

OCCURRENCE OF JUVENILES OF CULTURABLE SHRIMP SPECIES IN THE STAKESEINE FISHERY AT THE NEGOMBO LAGOON

by

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ABSTRACT; The rapid expansion of shrimp culture industry in the western coastal areas has increased the demand for shrimp juveniles. Existing hatcheries may not be able to meet this demand in the near future. On the other hand some of our water resources in these areas do not provide ideal conditions for *Penaeus monodon* culture which is the only species used in hatcheries. The present work assesses the juvenile resources of other culturable shrimps (*Penaeus indicus*, *Penaeus merguensis*, *Penaeus semisulcatus*, *Metapenaeus dobsoni*) which are suitable for fluctuating environmental conditions of our lagoons in the west coast. Stakeleine fishery, the major fishing method for shrimps in a typical highly productive Wet Zone estuary was selected for the present work. Juveniles of *M.dobsoni* were found consistently in considerable numbers while the abundance of *P.indicus/P.merguensis* was found seasonal. All the juveniles of different species were more abundant in the second inter- monsoonal months. The abundance of juveniles showed a correlation with some of the environmental parameters monitored. The results reveal the possibility of establishing an aquaculture industry for *M.dobsoni* throughout the year and for *P.indicus/P.merguensis* seasonally based on the abundance of juveniles in the stakeleine fishery.

INTRODUCTION

Coastal areas of Sri Lanka offer a considerable amount of water resources and low lying delta areas for shrimp culture development. The total brackish water area has been estimated at 121,300 ha (Pillay, 1968) while the extent of coastal swamps around brackish water bodies is estimated at 70,800 ha (Wickramasuriya, 1969). Recent rapid expansion in shrimp culture has increased the demand for juveniles of the culturable species of shrimps in the coastal areas. Although, several hatcheries are now in operation for the production of post larvae they are involved only in the production of one particular species (*Penaeus monodon*). This species has been recommended as the most suitable species for culturing in the South East Asian region (Apud *et al.*, 1985). Recent studies carried out by NARA (1987) have shown that the chemical and physical environment of the lagoons of Sri Lanka vary from one lagoon to another. The potential for aquaculture development of *P.monodon* is thought to be limited to backwaters with relatively low salinities.

Penaeus semisulcatus, *P.indicus*, *P.merguensis* and *Metapenaeus dobsoni* are the other species which are identified as suitable candidates for shrimp culture. These species are naturally found in the brackish water areas of the west coast of Sri Lanka. The present study was carried out with the aim of evaluating the juvenile resources of the most abundant commercially important shrimps in stakeleine fishery which is identified as the major fishing method for shrimps in the Negombo Lagoon.

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MATERIALS AND METHODS

The study was carried out in the Negombo estuary (latitude 7° 11' N and longitude 79° 50' E) in the west coast of Sri Lanka (Fig.1). Samples of shrimp juveniles were collected from stake seine net landings at the stake seine landing site bi-weekly for a period of one year from January to December 1986. The environmental parameters ; salinity, pH, and turbidity were monitored using a refractometer, Chemitrix type 300 pH meter and a Hach turbidity meter, twice monthly in the lower reaches of the lagoon where the stake seine nets are in operation. Data on rainfall and the maximum and minimum air temperature of the catchment area of the lagoon were collected from the Department of Meteorology.

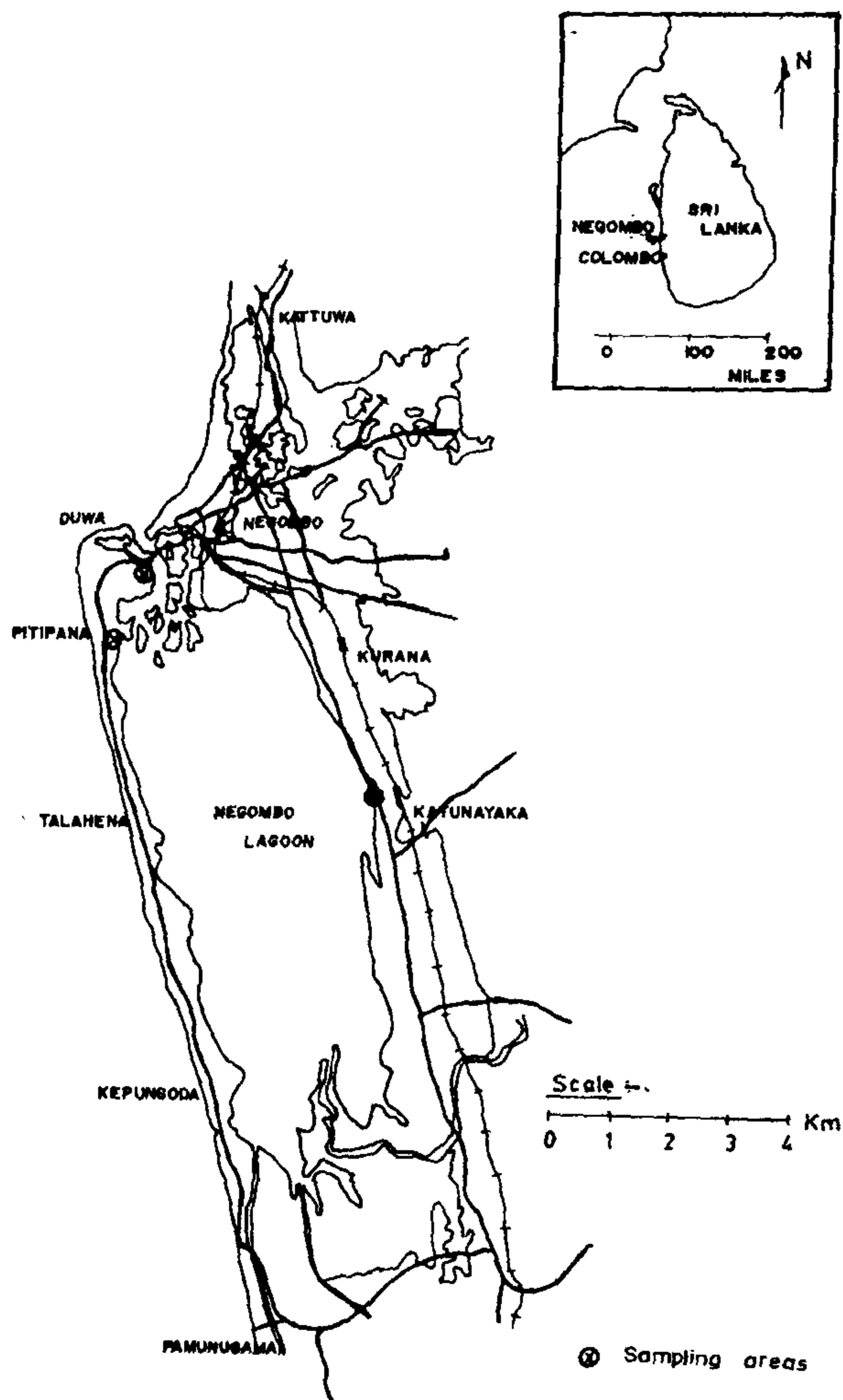


Fig.1 - STUDY AREA

RESULTS

Monthly variation in rainfall and maximum minimum air temperatures are given in Fig. 2 while Fig. 3 give the variation in salinity, pH and turbidity during the period of study.

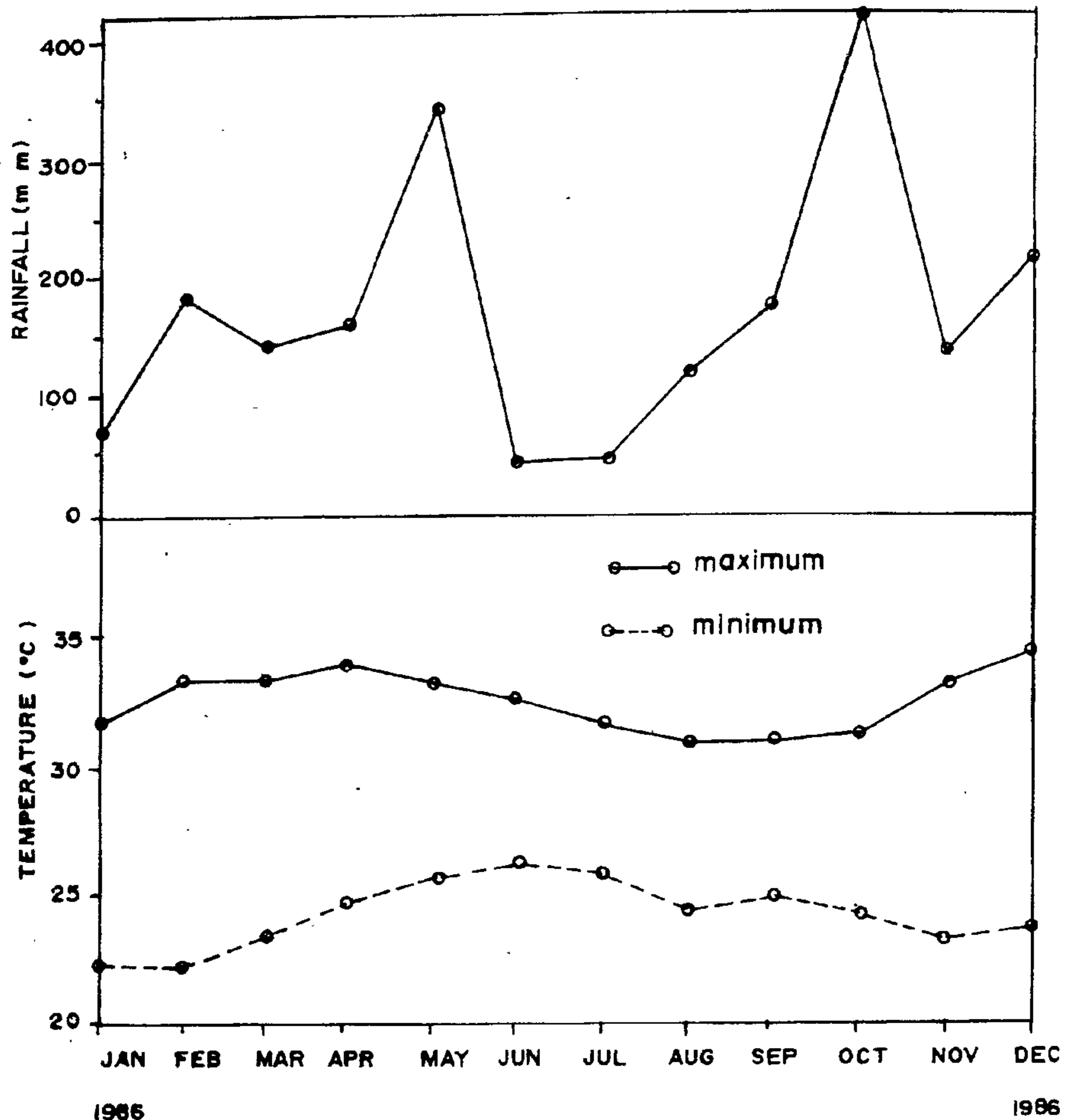


Fig: 2 Variations in rainfall and air temperatures from January to December 1986 on the catchment area of the Negombo lagoon.

As is typical of the Wet Zone Negombo estuary receives some rainfall through out the year. Rainfall was relatively high during the months of February, April, May, September, October, November and December. January, June and July were relatively dry months. Maximum and minimum air temperatures did not fluctuate very widely. The maximum air temperature fluctuated between 30°C and 34 °C while minimum air temperature varied between 22°C and 26°C.

The salinity recorded at the lower reaches of the Negombo estuary varied from 20 to 30.5ppt. Months of June, July and October showed relatively high salinities. The turbidity values fluctuated between 3 NTU to 10. During the months of January, May September, October and November The waters were highly turbid . The variation in pH was from 6.5 to 8.0, and the latter part of the year showed relatively higher values for pH during the sampling period.

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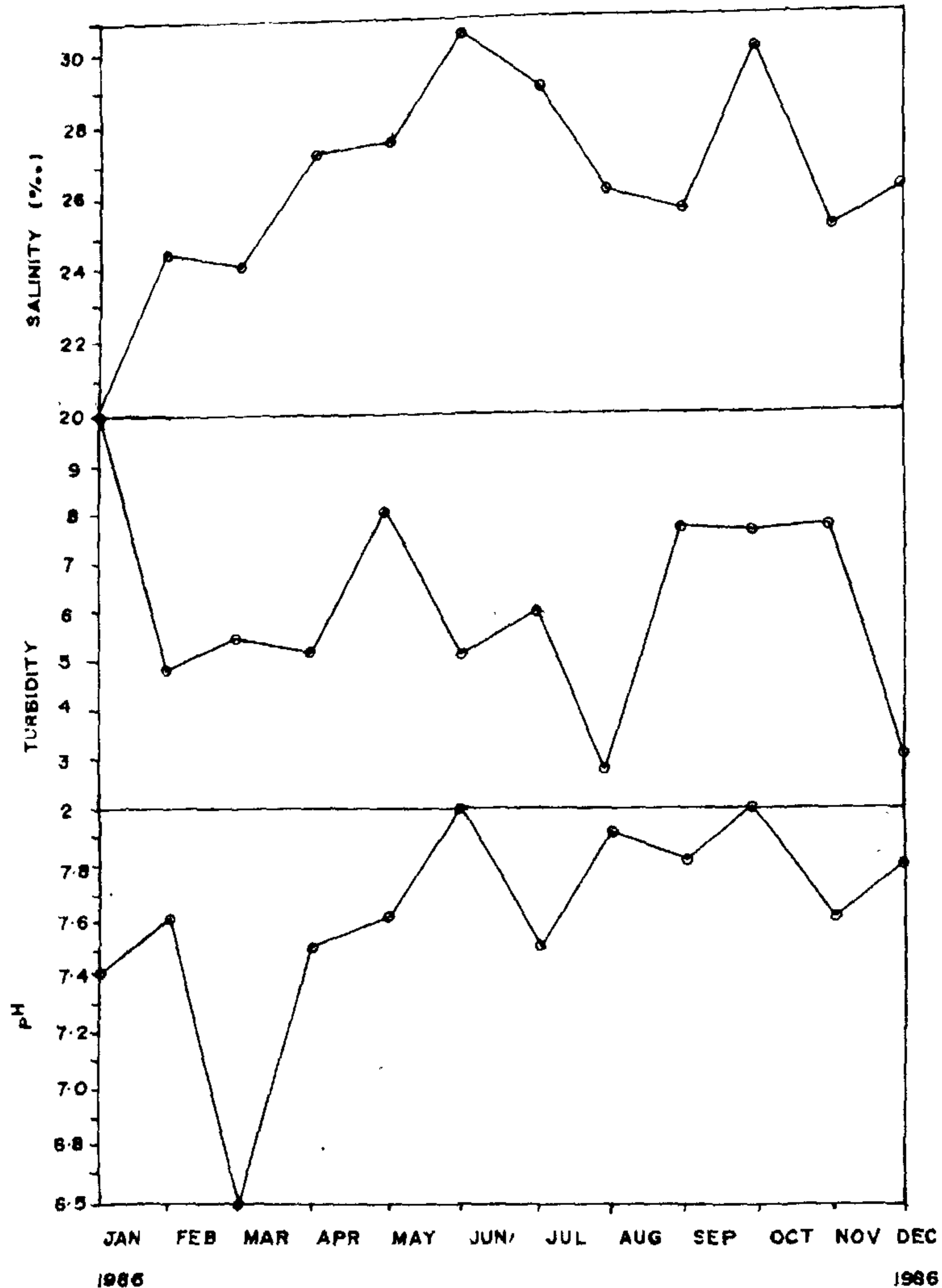


Fig. 3 Variation in salinity, turbidity and pH in the lower reaches of the Negombo lagoon from January to December 1986.

Fig. 4 presents the monthly variation in number of shrimp juveniles of *P. semisulcatus* and *P. indicus/ P. merguensis* per stake seine net during the period from January to December 1986. The number of shrimp juveniles of *P. indicus/ P. merguensis* were high during the months of June, November and December. The fluctuations in *P. semisulcatus* were relatively low during the sampling period.

The months of November and December showed the peak values for *M. dobsoni* juveniles in the stake seine net samples (Fig. 5). The other months of the year did not show considerable variation in *M. dobsoni*.

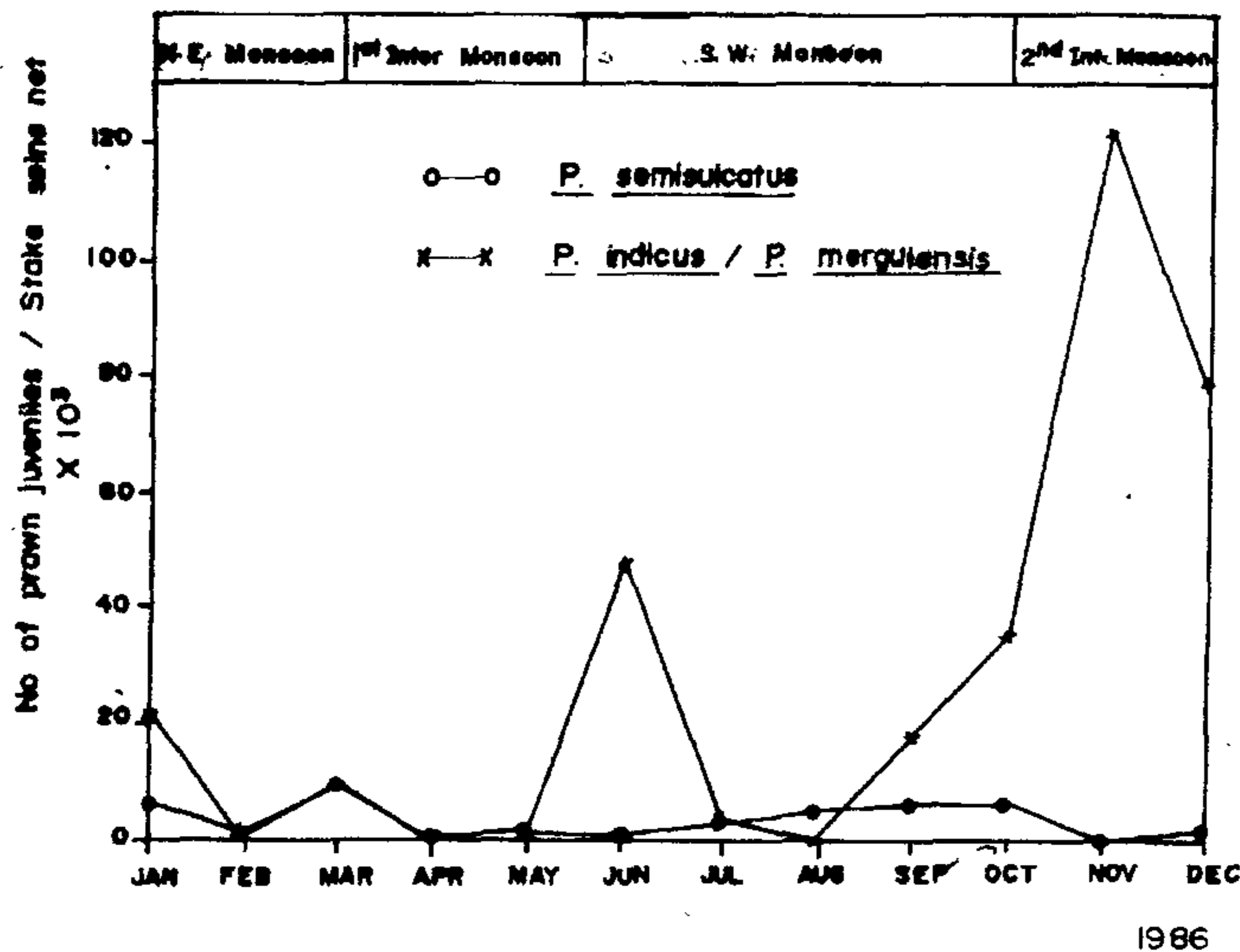


Fig: 4 Seasonal variation in number of Shrimp juveniles of *P. semisulcatus*, *P. indicus* / *P. merguensis* / stake seine net from January to December 1986

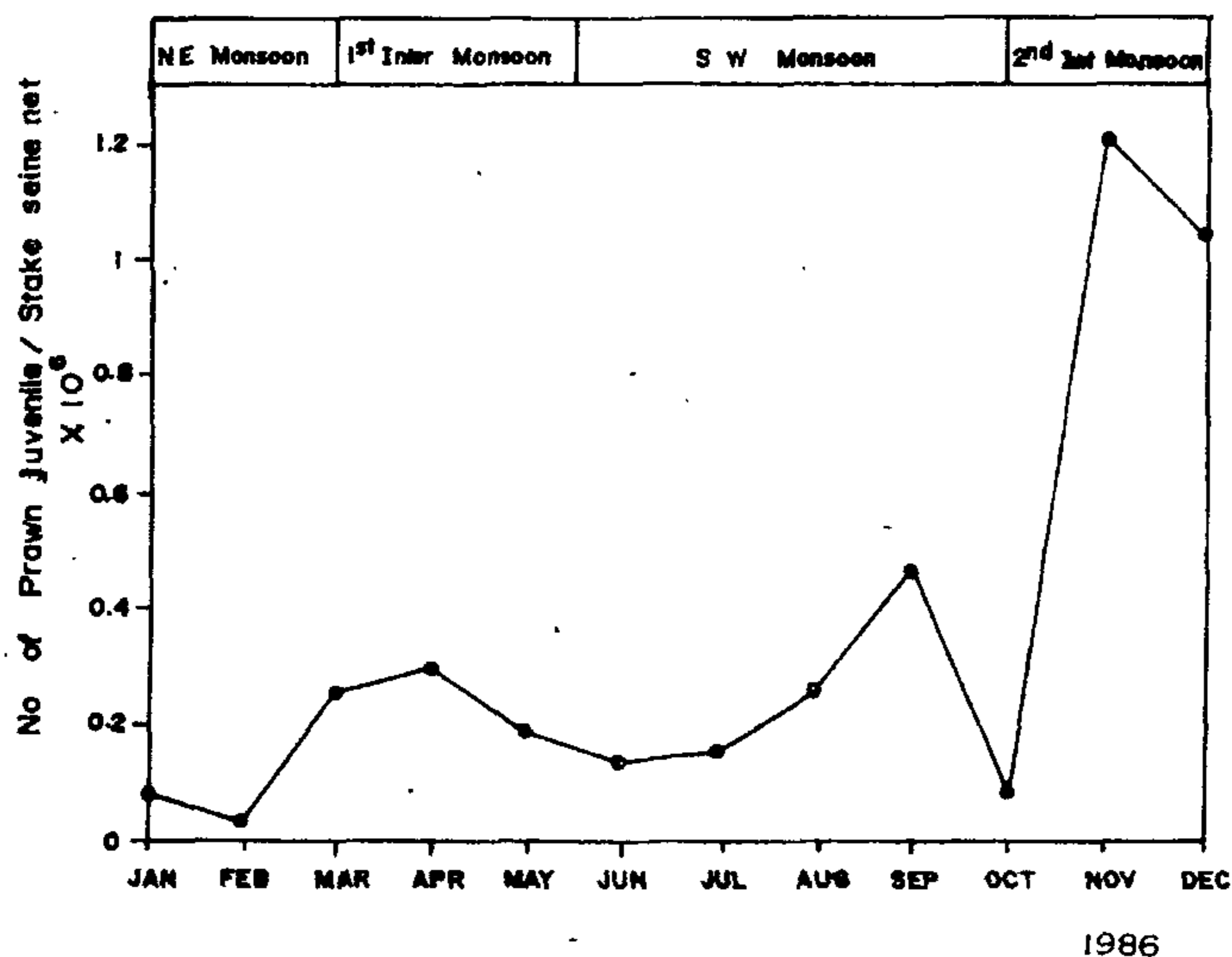


Fig : 5 Seasonal variation in number of prawn juveniles of *M. dobsoni* in stake seine net from January to December 1986

DISCUSSION

Stakeseine net fishery is a passive fishery practiced traditionally by the fishing communities of the Negombo estuary. The operation of stakeseine is done during the night time. The net is placed just before the low tide and the shrimps and fish caught in nets are collected at the beginning of the high tide. This method can be considered as the major method for catching shrimps in the Negombo lagoon. The shrimps which get caught in these nets are the migrating shrimps from the estuary to the sea. The sizes in this study considered as juveniles are given in the table 1. These sizes are ideal for a short growing period (about two months).

Table 1: **The lengths of the shrimps considered as juveniles.**

Species	Size range (mm)*
<i>P.indicus/P.merguensis</i>	20 to 92
<i>P.semisulcatus</i>	15 to 100
<i>M.dobsoni</i>	20 to 50

* modified from Subramaniam et al (1979)

There was a considerable monthly variation in rainfall during the sampling period. As it is typical of Wet Zone, two relatively dry periods were found in between two relatively wet weather periods. The annual variations in air temperature were relatively low. The fluctuations in salinity were from 20‰ to 30.5‰ and showed some relationship with the rainfall during certain months of the sampling period. High turbidity periods coincided with the periods of high rainfall except for the month of January.

The relative abundance of the juveniles of *M.dobsoni* is significantly higher than that of the *P.semisulcatus* and *P.indicus/P.merguensis* throughout the sampling period. Considering the main seasons of the year, the abundance of most culturable species of juveniles are very high during the 2nd inter monsoonal period. The abundance of juveniles during the North East monsoonal period is low for *M.dobsoni*.

The abundance of *M.dobsoni* juveniles showed a negative correlation with salinity ($r = -0.13$), while the abundance of *P.semisulcatus* showed a positive correlation with salinity ($r = 0.34$). The abundance of *P.indicus/P.merguensis* did not show a correlation with salinity.

Juveniles occurring in stakeleine fishery are ideal for short grow-out periods of about two months in pond culture. The estimated total numbers of juveniles (Table 2) suggest the possibility of establishing such culture practices based on the juveniles of the *M.dobsoni* where the juveniles are available throughout in considerable numbers. Although the species *P.indicus/P.merguensis* are well accepted species for shrimp culture, juveniles are available during only the latter part of the year in considerable number. The juvenile resources of *P.semisulcatus* are not sufficient to establish an aquaculture industry based on naturally occurring juveniles in the Negombo estuary.

Table 2: **The estimated total numbers of juveniles of *P.semisulcatus*, *P.indicus/P.merguensis* and *M.dobsoni* in stakeleine net samples.**

Total numbers of Juveniles(millions)			
month	<i>P.semisulcatus</i>	<i>P.indicus/ P.merguensis</i>	<i>M.dobsoni</i>
JAN 1986	245	.868	3.218
FEB	*	*	1.180
MAR	.368	.347	10.191
APR	*	*	11.800
MAY	*	.069	7.509
JUN	*	1.910	5.364
JUL	.122	.174	6.169
AUG	.184	*	10.191
SEP	.246	.695	18.773
OCT	.246	1.389	3.218
NOV	*	4.861	48.275
DEC 1986	*	3.125	41.838

* less than 0.1 million

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