

CHAPTER 3

Description of the study area

The Sundarbans is located between 21°32' and 22°40'N latitudes and between 88°5' and 89°E longitudes bounded by Dampier-Hodges Line all through its north (Fig.3). The river Hooghly is in the west, Bay of Bengal in the south and eastern boundary is demarcated by Ichhamati-Kalindi-Raimangal rivers. The total area of Sundarban region is 9630 sq.km. of which the area under reserved forests is 4264 sq.km. and the rest of the area is reclaimed and inhabited. In 2585 sq.km. of forest area, Sundarban tiger reserve had been created in 1973 and the balance forest area is demarcated for forestry manipulation activities. There are three wild life sanctuaries namely Sajnekhali, Halliday island and Lothian island and one National Park within Sundarban Biosphere reserve area.

The mangrove tract in Sundarban signifies the special ecological effect due to tidal ingress of sea undeterred by upstream flow and plant community manifests abnormal adaptation like development of pneumatophores, still roots etc.

The tract is famous for its richness and diversity of mangrove vegetations with many dominant genera viz. *Rhizophora*, *Ceriops* *Bruguiera*, *Avicennia*, *Aegiceras*, *Xylocarpas*, *Phoenix* etc. (RSAM, 1992). The forest is almost without *Heritiera fomes*. These mangroves stabilise loose soil and detritus and act as a filter for land runoffs, and function as a bulwark against sea erosion and protect the hinterland from tidal surges, cyclonic storms and high velocity winds.

The delta is characterised by tidal sand bars and net work of tidal channels in between. The sand bars of islands are oriented more or less perpendicular to the trend of the shoreline and parallel to the directions of tidal flow.

Land ocean boundary condition of Sundarban criss crossed by numerous creeks and rivers with the Hooghly river as its main artery, is in the form of low swampy terrace characterised by extensive fluvio marine deposits.

This delta is ornamented with large number of tidal bars and tidal islands. The intertidal zone sediments are composed of over 95% light minerals of which quartz and chert constitute 70% and Feldspar about 25%. Heavy minerals include pyroxaene, amphibole, tourmaline, epidotezoisite, apatite sphere and iron oxides and they constitute 1-5% of the sediments.

All over Sundarbans there is approximately 300 sq.km. of area comprising of intertidal blanks and charlads suitable for afforestation and creation of mangrove forests. Since the inception of Sundarban Biosphere Reserve from 1989-90, an area of more than 6000 ha has been covered by mangrove forests through artificial regeneration in addition to raising of about 700 ha of other types of plantations. In the eco-restoration programme, emphasis is being given to expeditiously cover the newly formed charlads and mud-flats along the stream banks by mangrove forests through artificial regeneration with progressively increasing quantum of plantation area every year.

Station locations :

The Hooghly Estuary, the first deltaic offshoot of the Ganges, lies approximately 21°31' - 23°20'N and 87°45' - 88°45'E and covers the western part of the marshy deltaic coastal area of Sundarbans. This estuary can be classified as partially mixed type (NIO, 1986) estuary with semidiurnal tides of a maximum aptitude of about 5.5 meters. In the monsoon period (July-Sept) enormous quantities of fresh water coming down the Ganges and Brahmaputra force the tidal flows seawards so that even at the mouth the water is only slightly brackish. In the dry season (November-March) however, these fresh-water flows drop to less than one-tenth of the monsoon discharge and saline water creeps back inland. Along with annual variation of fresh water flow, the river Hooghly has experienced long term changes in its processes which illustrate the delicate balance of process and form in the channel and also the dependance of man on the estuary. A gradual swing of the Ganges eastwards due to tectonic uplift in the west has been shown during last five or six centuries. This results a gradual loss of fresh water flow into the Hoogly from the Ganges. This loss of fresh water has profoundly

changed the character of Hooghly. Siltation has increased dramatically and saline water has penetrated far inland. To increase the fresh-water flow from the Ganges a barrage at Farrakka has been commissioned in 1975 to divert the flow of the river into the estuary. The Ganges delivers an enormous supply of sediment (460×10^6 tonnes) to the Bengal Fan every year. The high suspended yield of this river is due to the combination of extreme topographic relief and monsoon climate (Holeman, 1968). This tropical estuarine ecosystem climate is well recognised by three seasons: pre-monsoon (February to May), with little or no rain-fall and prevalence of higher temperature, South West monsoon (June to September), when heavy atmospheric precipitation is experienced and post monsoon (October to January), when there is occasional rainfall due to western disturbances and low temperature. This estuary receives large volumes of fresh water during south-west monsoon season.

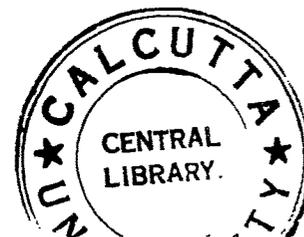
Four stations were selected to collect water and sediment samples and only one station at Chemagari was selected to collect the *M.birmanica* specimens. The description of all these stations (Fig.3) are mentioned briefly :

Sargar Island (st-1) : This station is located at the southernmost part of Sagar island and at the confluence of Bay of Bengal and Hooghly river. It is geographically situated at longitude $88^{\circ}46.6/E$ and latitude $21^{\circ}-41.2/N$.

Kachuberia (st-2) : It is situated at the northernmost tip of the Sagar island where the Hooghly estuary bifurcates on its way to the Bay of Bengal and lies approximately at longitude $88^{\circ}8.15/E$ and latitude $21^{\circ}52.72/N$. This station is almost at the middle portion of the main mixing zone of the estuary.

Diamond Harbour (st-3) : This place is at the extreme upstream end of the 89 km. long mixing zone of the Hooghly estuary. The water masses here is fresh water dominated throughout the year and lies approximately at longitude $88^{\circ}9/E$ and latitude $22^{\circ}8.78/N$.

Lothian Island (st-4) : This station is located at the northern tip of the Lothian island. The entire island is covered with thick mangroves. Geographically it is situated at longitude $88^{\circ}19/E$ and latitude $20^{\circ}50/N$.



Chemagari (st-5) : The station Chemagari is located in the south –eastern part of Sagar island and is about 11 kms. north-east of Ganga Sagar. One of the major Creeks of this island is Chemagari Creek, which flows through this place running east end to west end of this island. At the mouth of this Creek a huge mud flat becomes exposed during low tide condition. Among the various bivalves *Macoma birmanica* is very abundant in the lower littoral zone of this mud flat. This place was selected for its easy accessibility, greater population density of the species and less disturbances due to human activities.

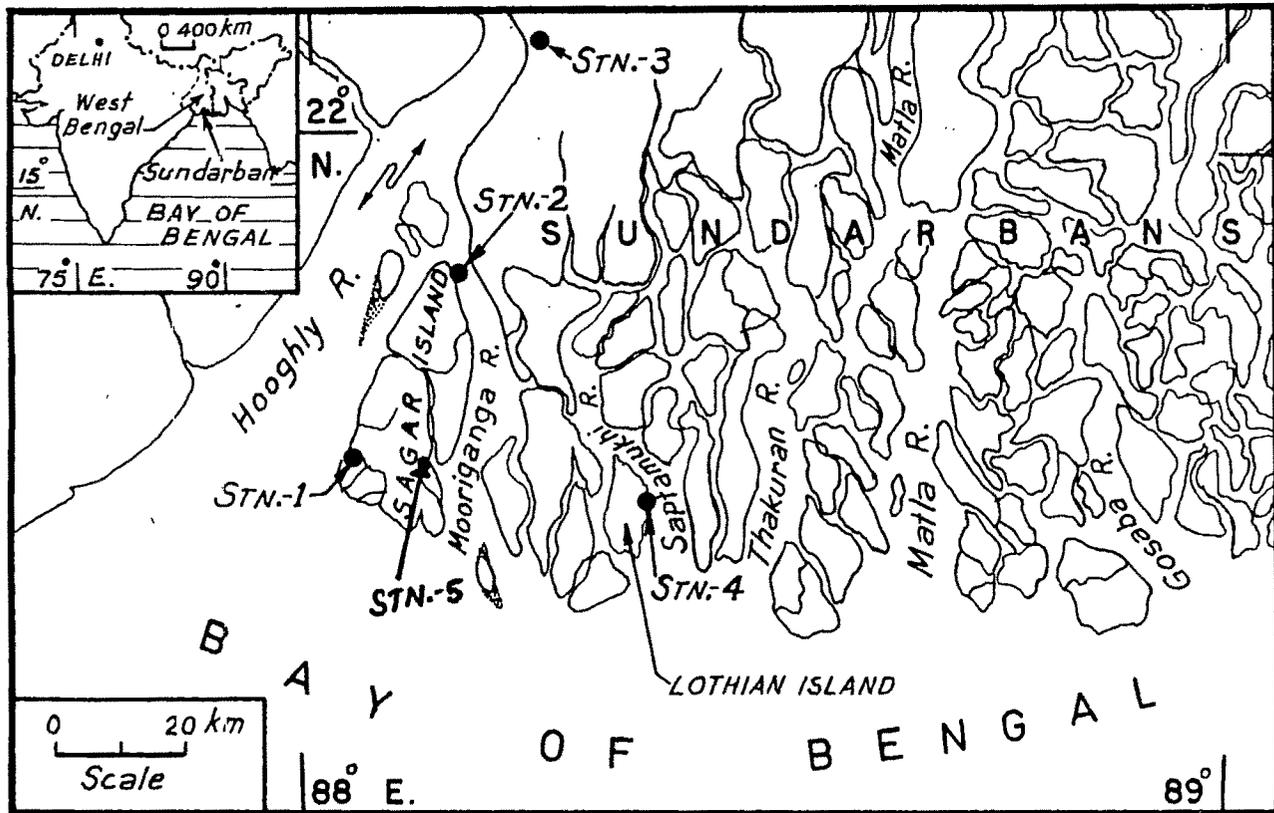


Fig.-3 A MAP SHOWING THE LOCATIONS OF SAMPLING STATION.