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DISTRIBUTION AND SEASONAL VARIATION OF THE BENTHIC FAUNA OF THE ASHTAMUDI LAKE, SOUTH-WEST COAST OF INDIA

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ABSTRACT

Distribution, abundance and ecology of the benthic fauna, from two stations in the Ashtamudi lake (Kerala) have been reported. Faunal density was much higher in the lower part of the lake with peaks of abundance during the monsoon. Corresponding biomass values were also observed. While polychaetes and amphipods constituted the bulk of the population at both the stations, isopods and pelecypods were well represented in the lower reaches and oligochaetes in the upper reaches of the estuary.

INTRODUCTION

While considering the characteristics of an aquatic biotope, benthic constituents in view of their role in fishery potentiality (Blegvad, 1930; Bristow, 1938 and Stickney and Stringer, 1957) have to be taken into account. Recently much attention has been paid to the studies of nearshore and etstuarine benthos (Parulekar and Wagh, 1975; Parulekar, 1973, Ansari, Parulekar, Harkantra and Nair, 1977; Parulekar and Dwivedi, 1973; 1974; Parulekar, Rajamanickam and Dwivedi, 1975; Mary, 1958; Desai and Krishnankutty, 1967; and Kurian, Damodaran and Antony, 1975).

However, no study has so far been made on the ecology and hydrographical features of the Ashtamudi lake. The present paper deals with the seasonal fluctuations of the benthos of the Ashtamudi lake, which is the second largest estuary in Kerala and is situated at 8°52·5′-8°60′ N lat. and 76°30′-76°40′E long. It is a palm-shaped set of eight lakes covering an area of about 32 sq. km (Fig. 1). These lakes join to form the main lake, constituting the Ashtamudi estuary, which permanently opens into the Arabian Sea. Two sites were selected for the present study, one at the Neendakara port area (Station-A) and the other at the Olaiylkadavu (Station-B) situated about 8 km southeast of the barmouth. Depths at the collection sites ranged between 1·0 to 1·5 m at Station-A and 1·0 to 1·8 m at Station-B.

MATERIAL AND METHODS

Bottom samples were collected at monthly intervals using a cylindrical corer of 12 cm diameter and 15 cm height. For every collection 5 similar samples were taken from a radius of 3 metres and the results represent the average of these samples. After fixing in 10% formalin the samples were repeatedly washed and filtered

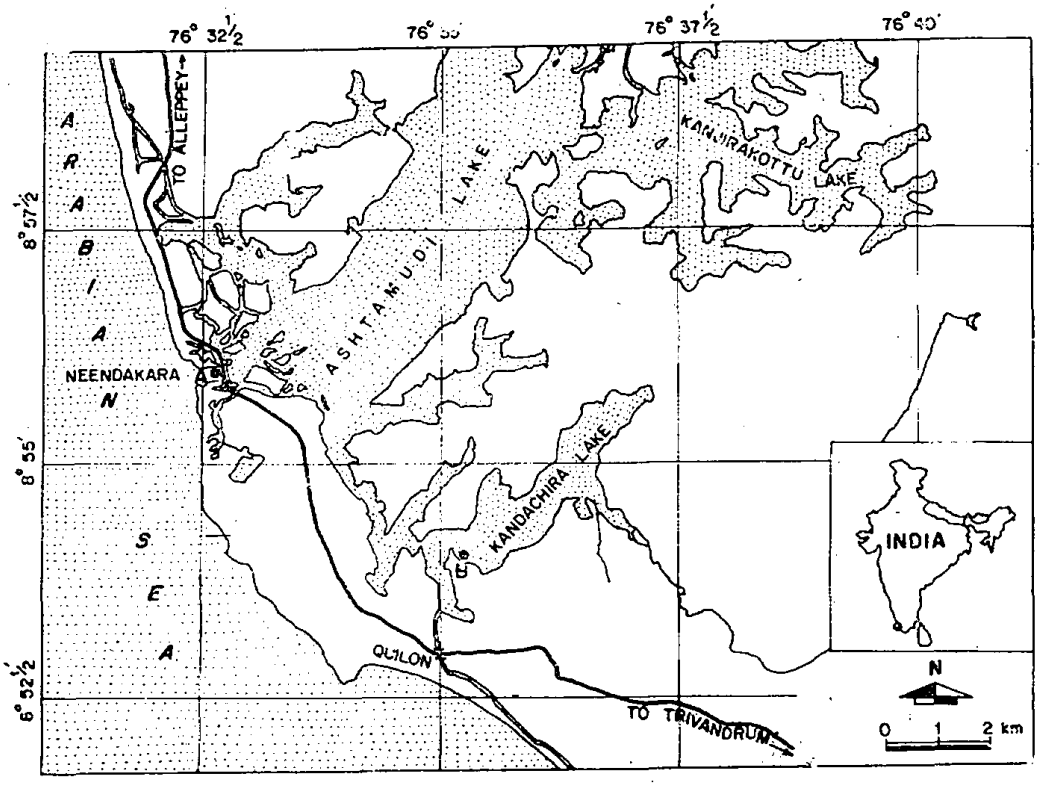

Fig. 1. Ashtamudi lake showing the study sites.

through sieve with mesh size of 210 μ (No 72). The organisms were separated and identified. Biomass figures given are those of preserved materials taken within 3 days of preservation representing wet weight of organisms (after blotting out the preservative) including weight of hard parts such as shells of molluscs.

Water samples were collected using Mayer's water sampler. Hydrographic features such as salinity and dissolved oxygen content were estimated titrimetrically (Strickland and Parsons, 1965). In the present study the period between February to April is considered as pre-monsoon, May to October as monsoon and November to January as post-monsoon.

RESULTS

Among the hydrographical features studied, salinity and oxygen were the most fluctuating parameters. Salinity ranged between 13·7–32·5‰ at Station–A and 7·6–30·0‰ at Station–B in surface waters and 16·5–33·6‰ at Station–A and 8·1–32·5‰ at Station–B in bottom waters (Fig. 1A). The surface water temperature at Station–A ranged between 26·5–32°C, it was between 27–33°C at Station–B. Temperature variations of bottom waters of stations A and B were between 26–32°C and 27–33°C respectively (Fig. 2). Though lowest temperatures were recorded during July at both the stations, the highest temperatures were recorded during April at Station–A and in October at Station–B. At Station–A the seasonal variations in the dissolved oxygen content ranged between 4·0–4·6 ml/l in surface water and 3·6–4·0 ml/l in bottom water. However, the fluctuations at Station–B were very high owing to the frequent admixture of polluted water from the nearby areas. It

fluctuated between 3·9–5·3 ml/l and 2·9–4·8 ml/l in surface and bottom waters respectively (Fig. 3). pH varied within a narrow range at both the stations, being between 7·9–8·2 and 7·4–8·3 in surface and 7·8–8·2 and 7·3–8·3 in bottom waters of stations A and B respectively.

Faunal characteristics

The benthic fauna of this lake is subjected to wide seasonal fluctuations. The faunal density ranged between 1480–195410/m² (mean 26396) at Station–A and 150–1200/m² (mean 445) at Station–B with peaks of abundance during the monsoon (Fig. 4). Corresponding biomass values ranged between 2·13–220·20 g/m² (Fig. 5) (mean 49·47) at Station–A and 0·3–4·6 g/m² (mean 2·05) at Station–B. While polychaetes and amphipods constituted the bulk of the population at both the stations, isopods and pelecypods were well represented at Station–A and oligochaetes at Station–B. Of the 14 taxa of polychaetes identified *Nereis* sp., *Diopatra neapolitana* and *Prionospio* sp. were common at both the stations and their density was always higher than that of the other polychaetes. Among others *Goniada* sp., *Sthenelais* sp., *Ancistrosyllis* sp., *Lumbrinereis* sp., *Glycera* sp., *Perinereis* sp., *Polydora* sp., *Nephthys* sp., sabellids and maldanids were present only at Station–A. They were well represented during the pre- and post-monsoon periods except the one genus, *Polydora* and were virtually absent during the monsoon. *Dendronereis* sp. was obtained from Station–B during the monsoon and post–monsoon periods and its number was greater than that of any other taxa of that area.

Crustaceans were the next important group represented by amphipods, isopods, decapods and tanaidaceans. Though amphipods were second only to polychaetes in species composition, their density was higher than that of any other components of the benthic community. Of the 7 species of amphipods identified *Corophium triaenonyx, Ampelisca scabripes, Photis digitata* and *Photis geniculata* were common at both the stations. Their density was noticeably higher during the

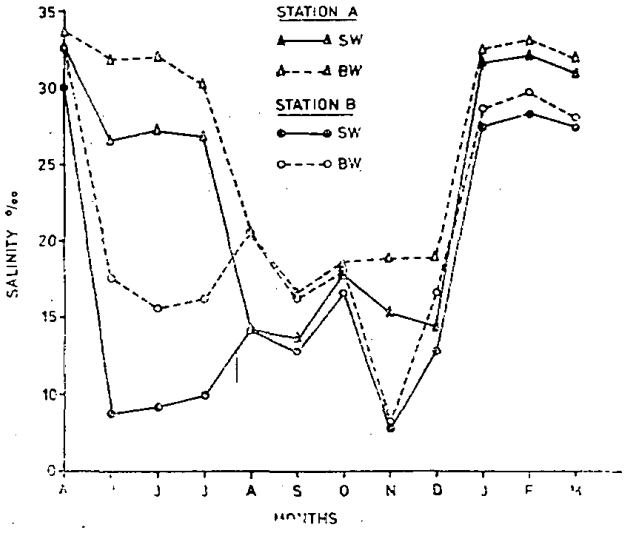

Fig. 1A. Seasonal variations in the surface and bottom water salinities of the Ashtamudi lake.

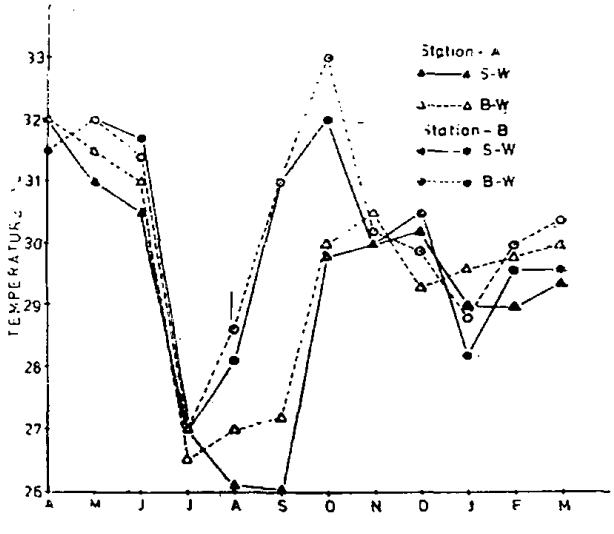

Fig. 2. Seasonal variations in the surface and bottom water temperatures of the Ashtamudi lake.

monsoon and post-monsoon periods with peak during November, ranging between 60-186600/m² (mean 23574) at Station-A and 0-360/m² (mean 143) at Station-B. A few *Melita zeylanica* and *Quadrivisio bengalensis* were occasionally obtained from Station-A. About 2% of the amphipods are as yet unidentified at both stations. Others like isopods, tanaidaceans and decapods were found only at Station A, occurring periodically in small numbers. While *Tanais* sp. was the only representative of Tanaidacea, Isopoda was represented by *Cirolana willeyi, Sphaeroma terebrans* and *Xenanthura linearis*.

Molluscs were present only at Station-A, mainly composed of pelecypods represented by *Musculista arcuatula* and *Solen* sp.

DISCUSSION

The hydrographical features as well as the benthic fauna of this lake were subjected to wide seasonal fluctuations. Being an estuarine biotope, salinity was by far the most fluctuating factor at both the stations. It was always much higher at the mouth of the lake than at the upper reaches. On the other hand temperature was generally lower at Station-A than at B. Lowest values of both salinity and temperature were recorded during or immediately after the monsoon season. Dissolved oxygen content at Station-A was more or less the same with minor fluctuations, irrespective of monsoonal changes. At Station-B, however, it was subjected to wide fluctuations. During the hot pre-monsoon period it was very low in the bottom water and higher in the surface water.

The population density of the benthic fauna was generally high during the monsoon season. The density of the benthic fauna of Station-B was poor throughout

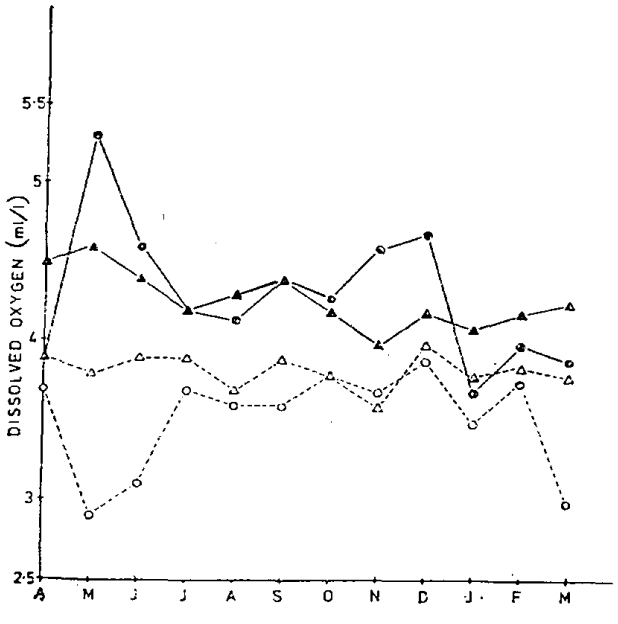

Fig. 3. Seasonal variations in the dissolved oxygen concentrations of surface and bottom waters of the Ashtamudi lake.

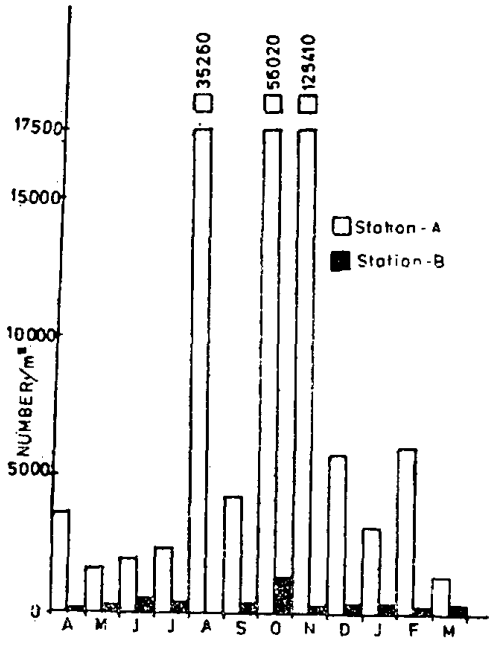

Fig. 4. Seasonal variations in the total benthic fauna of the Ashtamudi lake as n/m².

the year, especially during the pre-monsoon period.

An inversely proportional correlation was observed between population count and salinity. Qasim, Bhattathiri and Devassy, (1972) also observed that in an estuarine environment where changes in salinity are very large, maximum abundance of many organisms occurs at exceptionally low salinities. In the present study, it was found that even though there were remarkable seasonal fluctuations in the population density, the faunal characteristics were more or less constant during the yearly cycle.

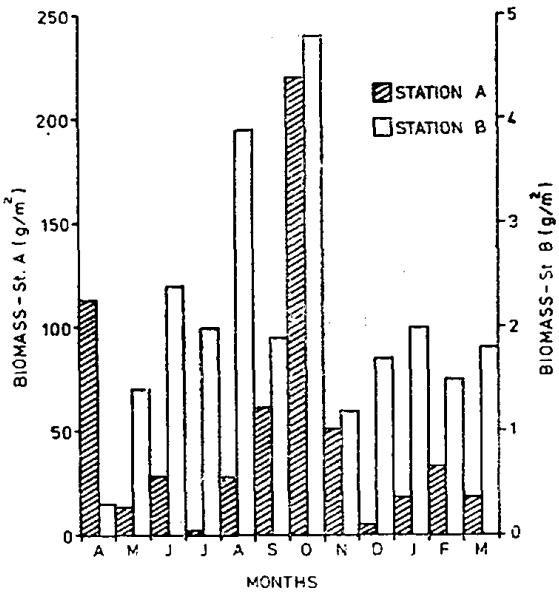

Fig. 5. Seasonal variations in the total boiomass of benthic fauna of the Ashtamudi lake.as g/m².

A correlation between population density and biomass values of the entire fauna is not discernible. This is due to the difference in the peak incidence of the different faunal elements. Though the biomass value of Station–B was very low that of Station–A was within the range of those reported for the Zuary estuary (Parulekar, Rajamanickam and Dwivedi, 1975 a), Mandovi estuary (Parulekar and Dwivedi, 1974) and Cochin estuary (Desai and Krishnankutty, 1967) and much lower than that of the Veli lake (5.2 – 3600 g/m², personal observation). As regards population density, it was much higher than those of the above mentioned estuaries.

Polychaetes, amphipods and pelecypods were the major components both in biomass values and population density.

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