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Hydrographic parameters off Gulf of Mannar and Palk Bay during an year of abnormal rainfall

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Abstract

The results of monthly observations on the hydrographic parameters in the Gulf of Mannar and Palk Bay during the period 2002-03 are reported. The meteorological parameters for the period have also been compiled. The area received 1120mm rainfall during the period as against a normal of 760mm. Maximum wind velocity of 16.2km/hr was in June and humidity of 78% in December. A comparison of the parameters of temperature, salinity, pH, dissolved oxygen, primary productivity and biomass of both the ecosystems is presented.

The Gulf of Mannar and Palk Bay lie on the south and north respectively of the narrow peninsular extension of the mainland that is connected to the Pamban Island along the southeast coast of India (Lat. 8° 55' -9° 15' N - Long. 78° - 79° 16'E). The area is exposed to the vagaries of both the southwest and northeast monsoons. The rainfall during the former is negligible and the major portion of the 760mm of annual normal rainfall occurs during northeast monsoon. Hydrographic parameters of Gulf of Mannar and Palk Bay during a period of abnormal rainfall (1120 mm) have been monitored during 2002-03 and the results are presented.

Materials and methods

Water samples were collected on a monthly basis during 2002-03 from both Palk Bay and Gulf of Mannar. At Palk Bay, a station for monitoring was fixed at 6-m depth northeast of the Coast Guard jetty. In Gulf of Mannar, the station was selected at a depth of 6m from southeast of INP jetty. *In-situ* observations on atmospheric temperature as well as surface and bottom water were made. Salinity was determined by Mohr's titration method (Strickland and Parsons 1968). The pH was measured using ELCO pH meter. The dissolved oxygen was determined by Wrinklers method. The Gross and Net Primary productivity were determined after keeping the light and dark bottles in lab condition for 3hrs and then the dissolved oxygen values were estimated by Wrinklers method. The same was converted for carbon equivalent using a PQ of 1.25 for obtaining gross production. The Plankton sample collections were made in 10-minute surface hauls by a net of 50cm diameter made of Organdy cloth of mesh size 90 μ and towed from a non-mechanised boat. After preserving the sample in 5% formaldehyde the volume of each haul was determined by displacement

method. The meteorological data for the period were collected from Central Electrochemical Research Institute-Mandapam (CECRI). The monthly total rainfall, the average monthly wind velocity, humidity and atmospheric temperature monitored at these stations were compiled from the daily data.

Results and discussion

Temperature: The maximum atmospheric temperature of 35°C was observed in April in the Palk Bay as against 32°C in March. It has been observed in the present study that, there is not much variation in temperature between surface and bottom water at both areas. The surface water temperature was highest in August (31°C) and in April (32.8°C) in Palk Bay, compared to 32.6°C and 31.8°C respectively in the Gulf of Mannar (Fig.1).

Salinity: Salinity immediately after rainfall for the surface water in Gulf of Mannar was as low as 21.9 ppt in January. It increased to 34.3 ppt in February, though the total amount of rainfall in that month (27mm) was more than that of the previous month (14.8mm). The salinity of bottom water of Palk Bay was more than that of Gulf of Mannar during all the months except in June. The amount of annual rainfall was abnormally higher (1120mm) during 2002-2003, against a normal of 760mm (Fig.2).

The pH of water: The average pH in the Palk Bay was 8.36 and showed no significant difference in surface and bottom. In the Gulf of Mannar it was comparatively lesser, the average being 8.32 for surface water. In the present study in Palk Bay, maximum pH of 8.72 at salinity 33ppt was observed in March while in October it was 8.26 and 27.8 ppt. respectively (Fig.1).

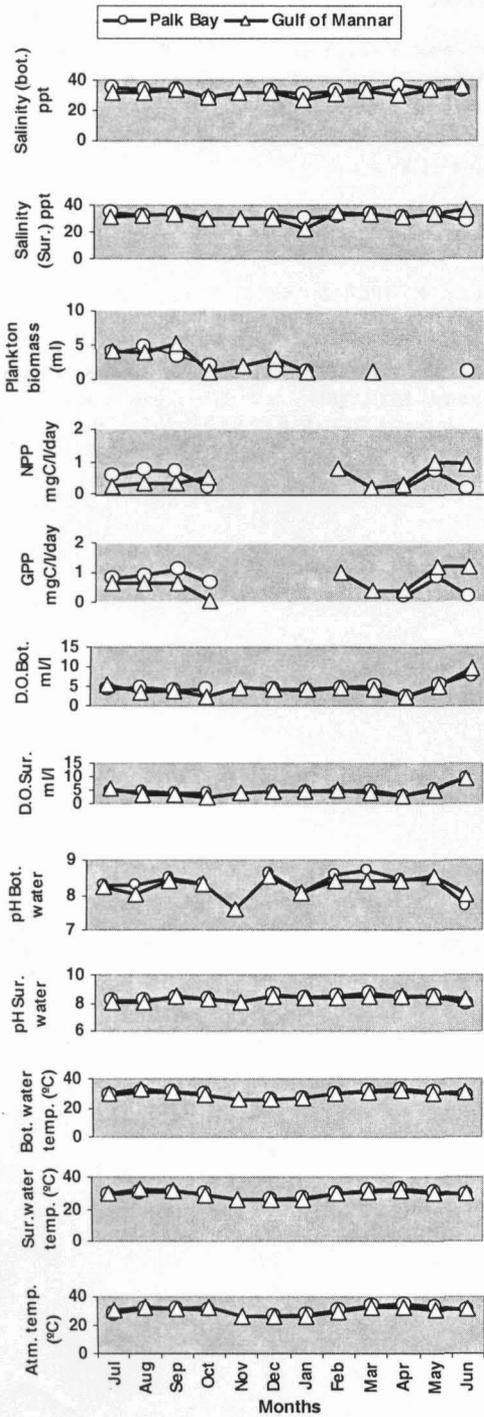


Fig. 1 Hydrographic parameters of Palk Bay and Gulf of Mannar (July 2002-June 2003)

Dissolved oxygen : In an earlier study, Jayaraman (1954) observed greater variation in the oxygen content in the Palk Bay than in Gulf of Mannar. The dissolved oxygen value varied between 3-5ml/l for Palk Bay during May 1951 to April 1953. During April 2003, the value for Palk Bay was 2.96ml/l. An exceptional increase was observed during June (Fig.1).

Gross and Net Primary Production : In Palk Bay, the Net Primary Productivity (NPP) and Gross Primary Productivity (GPP) were higher during July-September 2002 compared to April -June in Gulf of Mannar. In the present study the average GPP for Palk Bay was 0.67mgC/l/day and for Gulf of Mannar 0.68mgC/l/day. It was observed that reduced light intensity due to clouds has affected the primary productivity during October, November, December 2002 and January 2003.

Plankton biomass : The volume of plankton biomass determined on a monthly basis, ranged between 1- 4.8ml for Palk Bay and 1-5.2ml for Gulf of Mannar. Girijavallaban *et al.* (1982) observed that the average values of zooplankton production in Mandapam waters showed a declining trend from 1979 to 1982. In those three years, the values were 18cc, 19cc and 5cc respectively for 10 minutes surface haul.

Meteorological observations : The maximum rainfall was in October (382mm), which occurred at a stretch of

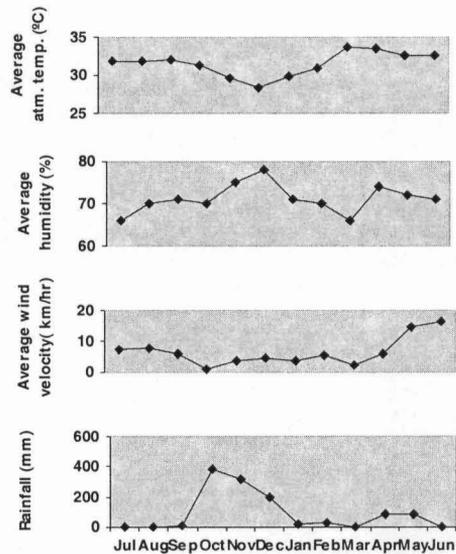


Fig. 2 The monthly rainfall, average wind velocity, humidity and atmospheric temperature from July 02-June 03

10 days. The rainfall during September, November and December accounted for 81% (909.7mm) of the total annual rainfall in the region during 2002. The larger amount of rainfall leads to more drainage from the catchment area, which would significantly influence the water quality of the near shore areas. The total annual rainfall for the year 1978-1979 was 1235mm with most of it falling during northeast monsoon months (James and Najmuddin, 1986). In the present study the humidity observed was highest (78%) in December and lowest (66%) in July. Humidity influences the evaporation rate, which in turn can affect the salinity.

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