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SEASONAL PERIODICITY OF ZOOPLANKTON IN ENNORE ESTUARY, MADRAS DURING 1975 AND 1976

M. SRINIVASAN AND M. B. RAGHUNATHAN

Southern Regional Station, Zoological Survey of India, Madras

ABSTRACT

The fluctuation and abundance of Zooplankton, with special reference to dominant groups like copepods and chaetognaths collected from Ennore estuary during 1975 and 1976 are discussed. Observations on the fluctuation of certain phytoplankton such as *Asterionella* and *Coscinodiscus* that were abundant in the collections are also made.

INTRODUCTION

Ennore estuary is situated at fifteen km. away from Madras city. It is three km. in length, one km. in width and depth varies from 1.5 to 2.5 m. Koratalayar river forms the main channel for this estuary besides the Buckingham canal and Red Hills surplus channel. Prior to dredging by Ennore thermal station, the sand bar at the mouth remained closed at least for six months in a year, and connected with the Bay of Bengal only during the north-east monsoon period (October–December).

The hydrobiology and fisheries of Ennore estuary were studied in detail by several workers (Chacko, 1956, 1963 ; Chacko and Rajagopal, 1962 ; Evangeline and Subbiah, 1969). All these investigations were carried out prior to dredging when the bar mouth of the estuary remained open only during the north-east monsoon period. Whereas, the present investigations were carried out after the dredging has been completed and the estuary became connected to the sea throughout the year. These investigations were undertaken with a view to find out the impact of dredging on the hydrology and plankton of the Ennore estuary.

MATERIAL AND METHODS

The material for this investigation was obtained from 50 zooplankton samples collected between May 1975 and September 1976 from two fixed stations (Fig. 1) one near the bar mouth and the other about 1 km. away from the bar mouth. Due to unavoidable circumstances samples could not be collected during January and February 1976. Zooplankton and water samples were collected from these two stations twice in a month. A half m. nylon ring net was used for collecting the zooplankton. The net was towed at the surface for ten minutes from a country boat between 7 and 8 AM.

The plankton samples were fixed in 5% formalin and the volume was determined

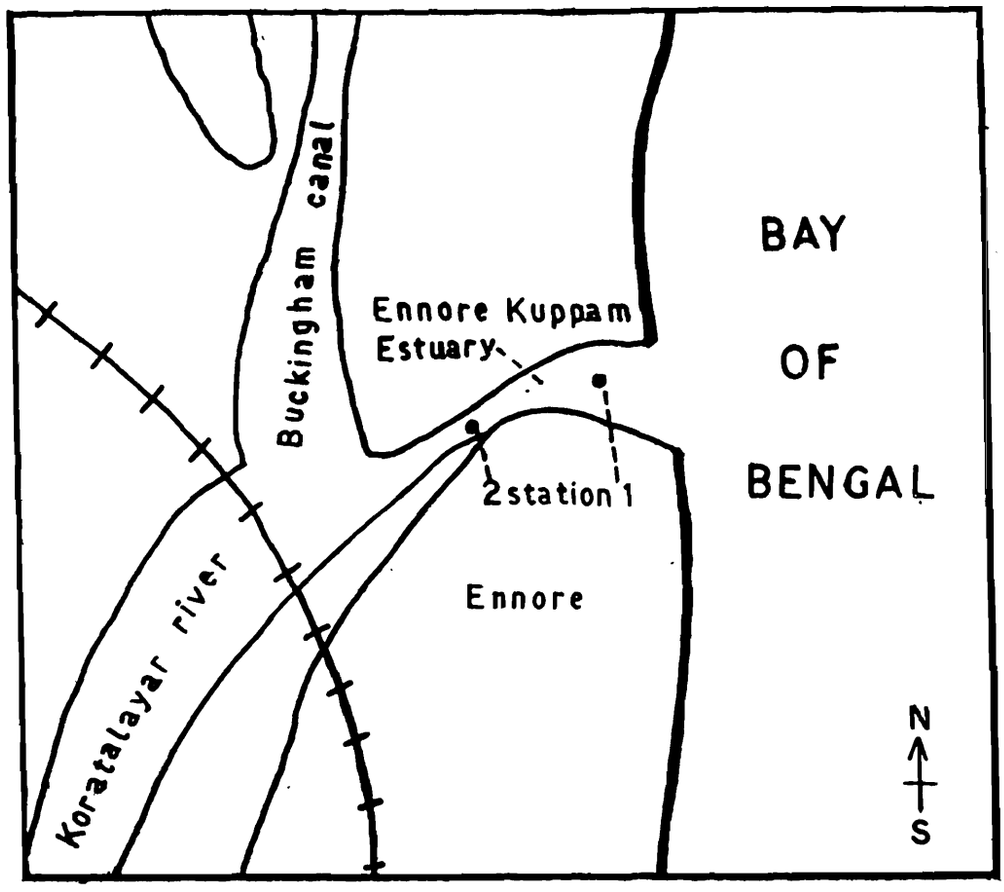

Fig. 1. Map of Ennore estuary showing the station position

by the displacement method. Then the plankton was diluted to 250 ml. from which (after stirring well) a subsample of 2 ml. was examined in a Sedgewick-rafter cell, for the enumeration of different organisms. For macroplankton like Chaetognatha, the entire volume of the plankton was analysed and the number was counted. Water samples collected from the two stations, where the plankton samples were also collected, were analysed for salinity and temperature.

Hydrological Conditions

The surface water temperature of the estuary ranged from 26° 4′ C to 32° 3′ C, with a minimum during December, 1975 and maximum during May, 1976. The occurrence of minimum and maximum temperature values coincides with the seasonal changes such as monsoon and summer.

The salinity ranged during the period of observations from 2‰ to 35‰. Wide fluctuations in surface salinity values were noted during October–December, 1975 when the estuary is flooded with rain water. During the rest of the period the salinity values were in the range of 24.5‰ to 33.5‰.

Plankton

The volume of the zooplankton varies from 0.4 to 3.6 ml. Three peaks were noted during the period of investigation, one in may 1975, second in November 1975 and the third in June

1976 (Fig. 2). The values were very low during September 1975 and May 1976.

The volume of zooplankton was mainly controlled by the larval forms of copepodss uch as nauplii, zoea and copepodites (Fig. 3). Adult copepods were very few and even among the adults only calanoids were the dominant forms. The other forms like medusae, polychaete larvae, *Lucifer*, Chaetognatha, *Oikopleura*, *Penilia*, Cypris larvae, *Tomopteris*, bivalve larvae, fish eggs, fish larvae, ostracods and nematodes were also noticed.

Chaetognatha were seen in all the plankton samples collected during the period of investigation except in may, 1976. Altogether 1800 specimens of chaetognaths belonging to *Sagitta bedoti* Beraneck, *Sagitta inflata* Grassi and *Sagitta pulchra* Doncaster were present. Maximum number of specimens were obtained during August 1976 (Fig. 4). *Sagitta inflata* forms more than 55% of the chaetognaths followed by *S. bedoti* (44%). The chaetognath population based on the present investigation does not show any definite pattern of fluctuation in abundance, as seen in Fig. 4 there are several peaks and downs.

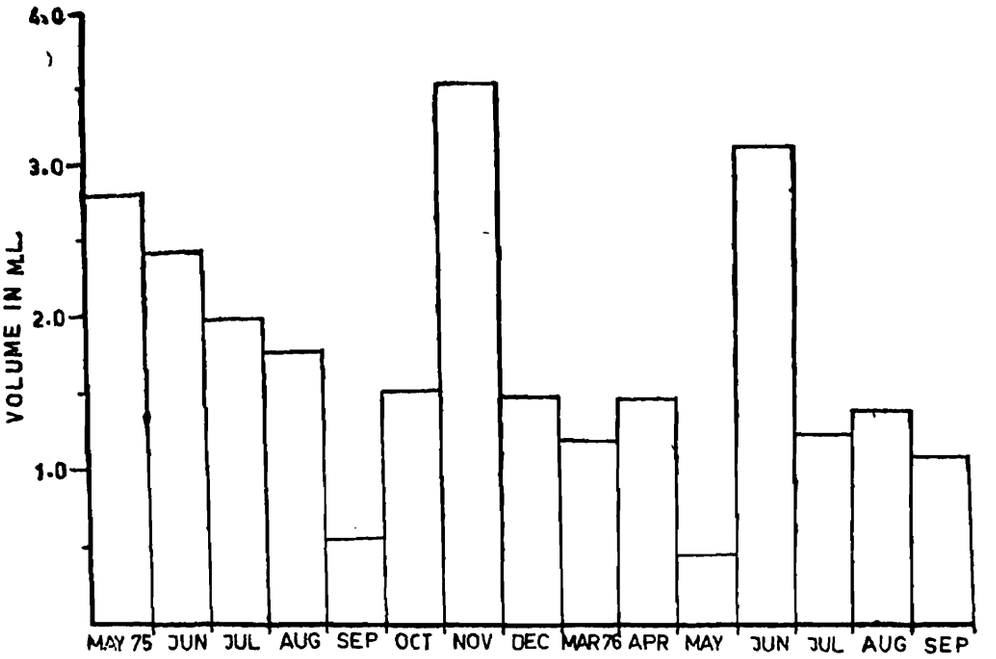

Fig. 2. Fluctuation of Zooplankton in Ennore estuary from May 1975 to September 1976.

Along with the zooplankton certain important diatoms like *Coscinodiscus* and *Asterionella* were also seen in large numbers in the samples collected from the estuary. They also have been studied for their seasonal fluctuation in abundance. Both these have shown two peaks, (Fig. 5) one during the north-east monsoon (November-December 1975) and the other during south-west monsoon (June-July, 1976). During these months the plankton samples were fully dominated only with phytoplankton especially these diatoms.

DISCUSSION

The present study revealed wide variations

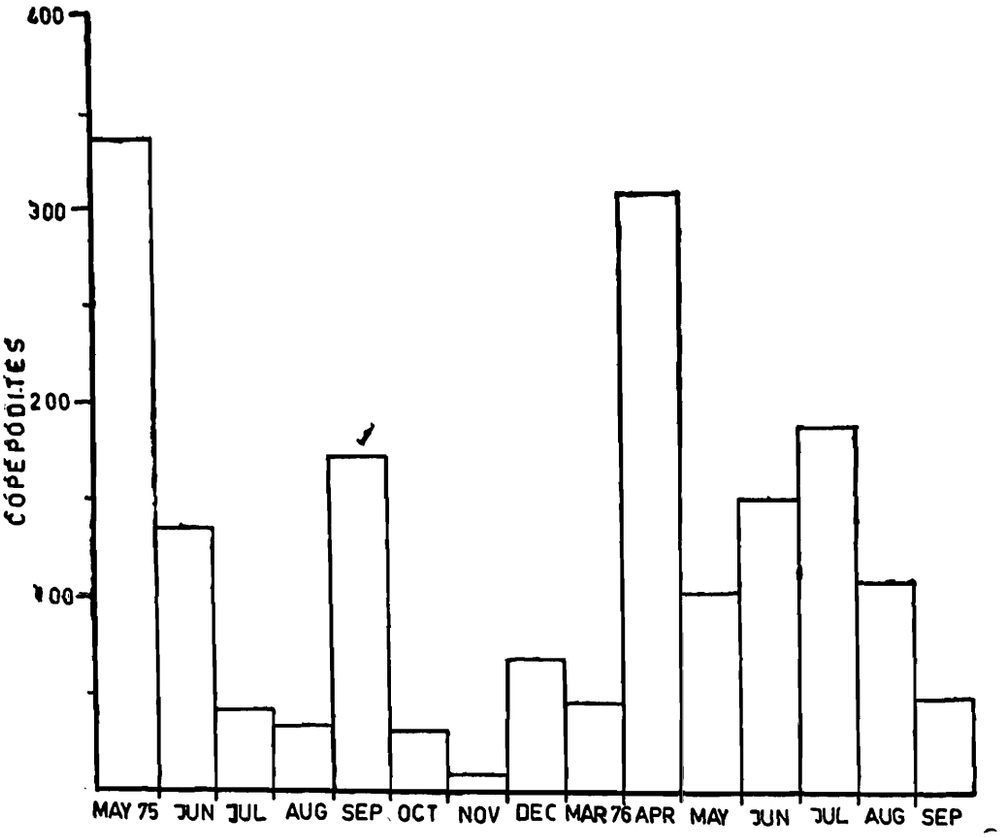

Fig. 3. Fluctuation of Copepodites in Ennore estuary from May 1975 to September 1976.

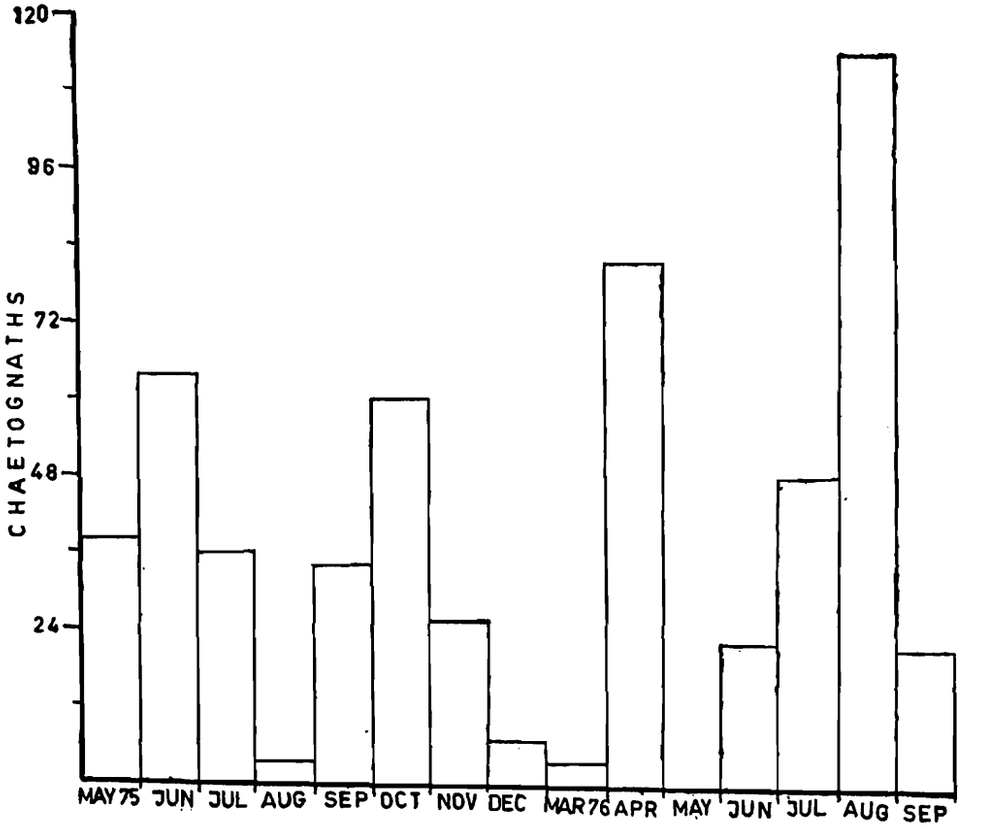

Fig. 4. Fluctuation of Chaetognaths in Ennore estuary from May 1975 to September 1976.

in hydrological factors and zooplankton. The occurrence of the temperature minimum and maximum coincides with the seasonal changes in this area. But the salinity gradient depends upon the relative balance of factors like run off waters from the land, rainfall, evaporation and wind action. Here wide fluctuation in surface salinity was noticed during

Among the phytoplankton, the following diatcms namely *Coscinodiscus* and *Asterionella* were dominant. The two peaks noted during this investigation coincide with the north-east monsoon and south-west monsoon (Fig. 5). This may be due to the run off from the land which resulted in addition of nutrients to the estuary.

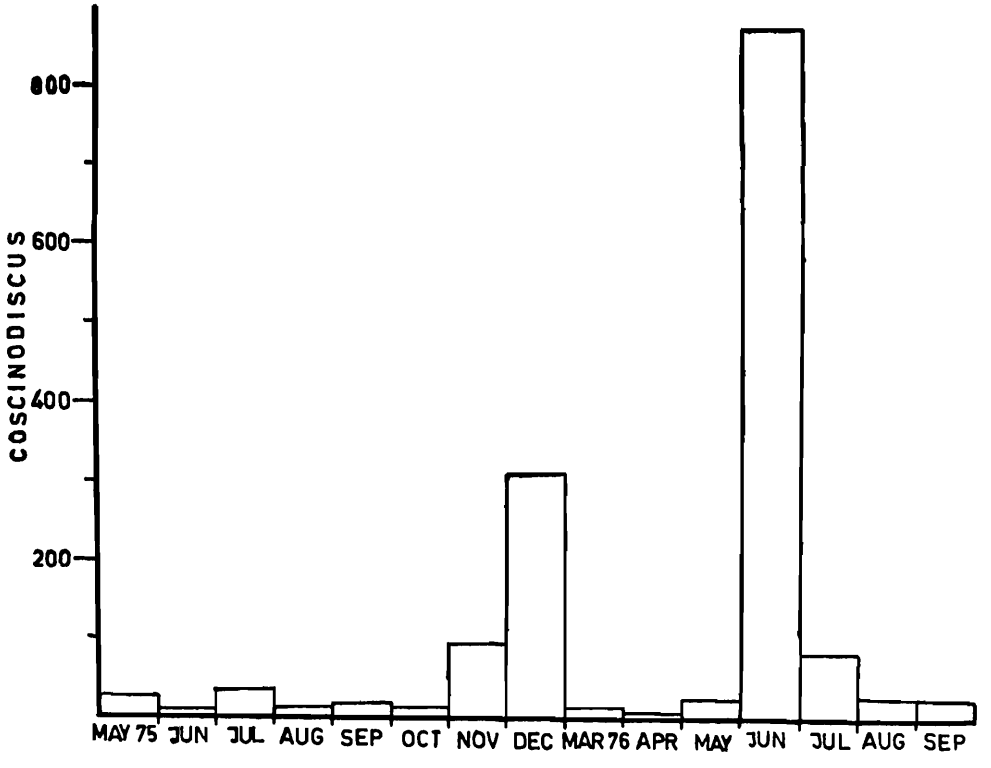

Fig. 5. Fluctuation of *Coscinodiscus* in Ennore estuary from May 1975 to September 1976.

October-December, due to monsoon effect. Prior to dredging, the maximum salinity values were even 46.7‰ (Chacko and Rajagopal, 1962). Then evaporation was playing a prominent role in controlling the salinity variations. After dredging, since the estuary is kept open regularly, the high salinity values were uncommon. In nearby Pulicat lake, salinity values reach upto 57‰ (50.5‰ average) in premonsoon months because of evaporation (Menon and Raman, 1977). Based on salinity values, this estuary is mixohaline in nature as the other estuaries nearby like Coum estuary, Adayar estuary and Kovelong estuary.

The zooplankton volume also indicate more or less the same situation. The phytoplankton peak is followed by zooplankton maxima (Fig. 2). Here calanoid copepods outnumber the other adult plankton forms as stated by Davis (1950) planktonic copepods, especially calanoids live and often are dominant both in freshwaters and in the sea. As in other estuarine specimens of Chaetognatha, (Srinivasan, 1972, 1977) here also the specimens are smaller in size because they are living in a habitat where there is a wide fluctuation in salinity.

Considering the quality of plankton, prior

to dredging the variety of plankton were more. During 1960-61, the diatoms *Coscinodiscus* and *Rhizosolenia* were common throughout the year. Among the zooplankton, copepods and nauplii were common. Prawn larvae and fish eggs were noted from June to November, (Chacko and Rajagopal, 1962). During 1965-1967 *Noctiluca, Foraminifera, Ceratium*, ctenophores, *Lucifer, Sagitta* and *Oikopleura* were recorded. Larval crustaceans, copepods, fish eggs and larvae were common throughout the year. Occasionally swarming of rotifers and mysids were noticed, (Evangeline and Subbiah, 1969). But during the recent investigations larval crustaceans, copepods, *Coscinodiscus* and *Asterionella* were the common forms. Besides bivalve larvae and polychaete larvae appeared during March-July. *Lucifer* and medusae were also recorded during the same period. During July, benthic forms like polychaetes, nematodes and ostracods were noted, perhaps because of turbulance. Pontellid nauplii appeared during August-September.

Prior to dredging, the closed and undisturbed estuary formed a safe nursing ground for fishes and other organisms. Hence the landings were found to be good. Particularly during May-June (Evangeline and Subbiah, 1969) mullet and prawn fishery were good. Since the estuary is kept open by mechanical means the silt generated in the process has adversely affected the fishery and the habitat has become less favourable for fish and other organisms and the fish landings have been considerably reduced.

As this conclusion is based on a short period of investigation, a detailed study based on several features such as transparency, conductivity, pH, salinity, dissolved oxygen, benthic fauna and fish landings is currently undertaken to have a better understanding about the ecology of Ennore ecosystem.

Acknowledgements

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