Rec. zool. Surv. India : **97** (Part-4) : 191-200, 1999

Short Communication

STUDIES ON SOME PHYSICOCHEMICAL PARAMETERS OF WATER QUALITY WITH NOTES ON OCCURRENCE OF COMMERCIALLY IMPORTANT MARINE FISHES AT DIGHA COAST IN WEST BENGAL

INTRODUCTION

The comprehensive marine water quality studies on the fast emerging tourist centre Digha, located at the juncture of coasts of West Bengal and Orissa in the Bay of Bengal, has been taken up to assess the viability/environmental feasibility for the vast marine resources as well as to study the sustainability and further scope in fish and shrimp culture along this coastal belt. Due to emerging need and pressing requirement of fish/shrimp as a rich natural food, attention of scientists, industrialists, government planners and the non government organisations, have been focussed on exploring more virgin coastal areas to produce more and more shrimps and edible fishes by the culture and captive methods. The coastal belt ranging from Rasulpur to Digha (via Junput, Sankarpur and Mohana) under Midnapore district of West Bengal has been found to attract them.

Under the present study, efforts have been made to incorporate and correlate the occurrence and abundance of thirty six available commercially important marine fish species in the study area for the period of premonsoon of 1993 upto postmonsoon of 1997 (March 1993 to February 1998). This is however, an ongoing monitoring/study work.

MATERIALS AND METHODS

Studies presented here were conducted during March 1993 to February 1998 at Digha which is situated close to the Gangetic mouth on the east coast of India at latitude 21°36' N and longitude 87°30'E. Coastline is straight and the beach is flat and compact. Marine water samples were collected in sterile glass bottles at 10-20 meters distance inside from the sea surface both at low and high tides in a stretch of 200 to 500 meters on either sides of beach near this research centre (Figure 1).

Generally temperature, pH, and dissolved oxygen were determined in the field itself. The regular analysis of these parameters was done once or twice a week throughout the study period. Surface water temperature, density, total dissolved soilds and total suspended solids were measured conventionally. pH and conductance were measured by Elico pH meter (Model No. LI-120) and Elico conductivity meter (Model No. C.M. 180) respectively. Chlorinity/salinity were measured by Argentometric titration. Modified Winkler's method was employed for the estimation of dissolved oxygen and the biochemical oxygen demand was measured by incubating the sample at 20±1°C in a BOD incubator (Model No. Cl-65, Remi cooling incubator) for five days.

Phosphate (PO_4-P), and nitrate (NO_3-N) were determined by following the Grashoft (1976) procedure. The remaining chemical parameters like total hardness, alkalinity, free carbondioxide, and sulphate were estimated by procedures defined in standard methods in APHA (1985), NEERI (1988), Martin (1970), Wilson (1975) and Aston (1978).

Since monsoon plays an important role in the biological and commercial activity of marine living resources, the three distinct seasons defined are premonsoon (March-June), monsoon (July-October), and the postmonsoon (November-February). Each season was further divided into early (I) and late (II) stages, each representing a block of two months duration.

Marine fish specimens collected from dragnet hauls from Paschim Gadadharpur, Udaypur, Ongaria Ghat, Jatranala Ghat, New Digha Beach, Hospital Ghat, about 6 Km, 5Km, 3Km, 2Km and 1Km respectively on the western side of Digha : Seahawk Ghat, about 1 Km on the east side of Digha.

Fishes were collected from fishing vessels from Digha Mohana, a more or less estuary zone about 4 Km on the east from Digha and from Sankarpur Harbour, a minor fishing harbour 5 Km away from Chauda Mile (near Ramnagar) in the Champa canal which falls into the sea across Digha Mohana.

RESULTS

During this period occurance and abundance pattern of 36 commercially important marine fishes of this area studied are given as in table no. 1.

The mean values of these parameters for every two months of interval for the three seasons (premonsoon, monsoon, postmonsoon) for the five year study period (March 1993-February 1998) are expressed here through figures 2-16, for each parameter separately. Free carbondioxide was reported in trace only, generally, every year during the early monsoon period (July & Aug.) therefore, this parameter could not be expressed through figure. The significance of mean values of different parameters was analysed using the one way analysis of variance technique, Snecedar and Cochran (1967) for each parameter separately.

DISCUSSION

From the results appeard so far, it appears that except temperature, chlorinity/salinity, conductance as well as total dissolved solids, all other parameters remain almost constant to the seasonal/digonal variations, which depict the general normalcy in the marine water quality parameters. The significance of chlorinity/salinity data variation with regard to monsoon season is such that the values increase moderately to sufficiently high from monsoon to postmonsoon and to premonsoon respectively.

Similar studies recently carried out at different riverine and marine systems in India by Mathur *et al.* (1986), Zingde *et al.* (1980), Malik *et al.* (1995), Srivastava *et al.* (1996) and Elango *et al.* (1992) assume significance of our present work as any catastrophic event to marine biological

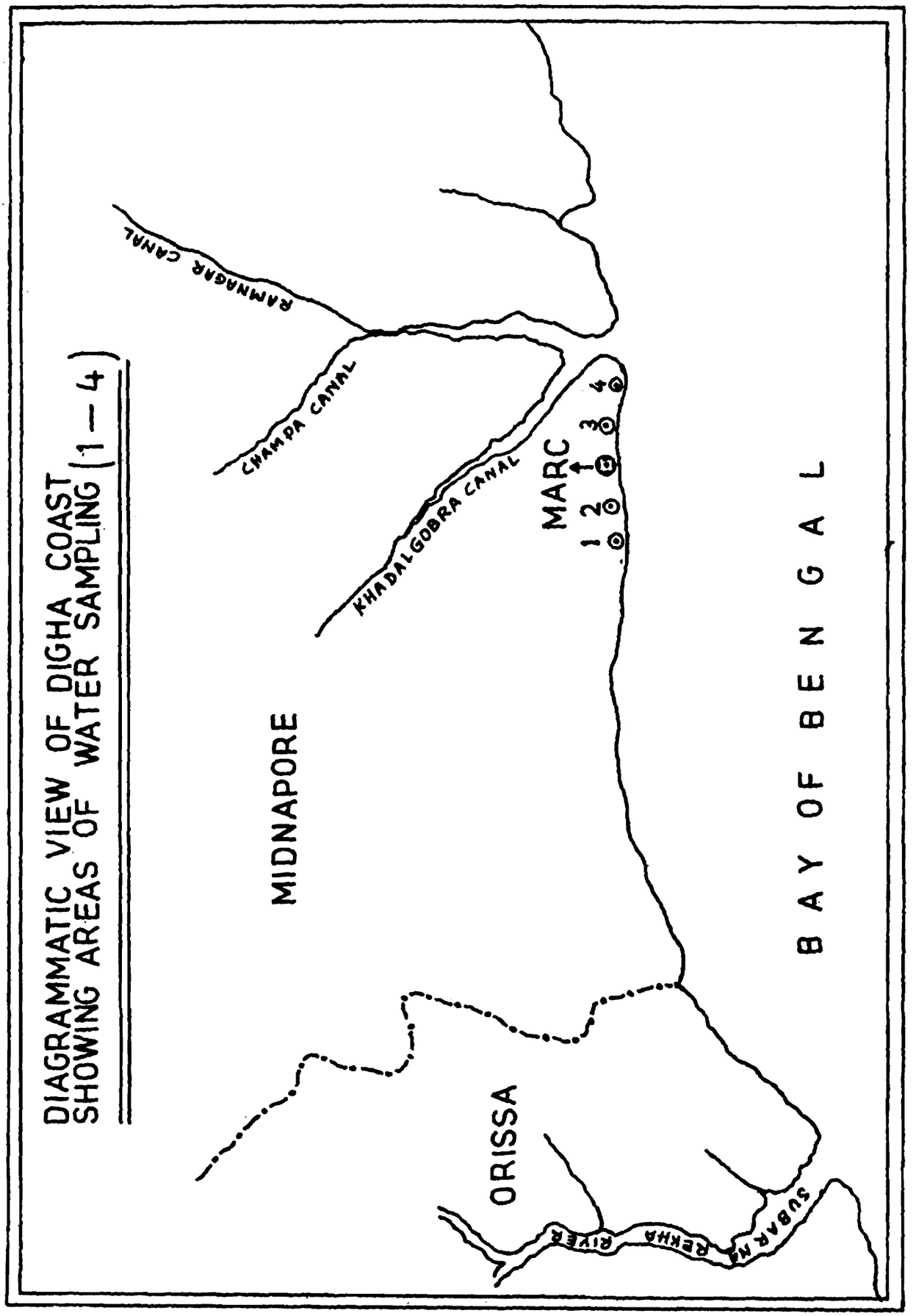


Fig 1 : Showing areas of water sampling points at Digha coast.

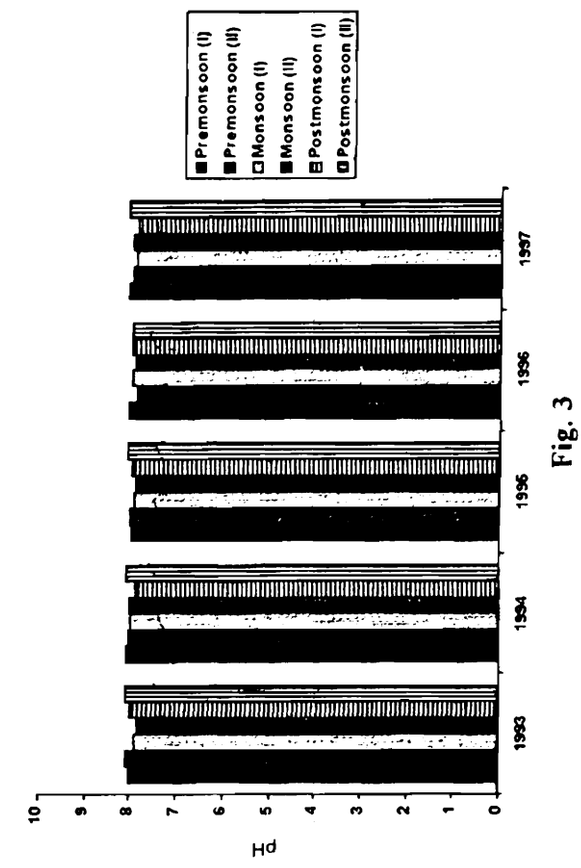
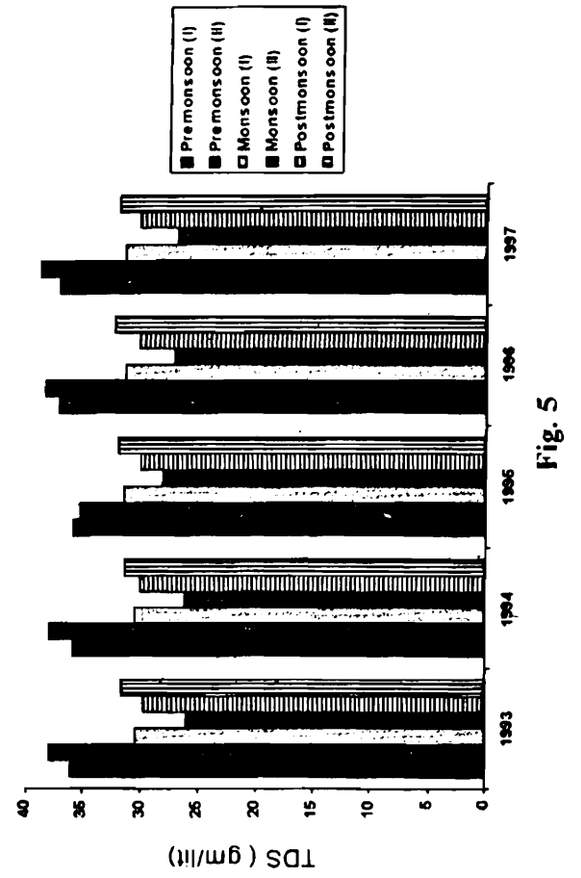


Fig. 3



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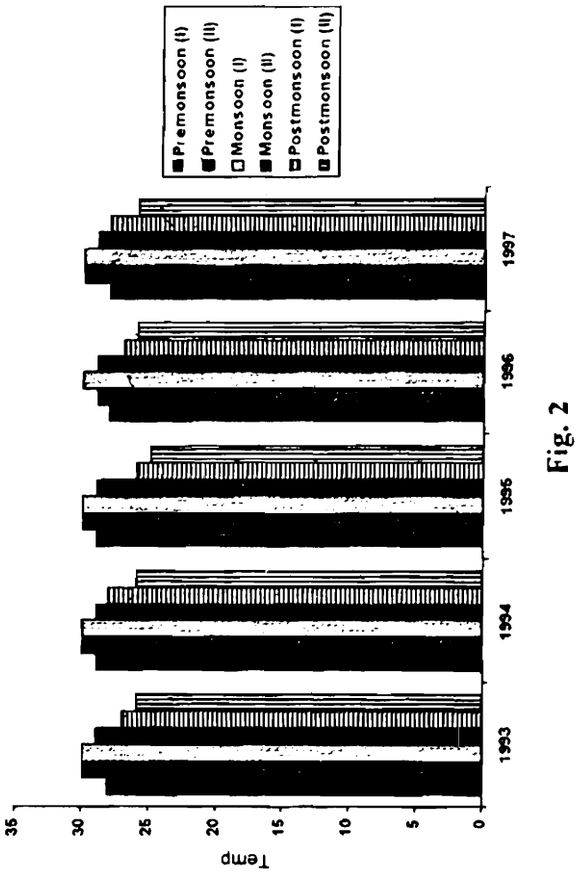


Fig. 2

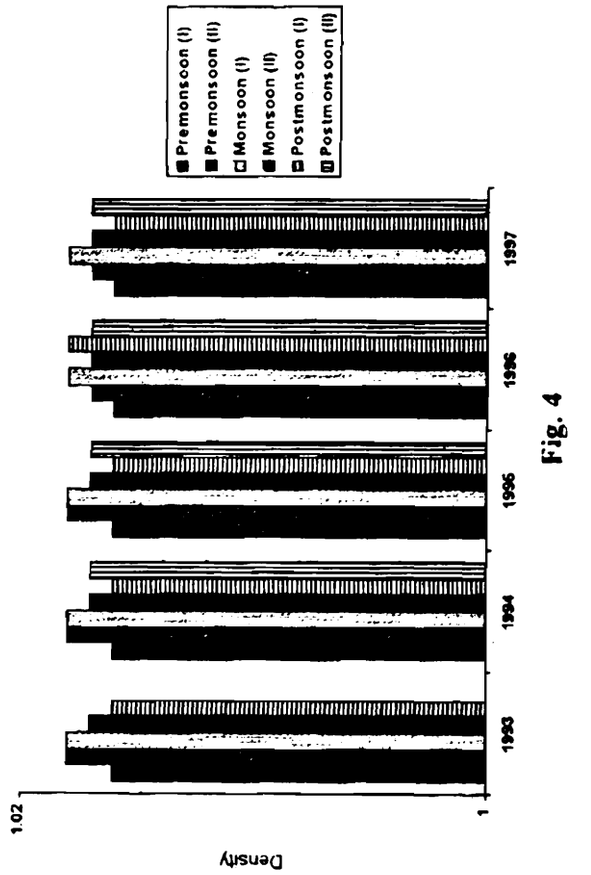


Fig. 4

Fig 2 : Temperature variation profile ; **Fig 3 :** Observed pH values of sea water samples throughout the year ; **Fig 4 :** Recorded sea water density ; **Fig 5 :** Measured total dissolved solids (gm/lit).

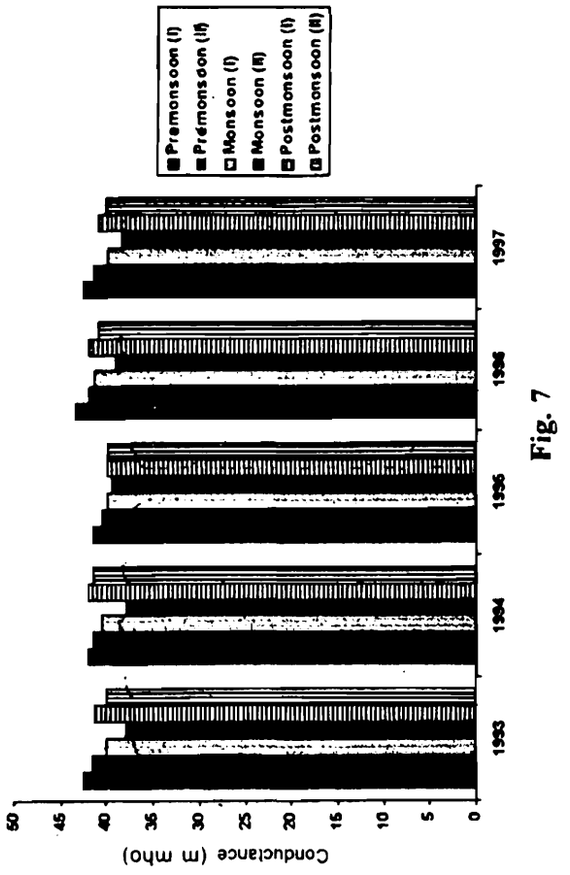


Fig. 7

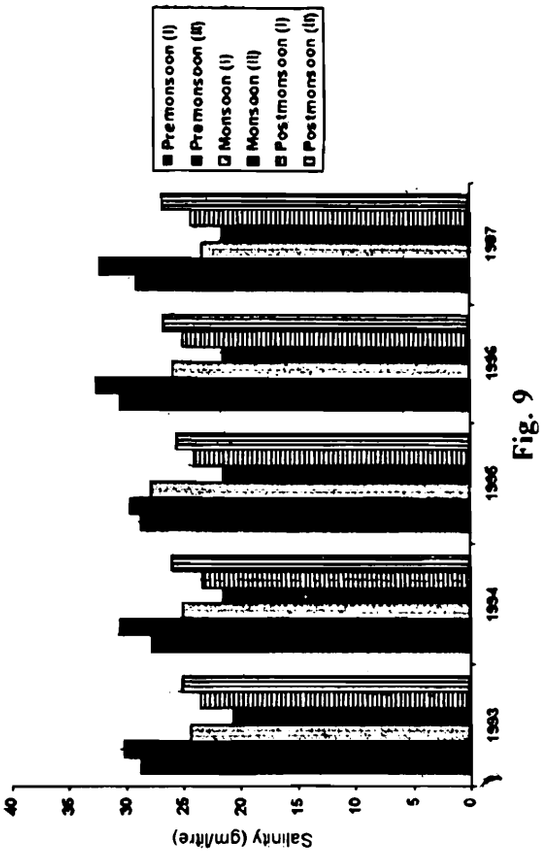


Fig. 9

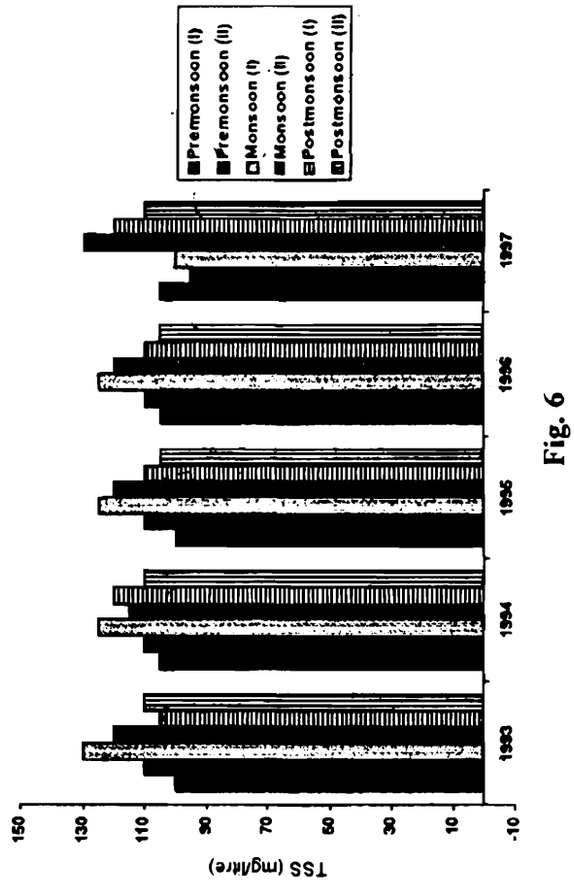


Fig. 6

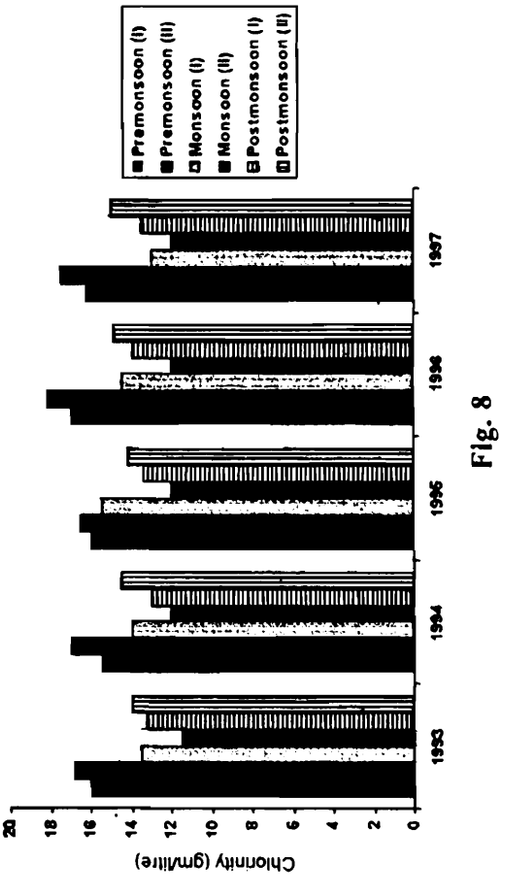
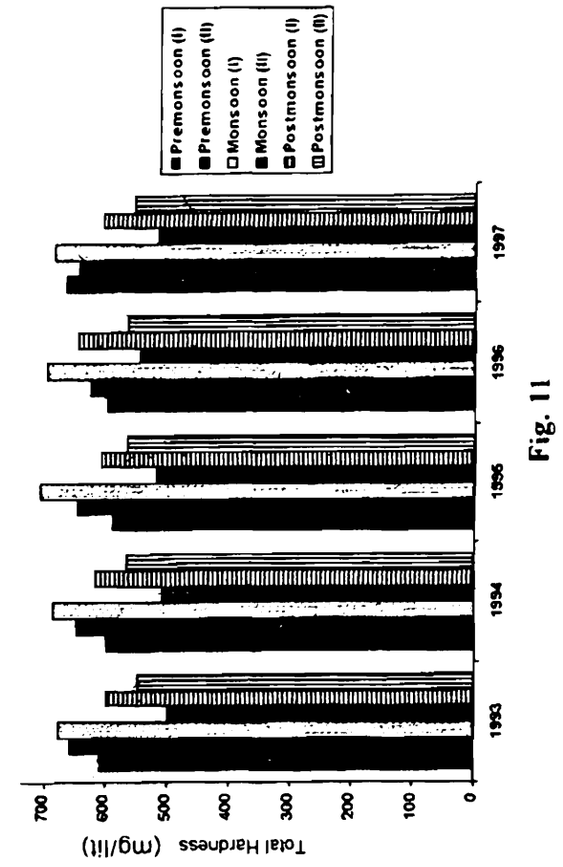


Fig. 8

Fig 6 : Measured total suspended solids (mg/lit) ; **Fig 7 :** Recorded conductance values for the sea water samples ; **Fig 8 :** Observed chlorinity variation for the sea water samples ; **Fig 9 :** Corresponding salinity values.



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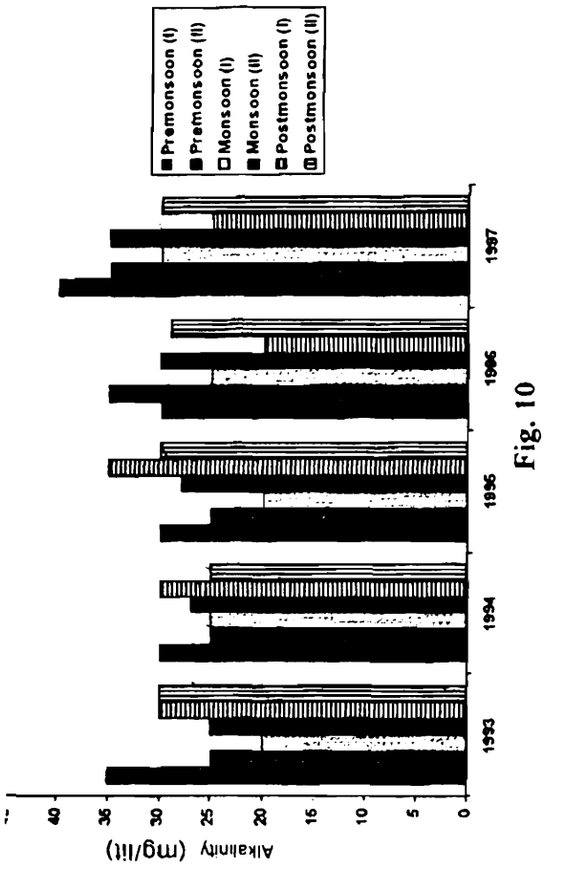

Fig. 10

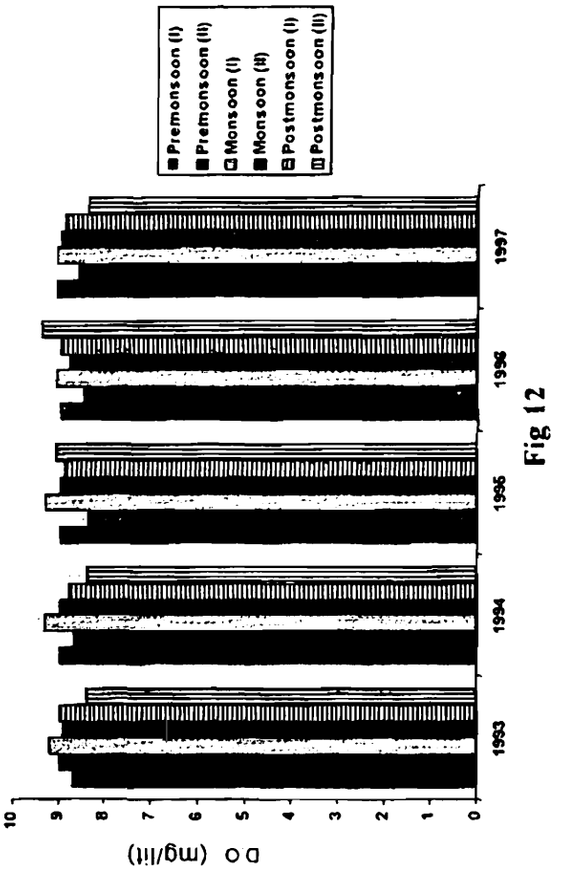

Fig 12

Fig 10 : Measured alkalinity values (mg/lit) ; **Fig 11 :** Recorded total hardness values (mg/lit) ; **Fig 12 :** Observed dissolved oxygen values (mg/lit).

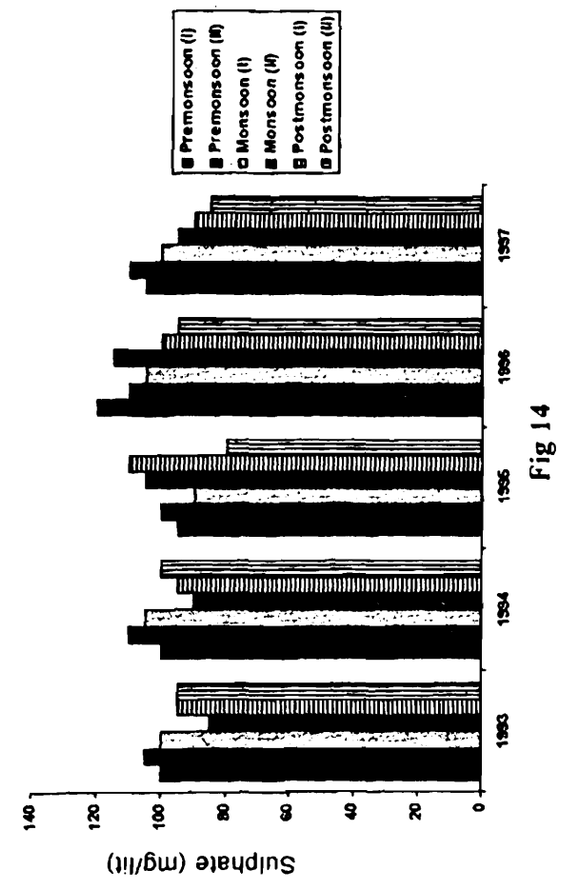

Fig 14

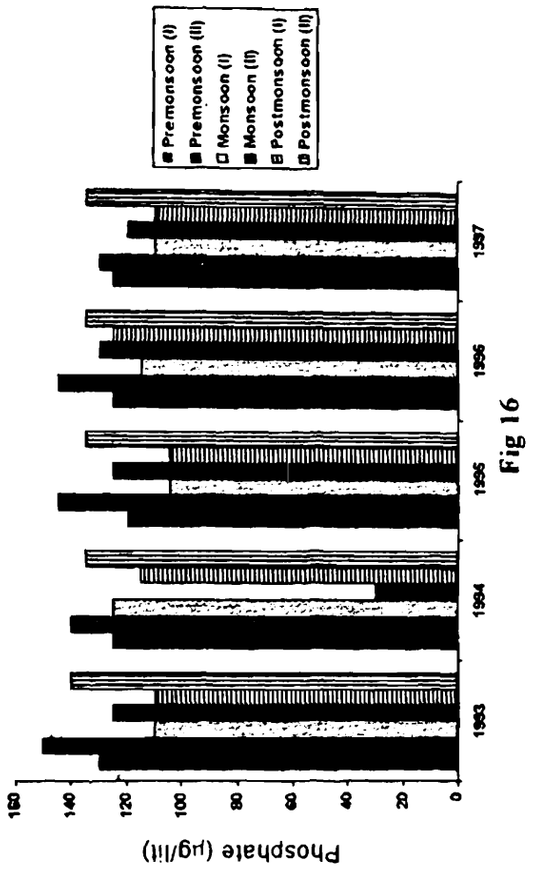

Fig 16

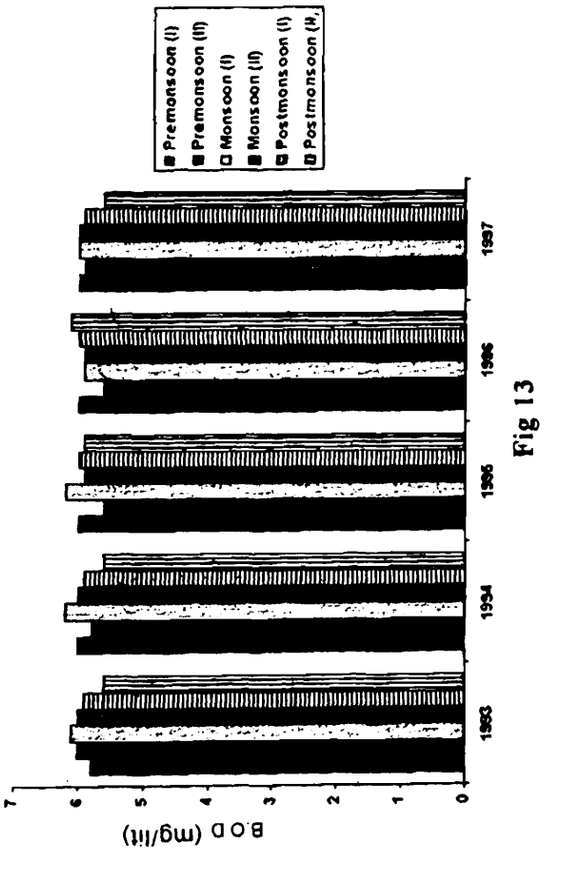

Fig 13

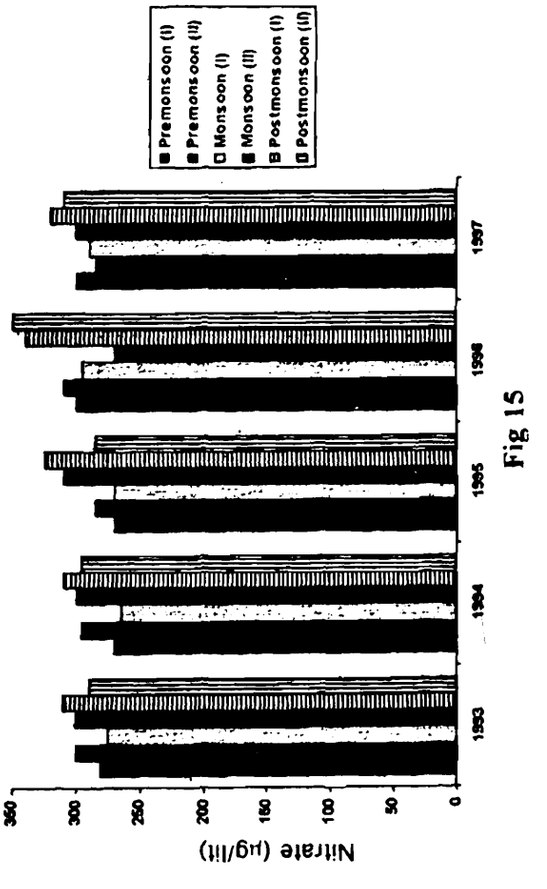

Fig 15

Fig 13 : Corresponding biochemical oxygen demand (mg/lit) ; **Fig 14 :** Amount of sulphate (mg/lit) ; **Fig 15 :** Amount of nitrate (µg/lit) ; **Fig 16 :** Amount of phospate (µg/lit).

resources may happen due to sudden significant changes in such parameters. Although, Digha being a silent zone, the profile of biologically important physicochemical parameters remain unaffected which is due to insignificant level of pollution load from the heavy metals, pesticides/ herbicides and hydrocarbons. But continuous and excessive exposure of such highly toxic pollutants getting accumulated in the marine system may alter the water quality upto such an extent that the very survival of some vulnerable species of fishes, shrimps, phytoplanktons and zooplanktons may be in danger. The sudden excessive changes in DO, BOD, alkalinity, salinity and pH etc. may adversely affect certain marine species upto the extent of extinction. It is with this reason that the regular monitoring of these biologically important physicochemical parameters have been taken as a priority task of this research centre.

Thus occurance and abundance pattern (monthwise, throughout the year) of these important commercial fishes around Digha coast in correlation to the physicochemical parametrs patern will serve the purpose of observations more meaningful from the Bio-ecological point of view. Hence, we are carrying out these studies as a regular monitoring and surveillance measure at this important coastal zone.

SUMMARY

Digha, a small tourist resort of West Bengal, is strategically important from the marine fishing and shrimp culture point of view. An annual profile of biologically important physicochemical parameters is reported here, which may be utilised as baseline observation, in relation to occurrence and abundance of commercially available marine fish species at this coast. Such parameters studied were : temperature, density, total dissolved solids, total suspended solids, pH, conductance, chlorinity, salinity, alkalinity, total hardness, free carbon dioxide, dissolved oxygen, biochemical oxygen demand, sulphate, nitrate, and phosphate. Attempts have been made to correlate occurrence and abundance of available commercially important thirty six marine fish species of this study area. Although, general trend of such parameters' values almost remain unaffected of seasonal or other variations, but chloronity/salinity varies significantly raising from monsoon to postmonsoon and from postmonsoon to premonsoon period. Our observations reported here for the last five years (March 1993 to Feb. 1998) merit importance from the point of view of assessing pollution threat out of ongoing agricultural and industrial activities in this area. Any kind of significant pollution may affect these parameters, which in turn will alter abruptly the survival, growth and breeding of a variety of susceptible marine organisms.

ACKNOWLEDGEMENT

Authors are grateful to Dr. J. R. B. Alfred, Director, Zoological Survey of India and to Dr. R. A. Khan, Jt. Director ZSI for valued suggestions during the course of study and also for critically going through the manuscript. Thanks are also due to Dr. Ramakrishna, Joint Director, ZSI, and the then Officer-inCharge, MARC/ZSI, Digha for providing necessary research facilities and encouragement.

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Zoological Survey of India
Marine Aquarium and Research Centre
Digha,West Bengal-721 428

A. HUSAIN
AND
T. K. CHATTERJEE