

**HYDROLOGICAL PARAMETERS AND A REPORT ON  
PLANKTONIC AND BENTHIC FAUNA OF SAGAR ISLAND,  
SUNDARBANS, WEST BENGAL**

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**INTRODUCTION**

Studies on hydrobiological features of Hooghly -Matla estuarine system is limited to a few reports. Works of Bose (1956), Dutta *et al.* (1954), Roy (1955), Shetty *et al.* (1961) and Gopalakrishnan (1971) provided some information for the upper stretch of the system. Recently, some hydrobiological findings were made by Bhunia and Choudhury (1981a, 1981b, 1982a, 1982b), Choudhury *et al.* (1980) from Sagar Island at the confluence of river Hooghly with Bay of Bengal. The present observation is on the changes in the hydrological parameters like, temperature, salinity, dissolved oxygen and pH of the waters around Sagar Island during November 1975 to June 1978. In addition, a qualitative survey of the zooplankton and benthic macrofauna was also undertaken in the creeks and the mudflats of the island.

Sagar Island, the largest block in the western sector of the Gangetic Sundarbans, is situated nearly 100 Km south of Calcutta, in the deltaic West Bengal, between lat. 20.56° to 21.88° N and long. 88.08° to 88.16° E. It is surrounded by large water bodies, river Hooghly in the northwestern side and the river Mooriganga in the eastern side. The southern part of the islands opens into the Bay of Bengal (Fig. 1). Three seasons are recognised in the area. The premonsoon period (March to June) is the dry season with considerably higher temperature. The south-west monsoon season (July to October) is accompanied by heavy rainfall and postmonsoon (November to February) comprises partly the winter season with comparatively lower temperature and less precipitation.

**MATERIALS AND METHODS**

The hydrological data were collected from two stations (A and B) as shown in Fig. 1. The water samples were taken at fortnightly interval in the forenoon hours from the surface during November 1975 to June 1978. Mean value for each month is presented in Fig. 2.

The temperature was recorded in degree centigrade in the field. The salinity of the sample was estimated by 'Mohr- Knudsen' method. Winkler's method was followed to estimate the dissolved oxygen content of the sample. for pH colour comparator disc was

used in the field. Monthly sampling of zooplankton was done for two years to note the occurrence of the different groups of zooplankton in this brackish water zone. The hand plankton net used for the sampling was made of bolting silk No.10 (mesh : 0.15mm). The qualitative study of benthos was based on monthly observation for a period of one year. Mud sample from a depth of 25cm were taken and the benthos inhabiting the mud were sorted out and preserved in 4% formaldehyde in sea water.

## RESULTS AND DISCUSSION

**Temperature :** The variation in temperature was between 22°C and 32° C. The lowest temperature was recorded in the month of January 1978. During the entire period of study the rise of temperature was noticed higher in the premonsoon months and lower during the post monsoon months. A bimodal temperature oscillation in every year was a distinct feature. Two maxima, one in the premonsoon season and the other in the monsoon were recorded (Fig. 2). Similar type of observation was reported by Sewell(1929) in the waters of Bay of Bengal and by Annigeri (1968) from Karwar Bay.

**Salinity :** Every year the salinity gradient increased to a maximum during the premonsoon months paralleling the temperature rise and decreased during the monsoon season due to heavy precipitation and surface drainage. The maximum and minimum salinity recorded were 24.9‰ in May 1976 and 1.3‰ in September 1977 (Fig. 2)

The change in salinity was maximum during March to June which accounts for no rain but with higher evaporation and was minimum during July to October when the South-West monsoon winds was accompanied by heavy rains. The period , from November to February may be considered a fluctuating period because the water is somewhat diluted with the just over monsoonal rain and followed by the winter months with minimum records of temperature and rain . During this period the salinity gradient kept a rising trend and attained maximum concentration in the premonsoon months.

**Dissolved Oxygen and pH :** The dissolved oxygen did not show any long range of fluctuation during the period of observations. The variation was limited within the range between 2.1ml/ and 3.8ml/l. pH remained almost constant throughout the year with a little fluctuation in the monsoon months (Fig.2).

**Zooplankton :** The occurrence of different components of zooplankton is discussed under two categories, Holoplankters and Meroplankters.

**Holoplankters :** Hydromedusae : *Bongainvillia* spp. were more or less common during the late premonsoon collections and very few in postmonsoon months.

**Chaetognaths :** The fair representation of *Sagitta bedoti* and *S. enflata* were observed during the premonsoon period. The paucity of the population during the South-West monsoon was noticed due to reduced salinity.

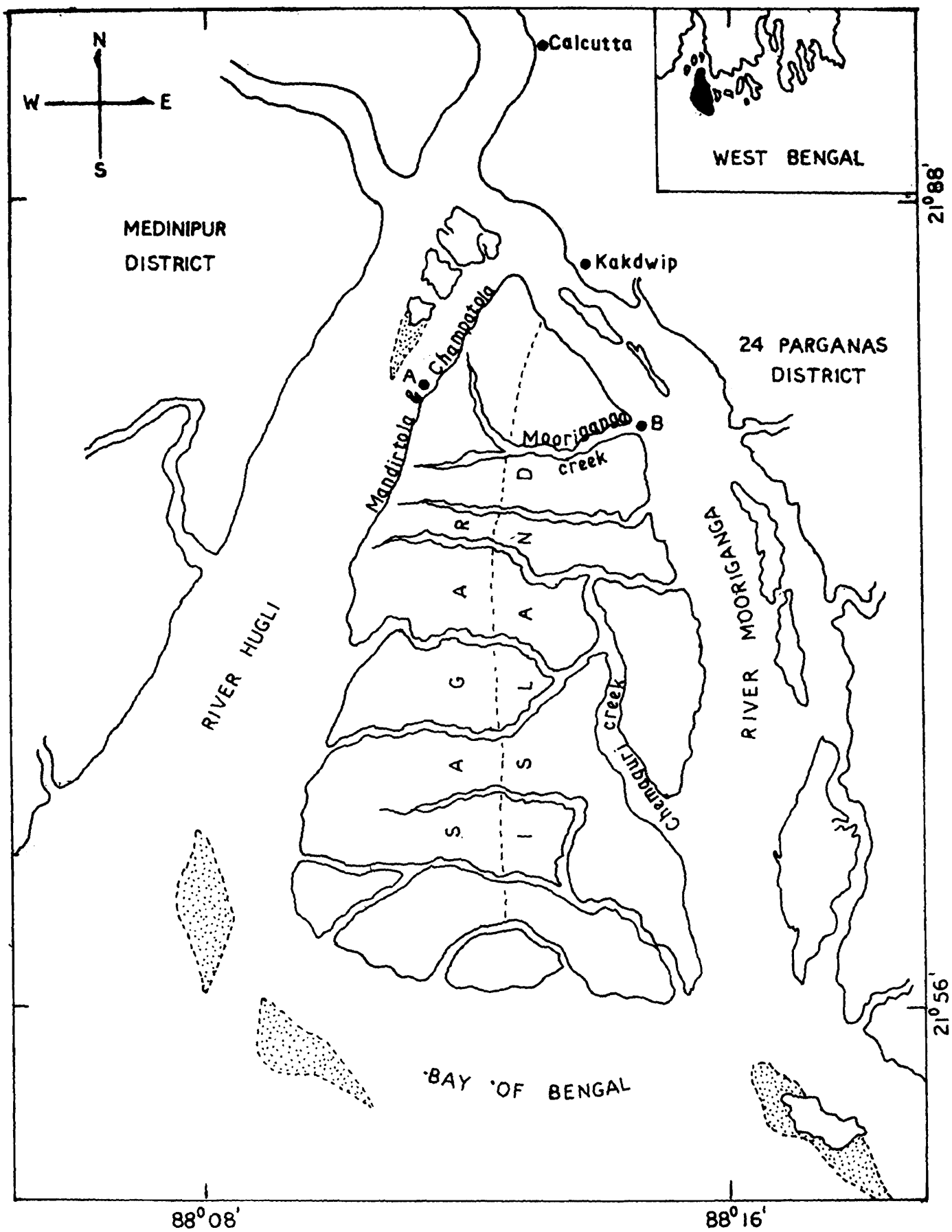


FIG.1 THE STUDY AREA WITH THE STATION POSITIONS (A & B).

*Records of the Zoological Survey of India*

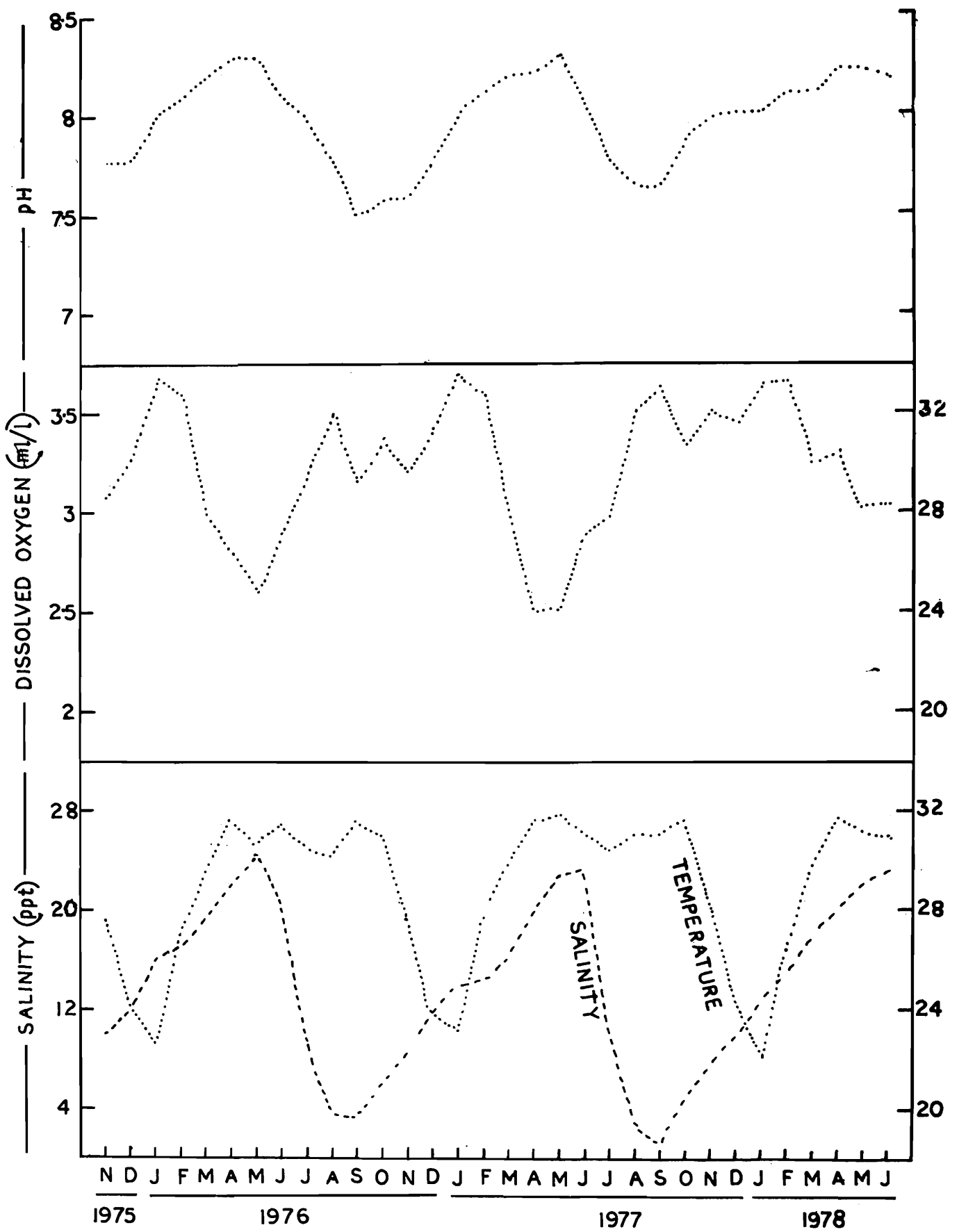


FIG. 2. MONTHLY MEAN VALUES OF DIFFERENT HYDROLOGICAL PARAMETERS DURING NOVEMBER, 1975 TO JUNE, 1978.

**Copepods :** Copepods constituting the dominant group of zooplankton were noticed in abundance during November to June, when the salinity of the ambient medium was fairly high. During July to October their occurrence of the large portion of the marine component was hindered due to monsoonal rain causing the dilution of the environment.

The following Copepod species were identified :

*Calanoid Copepods :*

*Acartia spinicauda* (Giesbrecht); *A. erythraea* (Giesbrecht); *A. centrura* (Giesbrecht); *Acartia* sp.; *Acrocalanus gracilis* (Giesbrecht); *A. similis* (Sewell); *Paracalanus aculeatus* (Giesbrecht); *Labidocera acuta* (Dana); *L. minuta* (Giesbrecht); *L. pavo* (Giesbrecht); *Echaeta marina* (Prestandrea); *Eucalanus monachus* (Prestandrea); *E. elongatus* (Dana); *Pontellopsis herdmani* (Thompson & Scott); *Pontella* sp.; *Pseudodiaptomus tollingarae*; *P. aurivilli* (Cleve); *P. annandalei* (Sewell); *Centropages* spp.

*Cyclopoid Copepods :*

*Oithona* spp.; *Corycaeus* sp.

*Harpacticoid Copepods :*

*Macrosetella gracilis* (Dana); *Euterpina* sp.

**Cladocerans :** *Evadne* sp. was encountered in the premonsoon months and very rarely noticed in the postmonsoon months.

**Mysids :** This group was observed more or less throughout the year. They were recorded in abundance during pre- and postmonsoon collections.

**Amphipods :** Very few gammarid amphipods were collected from the creeks during pre- and postmonsoon periods.

**Adult decapods :** *Lucifer* sp. comprised the group and found more or less in the sample throughout the year.

**Meroplankters**

**Crustacean larvae :**

1) The larvae of *Penaeus monodon* and *P. indicus*, *Metapenaeus monoceros*, *M. dobsoni* were collected during November to June.

2) Cirrepede larvae : Larvae of barnacles were recorded throughout the period except in the monsoon months.

3) Zoea and Megalopa : The occurrence of these two groups were common in pre- and postmonsoon collections.

Fish larvae : In the present study, the larvae of the commercially important fishes such as *Liza parsia*, *L. tade*, *M.cephalus*, *Lata calcarifer* were recorded more in the late premonsoon and less during the postmonsoon months. In Cochin backwaters, George (1985), and Menon *et al.* (1972) recorded the maximum fish eggs and larvae during the postmonsoon period. Sialas and Pillai (1975) recorded fish eggs during early premonsoon and postmonsoon period and fish larvae only during postmonsoon months from the same water.

Benthic macrofauna :

The qualitative analyses of benthic macrofauna of the lower littoral zone of Sagar Island were based on monthly collection. Species comprising the faunal community structure in the mudflat were encountered more during January to May and less during June to December.

*List of Benthic macrofauna ;*

Actinarians :

*Pelocoetes exul* (Annandale); *Pelocoetes* sp.; *Edwardsia jonesii* (Seshaiya & Cutress) ; *Andwackia* sp.; *Paracondylactis* sp.

Polychaetes :

*Dioptera neopolitana* (Dellechiaje); *Lepidonotus cristatus* (Grube); *Lumbrinereis notocirrata* (Fauvel); *L. polydesma* (Southern); *Talehsapia annandalei* (Fauvel); *Glycera alba* (Müller); *Nereis* spp.

Decapods ;

*Uca dussumieri* (Edw.); *U. annulipes* (Latreille); *U. marionis* var *nitidus* (Dana); *U. acutus* (Stripson); *U. triangularis* (de Man); *Carcinus meanus*; *Sessarma* spp.; *Scylla serrata* (Forsk.); *Dotilla brevitarsis* (de Man); *D. blanfordi* (Alcock); *Metaplax intermedia* (de Man); *M. distincta* (de Man); *Macrophthalmus pectinipes* (Gurin); *Alphaeus* sp.; *A. crasimanus* (Heller); *Stomatopods* ; *Cloridopsis bengalensis* (Tiwari & Biswas); *C. immaculata* (Kemp).

Isopods :

*Cirolana parva* (Hansen); *Sphaeroma terebrans*.

## Amphipods :

*Photis geniculata*; *Podocercus* sp.

## Bivalves :

*Glaucomya sculpta* (Sowerby); *Crassostrea cucullata* (Born); *Neosolen aquae-dulcioris* (E.N. Ghosh); *Tanysiphon rivalis* (Benson); *Dosinea excisa* (Schroter); *Macoma birmanica*; *Teredo* spp.; *Modiolus striatulus* (Hanley).

## Gastropods :

*Nerita articulata* (Gould); *N. lireata*; *Cerithidea* (*Cerithidiopsis*) *cingulata* (Gmelin); *C. obtusa* (Gmelin); *Littorina scabra scabra* (Linnaeus); *L. melanostoma* (Gray); *L. undulata* (Gray); *Natica tigrina* (Roding); *Onchidium tigrinum* (Stoliczka); *Assimineia brevicula* (Pfeiffer); *Neritina violacea* (Gmelin); *Telescopium telescopium*; *Nassarius foveolatus* (Dunker).

## Bryozoa :

*Electra* sp.; *Nemertines* (Species unidentified).

## Echiurids :

*Anelassorhynchus branchiorhynchus* (Annandale & Kemp); *A. dendrorhynchus* (Annandale & Kemp).

## Fish :

*Gobiopsis macrostomus* (Steindachner); *Scartelaos histophorus* (Valenciennes); *Boleophthalmus boddarti* (Pallas); *B. viridis*; *Pisodonophis boro* (Ham.); *Anguilla bengalensis* (Gray & Hardwick); *Muraena* sp.

## SUMMARY

The hydrological parameters, temperature, salinity, dissolved oxygen and pH in particular were studied in the water around Sagar Island during the period November 1975 to June 1978. In this estuarine habitat salinity showed pronounced fluctuation ( 1.3 - 24.9 % ) as compared to temperature ( 22° to 32° C ). The qualitative distribution of fauna was closely related to seasonal variation in salinity. The dissolved oxygen of the area varied from 2.1 ml/l to 3.8 ml/l and the range of pH read between 7.3 and 8.3.

The estuarine plankton was composed of a mixture of endemic species and a large portion of marine components which penetrates into the region during high saline premon-

soon period. Most common copepod species generally encountered were *Acartia* spp., *Labidocera* spp., *Eucalanus* sp., *Pseudodiaptomus* spp., and *Oithona* sp. Chaetognaths were represented by *Sagitta enflata* and *Sagitta bedoti*. The occurrence of groups like Cladocerans (*Evadne* sp.), *Lucifer* and Mysids were often recorded during the premonsoon months. A substantial representation of meroplankters were also recorded during pre- and postmonsoon seasons. The most common groups of Macrofauna represented were actiniarians, echiurids, decapods, polychaetes, bivalves, gastropods, nemertines and goboid fishes.

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