystem and thus, affected the various species, including humans, dependent on them.

The morphological studies of Estuaries are concerned with the changes in the cross section and the plans due to sedimentation and erosion. Thus, the studies might therefore aid us in understanding the changes of the freshwater systems over the years and the related effects on estuarine ecosystems. They also are key to understand the effects of the rise of sea levels, prevalent water pollution, soil erosion and the impacts of development. For identifying the changes, advanced techniques such as GIS can aid in performing the micro analysis of the area with results and evidence.

OBJECTIVES

1] To study the natural growth of a mangrove swamp that has not been disturbed and serves as an ideal wetland ecosystem

2] To use the results obtained and the patterns in growth of swamps for comparison with other disturbed mangrove habitats on Konkan coast and suggest the measures for their conservation and protection.

Experimental Design:

The intertidal, Jamdul Achara sand silt creek bar where there is an optimum density of mangroves was selected for the detailed study from the viewpoint of its development as a biosphere reserve. The maximum limits of inundation at high, mid and low tides were recorded and measured with reference to low water line.

Sediment samples were collected from the area and the density of mangroves ascertained by counting frequency of trees in every sector. The study area was visited frequently to keep track of the present use of the area by the locals. In this regard the assistance was taken from local people. The areas of human interference were identified and the nature of interference studied.

LITERATURE REVIEW:

The 720 km long coastline of Maharashtra is subject to rapid industrial development and urbanization resulting in the indiscriminate release of domestic and industrial effluents directly into estuaries, creeks and bays. There are 45 estuaries along the Maharashtra coast and most of them are heavily stressed due to multiple anthropogenic and industrial interventions. (Volvoikar, 2017).

The estuaries and creeks located along central west coast of India indicated a transition from river dominated depositional environment in the past to marine dominated depositional environment currently. As these estuaries and creeks are the pathways of terrestrial material load to the Arabian Sea, decrease in input of runoff material over time has significantly affected the biogeochemical processes. (2)

Study Area:

Achara creek (16° 37' N and 73° 20' E) on West coast of India, is a 30 km long tidal sector of river Kodavali (Fig 1.1). 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 1.2).

Location	16°37'N and 73°20'E
Size	25.9 sq km
Lithology	Basaltic, Lateritic
Area of mangroves	Approximately 60 sq km
Tidal range	2.5m
Length of tidal incision	30km
Mangrove type	Sonneratia Alba, Avicennia Marina, Avicennia Officinalis, Rhizophora Indica
Sedimentary features	Mud Flats, Terraces, Sand Banks and Tidal Channels.

Table 1.1 – Jamdul Achara: Basic data

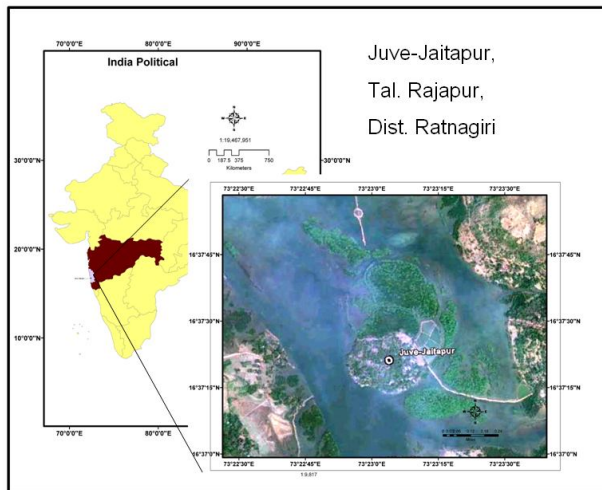


Fig 1.1

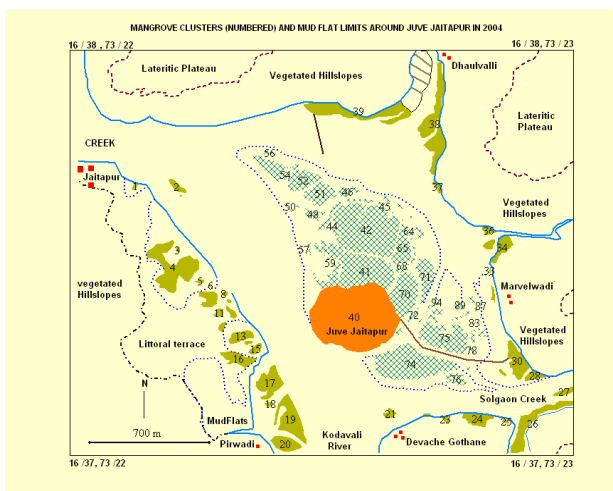


Fig 1.2

Result and Discussion -

Due to the complex wave and tide process and wide silt – clay substratum there is a thick growth of mangroves with its rich biodiversity.

Moderate to dense growth of mangroves is seen along the banks and on the mid creek bar in the estuary. Rhizophora and Avicennia are predominant species found in this creek. However distinct zonation in the trees does not exist here. Mangroves are mainly found on the tidal flats and on a very striking sand-silt-clay bar locally called Jamdul Achara, some 7 km inland at the head of the tidal mouth of the creek.

Silt clay substratum of mud flats is thin, thickness hardly exceeding 35 cm. On Jamdul bar, however, it is as thick as 60 cm. The height of trees varies between 1.5 to 2 m. Small barren patches in between the mangrove thickets are the areas of salt deposition.

The mangroves along the banks and on Jamdul are constantly disturbed by the people from the nearby settlements. Mangroves are being used as fuel wood, timber and fodder. Recently new buildings are being constructed by clearing mangroves. The mangroves are also being affected by the construction of Kharland bunds and reclamation of saline soils. Near the settlement, a part of the mangrove swamp is being used as a dumping ground.

CONCLUSION –

Study carried out on estuarine mudflats and mangroves sedimentary sub-environments along central west coast of India revealed that geomorphology, rainfall, river runoff, construction of dams, bridges and other anthropogenic activities have considerably influenced the depositional environment. (3)

The drainage density and stream frequency values have shown marked changes that were attributed to both natural and human activities, thus affecting the nature of the basin. The relief analysis of the basin indicates that most of the areas of the basin have gentle to flat gradient favoring frequent flood events. (4). The prediction of changes in the mid line channel from 2020 to 2050 by using temporal data set of satellite image by using ARIMA model. The channel length was reduced to 199.96km in 2020 and it is deviated from 224.35km. Changes in channel was observed by the mean of channel length and meander ratio and noted in the sinuosity index. (#5)

The morphometric analysis depicted that the catchment area of Vaitarna and Ulhas can be considered as 6th and 7th order drainage basins. Vaitarna river basin is characterized by higher bifurcation

n ratio and it indicates higher structural control and steeper slope. (6#) The current state of reports on estuarine systems focuses on the flora and fauna of the systems, the presence of trace metals / heavy metals prevalent due to water pollution or the presence of hydrocarbons due to oil spills in the sea.

The current state of reports on estuarine systems focuses on the flora and fauna of the systems, the presence of trace metals / heavy metals prevalent due to water pollution or the presence of hydrocarbons due to oil spills in the sea. Limited work has been done to analyse the changes in the width of the estuary (lower, upper and middle) over the years and how have the anthropogenic effects led to changes in the morphology of rivers and in turn affected the estuaries.

All these factors have affected the rooting and growth of *Rhizophora* seedlings. Grazing is yet another factor of major consequence due to which new seedlings are destroyed and pneumatophores are broken. Field surveys showed that the mid creek bar at Jamdul is relatively free from human disturbance, and has preserved more mangroves where the growth of new seedlings continues undisturbed. Here the tidal control has prevented the loss of mangroves and has increased the survival rate of seedlings.

The Jamdul Achara area is an ideal intertidal land that can be developed as a Biosphere Reserve to protect the mangroves .

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