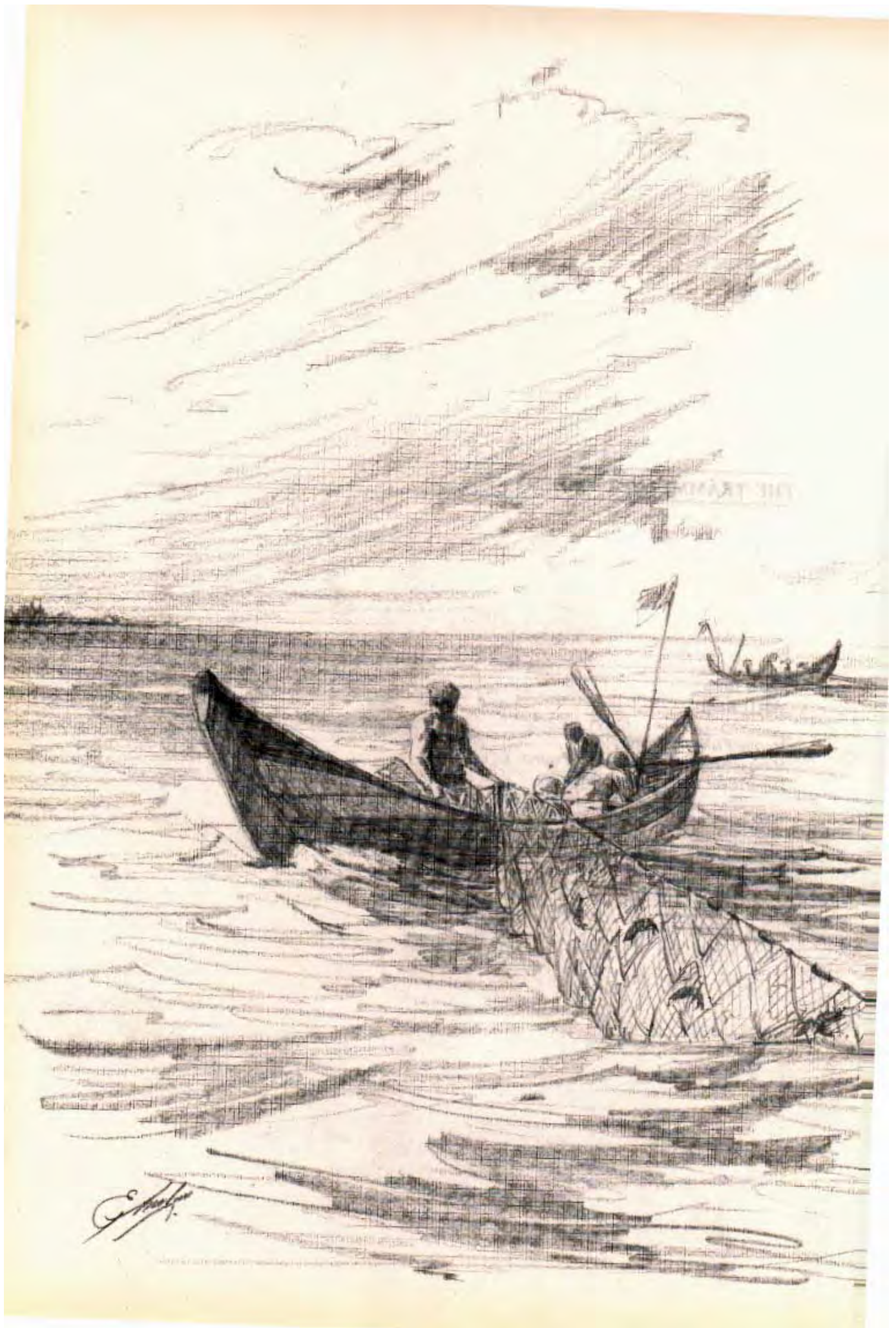


THE TRAMMELNET FISHERY

by

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25. INTRODUCTION

The trammelnet, perhaps about 100 years old in the Mediterranean Sea, was introduced in the Bay of Bengal region about a decade ago, spreading from Thailand to Malaysia, Indonesia, Sri Lanka and India in one direction and through Myanmar to the southeast coast of Bangladesh in late 1982. In Sri Lanka, this fishery is well developed and it has now spread to India. A boat development project in Kerala recently urged fishermen to pay greater attention to trammelnets, because of their high earning capacity. Though this net has long been operated in the Mediterranean for flatfish fishing, it is more popularly used for shrimping in the shallow waters of the Bay of Bengal.

Due to the effectiveness of the gear and its operation, as well on account of its profitability, the fishermen of the Teknaf coast of Bangladesh became interested in trammelnetting and began to buy gear from Myanmar fishermen. The fishery, thus, spread upto the Maikhali Island coast. Reliable information on the number of units in operation, the fishing effort and production etc. of this fishery are not available, except for some preliminary observations by Islam *et al.* (1987, 1988) and Khan and Rahman (1990). Islam (1991) also carried out a year-long study in 1988-89 on the trammelnet fishery in Bangladesh.

A study of the trammelnet fishery along the southeast coast of Bangladesh was carried out between November 1989 and October 1990. Fishing effort, size and composition of selected species of shrimp and finfish caught, and an estimate of the annual production from this fishery are presented in this paper.

The study was undertaken as a supplementary activity with very limited time allocation. As such, the results are of a preliminary nature.

26. METHODS

26.1 *Census*

An enumeration of the number of trammelnets in use and their distribution at landing points between Teknaf and Chittagong was made in February 1991 (Figure 29, see overleaf).

26.2 *Sampling programme*

Biological sampling of the catch by trammelnets was conducted once a month, at the Maikhali landing centre at Teknaf, for catch rate, catch composition and length frequencies of the four major shrimp species, and size ranges of other penaeid shrimp, spiny lobster and 13 finfish species. Information regarding economic aspects of the fishery was collected with the help of specially prepared questionnaires used while interviewing the fishermen.

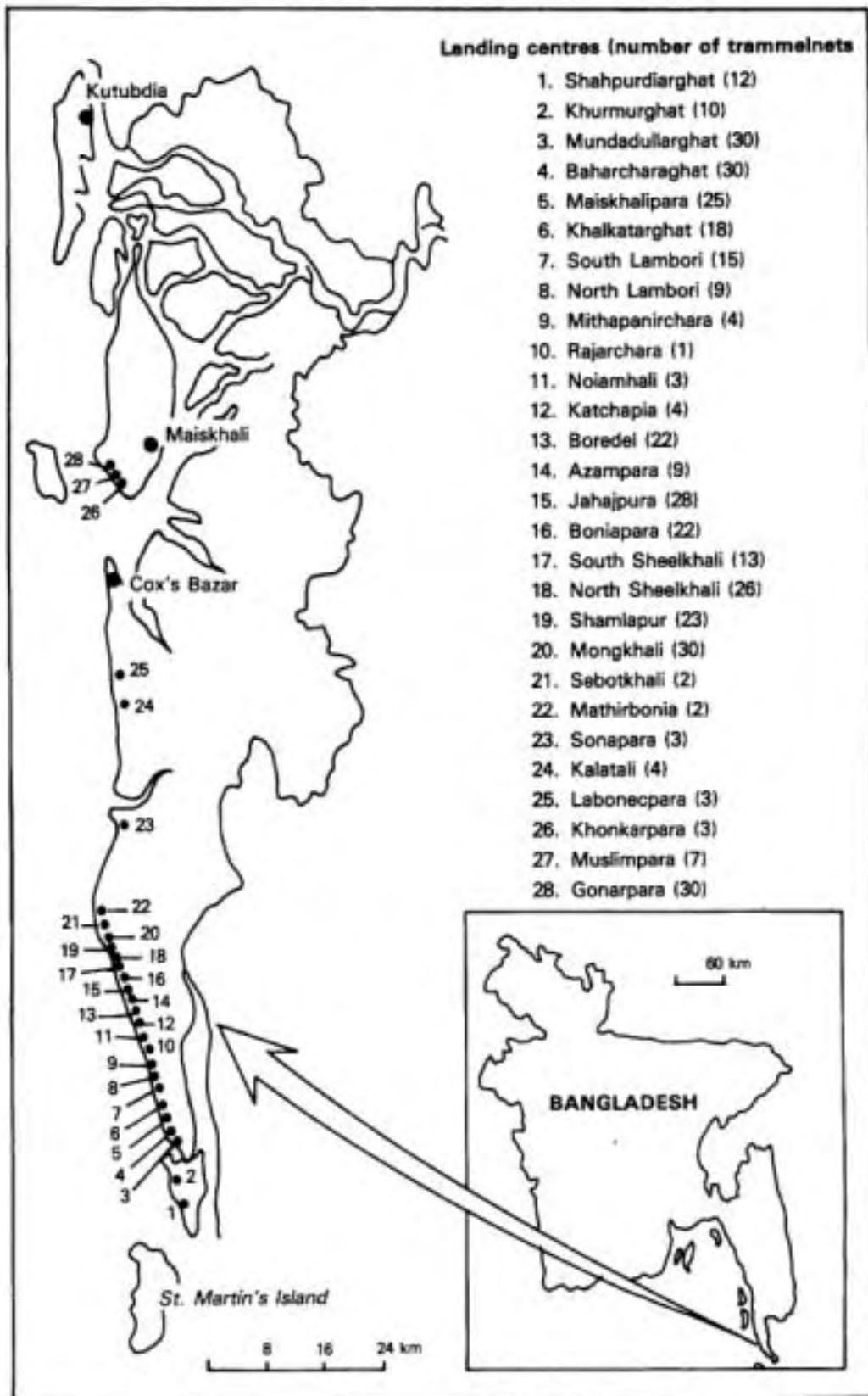
Biological sampling began in November 1989 and continued till October 1990 (except in February 1990), following the lunar calendar and the set bagnet fishery survey schedule. There was no fishing on the scheduled sampling days in April, May and June, due to rough weather conditions. Fishermen also avoided fishing in October, because of low catch rate.

26.3 *Estimation of production*

Annual production was estimated from the data on average catch rate (kg/boat/day), average number of nets operated per day in each month, number of active fishing days in each month and number of active fishing months in a year. This information was collected through questionnaires used while interviewing the fishermen during the catch-sampling visits.

See catch composition. Section 3.5

Fig 29. Landing centres of the trammelnet fishery in Bangladesh



26.4 Identification of species

For identification of shrimp and finfish, Dall (1956), Day (1989), Fisher and Bianchi (1984) and George (1969) were consulted.

26.5 Cost and earnings estimation

Information on fixed and variable costs, prices of shrimp and fish caught by trammelnets, the profit-sharing system marketing channels etc. was collected by interviewing the trammelnet fishermen during the monthly catch-sampling field visits. Questionnaires were again used.

27. RESULTS

27.1 The fishing gear

The trammelnet has been described in Khan and Rahman (1990). The special feature of this gillnet is that it has three panels attached to the same head and groundropes. The two outer panels have large meshes (150-265 mm) while the inner or middle panel has small meshes (40-45 mm). The height of the outer panels is 1.8 m, while the inner panel has a height of 2.25 m and, therefore, hangs with a considerable slack. When a fish pushes through the inner small-mesh panel, it is easily entangled in a bag formed with the help of the outer panels.

The outer panels are made with twine of size 210 d 6 while the inner panel is of twine of size 210 d 2. The groundrope of the net contains lead sinkers of 5mm diameter, placed at an average interval of 20cm. The floats on the headrope are of 27mm diameter and are placed at an average interval of 65cm.

A complete trammelnet set generally consists of 16 to 25 pieces. The majority of the sets have 18-20 pieces. The length of each piece of net is around 28m and each net costs Tk 1000-1200. Locally made nets cost less. The average life of a trammelnet is 4-5 years, with periodic mending or partial replacement of panels.

27.2 The fishing craft

The trammelnet fishermen generally use 8-10 m long open wooden craft of the dinghy type, powered by oars and sail. Each boat normally has one trammelnet set. A crew of five or six fishermen row the boat. The prices of the boat vary between 1k 5000 and 1k 8000 and their average life is 8-10 years.

27.3 Fishing area and operation

In Bangladesh, the trammelnets are operated in the shallow coastal areas at depths of 8-20 m and about 3-20 km from the fishing base. The area of operation depends on seasonal conditions. The rocky bed of St. Martin's Island is close to most fishing areas of the Teknaf coast and the fishermen try to avoid the rocky bed as it damages their gear.

From the census carried out, it was estimated that 400 trammelnet sets were operating from 28 fishing centres between Teknaf and Maikhali Island (Figure 29). The fishermen sail out in the early morning and often return in the afternoon. Some fishermen from Maikhali Island conduct night fishing and return the next morning.

The trammelnets were mainly concentrated in the Teknaf region, where the fishing centres were also close to one another (see Figure 29). Only a few trammelnets were operated in Cox's Bazar and Maikhali.

27.4 Fishing effort

All 400 sets were not operated every day. The fishing pattern depended on tides, climatic conditions and season. The minimum number of boats operated trammelnets during the rainy season and the maximum number in winter when the sea was calm. Thus, the number of fishing days a month depended on both the catch rate and seasonal changes in sea conditions. The soaking time was 3-5 hours/day.

¹US \$ 1 = 32 Tk appx. (1991-92).

The fishermen operated trammelnets for about 140 days during seven active fishing months and the total trammelnet fishing effort was estimated to be around 34,300 boat-days/year. The maximum fishing effort was during January and the lowest in November.

27.5 Catch composition

Seven species of penaeid shrimp, one species of spiny lobster and 29 species/groups of finfish were found in the trammelnet catches during the sampling period. Shrimp, lobster and finfish comprised 2.4 per cent, 0.1 per cent and 97.5 per cent respectively in the annual catch composition, by weight. Demersal fish were more prominent in the catches than pelagic fish in all seasons and contributed to more than 76 per cent of the total catch during the study (Figure 30).

Among the shrimp, the Tiger Shrimp (*P. monodon*), Indian White Shrimp (*P.indicus*) and Brown Shrimp (*M. monoceros*) were the major species. Tiger

Shrimp and Indian White Shrimp contributed 0.4 per cent and 1.6 per cent respectively to the catch during the year.

Croakers (Sciaenidae) and Catfish (*Arius* spp.) were the predominant species groups, more than 21 per cent each, whereas Bombay Duck (*H. nehereus*) were 19.3 per cent of the catch. Sardine (*Clupeids*) and Anchovy (*Engraulids*) were 10 per cent and 2 per cent respectively. Bigeye Shad (*I. filigera*) and Smoothmouth Herring (*R. russeliana*) were the most predominant species among the clupeids, while Anchovy (*Thryssa* spp.) and Hairfin Anchovy (*Setipinna* spp.) were the major contributors of the Engraulid group. Hairtail or Ribbonfish (*L. savala*) were a bit more than 3.6 per cent, and Whiting (*Sillago*) were around 2 per cent, followed by Grunts (*Pomadys* spp.). Therapons (Theraponida), Threadfin (Polynemidae), Mackerel (Scombridae) and jack/trevally (Carangids) only occurred very sporadically.

27.6 Catch rate

The catch rate varied from a minimum of 19.2 kg/day/boat in November to a maximum of 90.5 kg/day/boat in December. The annual average was 51.14 kg (Figures 31c and d).

The catch rate of penaeid shrimp was maximum in December, 5.6 kg/boat/day, and minimum in April (0.1 kg). Indian White Shrimp was the predominant species, but Tiger Shrimp was noticeable in November (Figure 31a). Among the finfish species, Bombay Duck had a catch rate of 60 kg/day in August, followed by Croakers with 44 kg in December and 16 kg in January. Clupeids (Herrings/Sardines), followed with 15 kg and 14 kg in December and January. Catfish were predominant in March, April and December, with around 10-12 kg. Engraulids (Anchovy) were predominant from August to December (Figure 31b).

27.7 Production

The production from the trammelnet fishery for the year November 1989 - October 1990 was estimated at 1754 t for 34,288 boat-days (Figure 31d). As shrimp made up 2.3 per cent of the total catch, the annual landing of shrimp from this fishery was estimated as 41 t, of which Tiger and White Shrimp were an estimated 6 t and 27 t respectively.

Fig 30. Annual percentage species composition of trammelnet catch

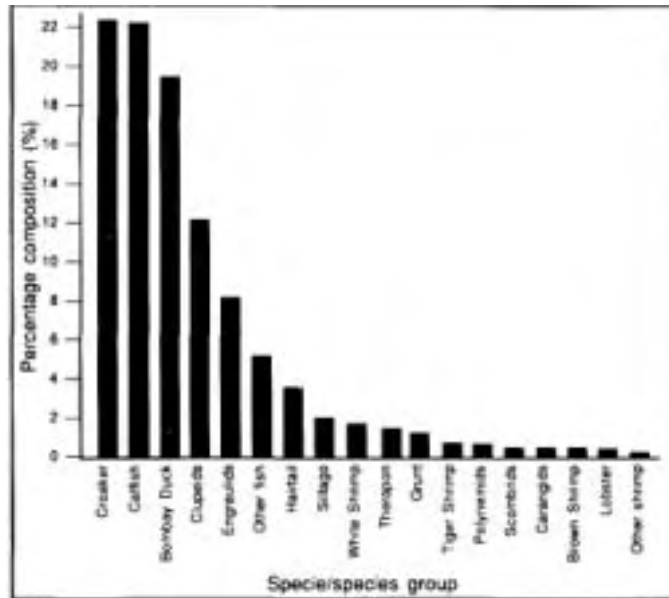
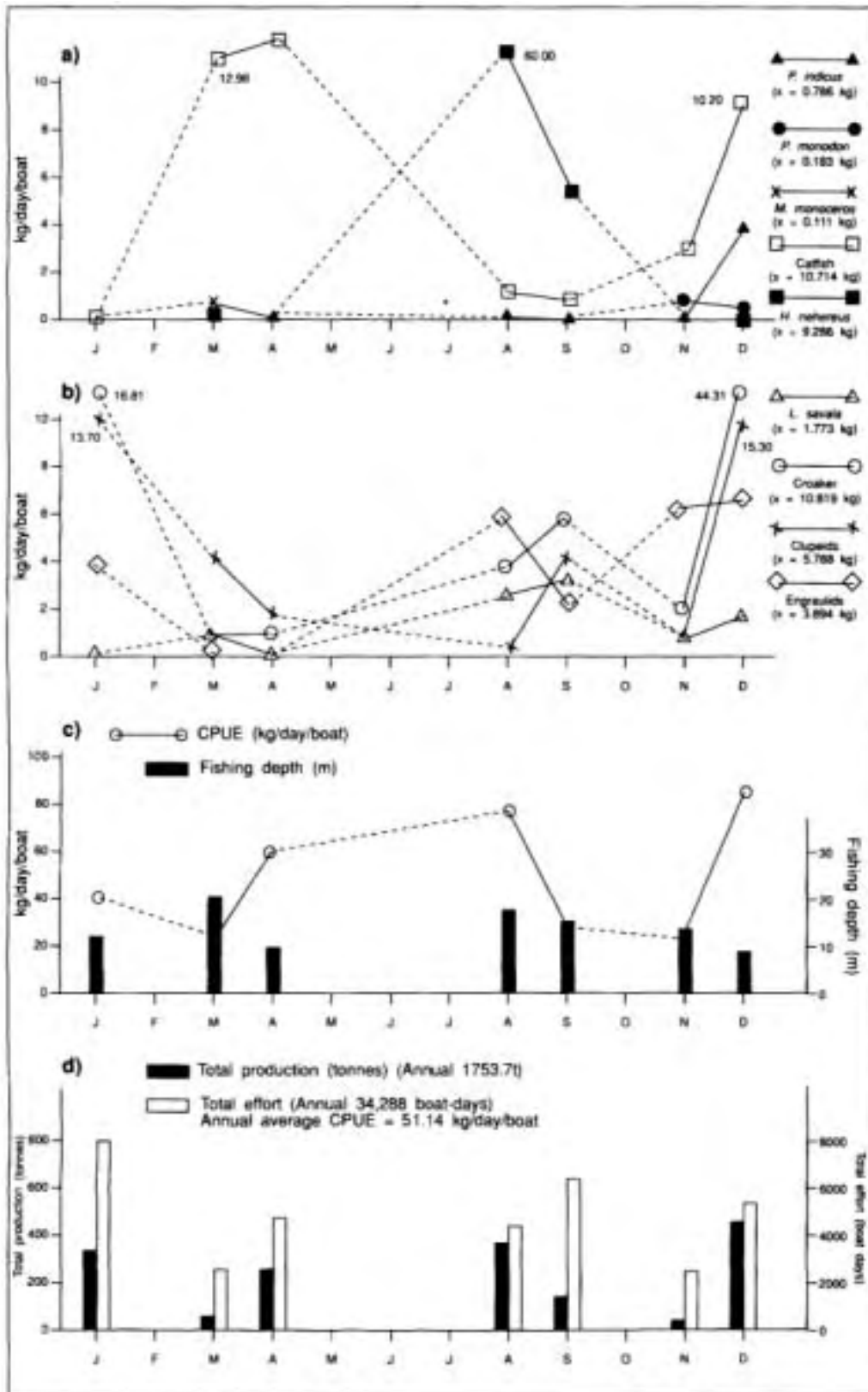


Fig 31. Monthly catch rates of shrimp and linfish species/species groups (a & b), catch rate and fishing depth (c) and total fishing effort and production (d)



27.8 Size composition

Size frequencies of shrimp and size ranges of finfish captured by trammelnet during the study are shown in Figures 32a and b.

Most shrimp and finfish were caught at sizes that were 40 per cent and more of their maximum lengths recorded in the region. Most of the shrimp caught in this fishery were in their preadult and adult stages.

27.9 Cost and earnings

SHARE SYSTEM

Most trammelnets and boats are owned by the better-off people of the fish landing localities. They are locally known as *bahardars*. The fishermen are paid on a share basis, after deducting incidental expenses, which are generally small amounts. If the owner is also a member of the crew, he gets an extra crew share. There were also a few cases of fishermen jointly owning a set or sets of gear and one or more supporting craft.

When the net revenue from the landed catch exceeds Tk 500, 50 per cent of it goes to the owner of the gear and craft and the remainder is divided equally among the fishermen. If the gross income is between Tk 200 and 500, then a fixed amount of Tk 200 is shared among the fishermen and the rest of the money goes to the owner. When gross revenue falls below Tk 200, all of it is distributed equally among the fishermen, without any payment to the owner. This is a traditional sharing system.

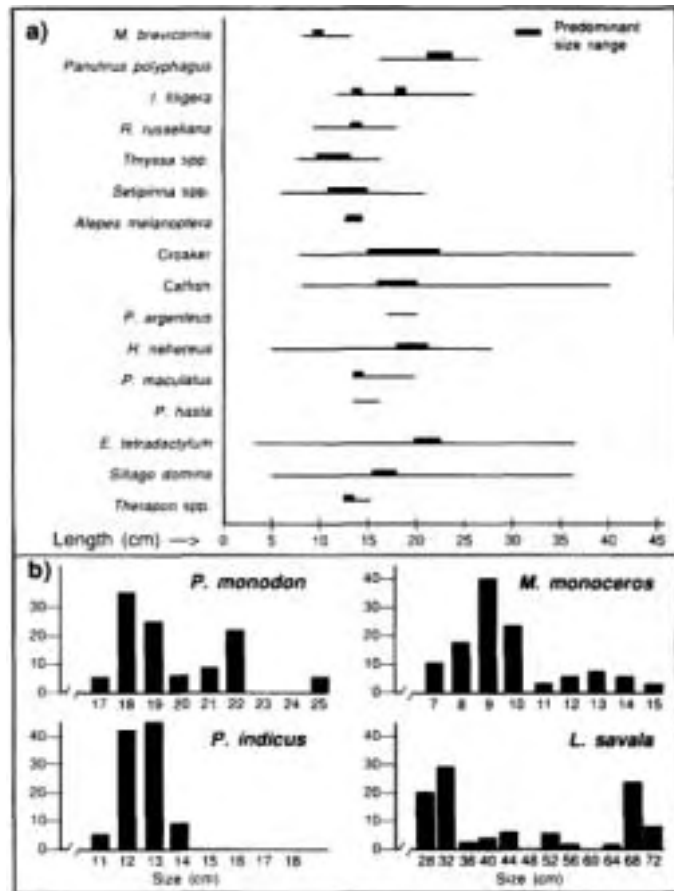
MARKETING

Catch is sold on a wholesale or retail basis to the middlemen at the landing centre. Middlemen sell the fish at local markets. Exportable shrimp are sometimes sold at a reasonable price to representatives of a freezing plant from whom the fishermen borrow money for capital and operational costs. Croakers also have a special demand from factories drying them for export.

COST AND EARNINGS ANALYSIS

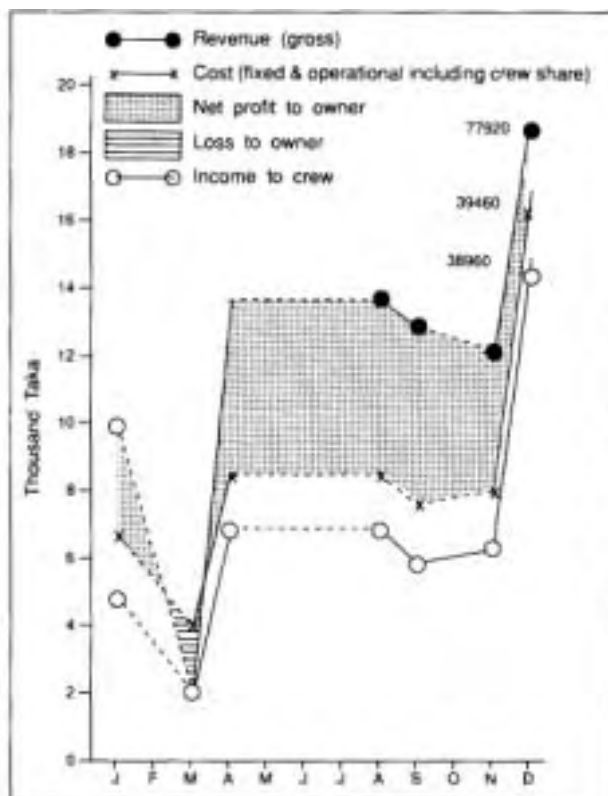
In most months, the *bahardars* earn a good income from this fishery, with maximum earnings in December and minimum in March. The gross income of a boat per day during the study varied from Tk 128 to Tk 3896, with the average gross revenue per boat per day being Tk 1036. The deductible expenses being very small, the net revenue would be almost equal to the gross revenue.

Fig 32. (a) Size ranges and predominant size ranges of major shrimp, lobster and finfish caught in the trammelnet fishery and (b) Size composition of *P. monodon*, *P. indicus*, *M. monoceros* and *L. savala*



The average annual gross earnings per boat was Tk 143,664 in seven fishing months and the annual income of the owner, after deducting the fixed costs (including depreciation, repair and maintenance cost of craft and gear – about Tk 9000) was Tk 59,437. The operational costs are generally incidentals such as tobacco and minor food items. During the period of the study, the trammelnet fishery was profitable in all months except in March, when there was a loss due to a decline in the catch rates of the more valuable species (Figure 33).

Fig 33. Monthly cost and earnings analysis of trammelnet fishery



28. DISCUSSION

The catch composition of the present study is somewhat similar to that of the earlier studies by Islam *et al.* (1987) and Islam (1991). Catch rates of White Shrimp (*P. indicus*), Croaker, Catfish and Bombay

Duck were higher in the earlier studies. Islam *et al.* (1987) observed the catch rate of Banana Shrimp (*P. merguensis*) in the October 1987 trammelnet catch to be 0.4 kg/boat/day (0.3 per cent), with a size range of 14-17 cm and a predominant size class of 14-15 cm. During the 1988/89 survey, the catch rates for this species was 0.03 kg/boat/day (0.1 per cent) in September and 0.7 kg/boat/day (1.6 per cent) in November, with a size range of 10-15 cm and a predominant size class of 13-14 cm. However, during the present study, this species did not occur in the trammelnet catches. It must also be mentioned that Banana Shrimp is one of the major species of penaeid shrimps in Myanmar waters (Price and Htin 1984).

Most shrimp and fish caught exhibited more or less similar size ranges and predominant size classes. They were mostly preadults and mature individuals. The penaeid shrimp caught by this gear were, on an average, fairly large in size and contained much less juveniles and immature individuals. It would appear that the trammelnet is a selective gear.

The number of fishing days and fishing months per year may vary from year to year, because of annual variations in weather and sea conditions. The production estimated during the year of study (1989-90) was 1754 t for 34,288 boat days (*i.e.* 51.1 kg/boat/day), whereas Islam (1991) estimated about 618 t for 19,720 boats/days/year in 1988/89 (31.3kg/boat/day). These figures indicate that both the effort and the catch per unit effort have increased, as only to be expected in a developing fishery. Khan and Rahman (1990) roughly estimated the annual production by the trammelnet fishery to be in the range of 27,000-36,000 t, assuming that 1500-2000 units of the gear are in operation for 270,000 to 360,000 boat days per annum. This over-estimation was based on information supplied by the fishermen during a few visits to the field.

It was learnt from the fishermen that there had been a rapid increase in the numbers of trammelnets over the last few years, but this rate of increase had somewhat reduced at present. This may be due to nonavailability of the gear, resulting from strong checks at the border between Bangladesh and Myanmar. It was also learnt that some trammelnets are made locally, but these are not popular.

29. CONCLUSION

The trammelnet, now operated by country boats, seems to be an efficient and economical gear for inshore capture fisheries.

Most catches are preadult and adults of selected species of shrimp and finfish. Hence this type of artisanal fishery does not seem to be destructive to the shrimp and fish stocks.

If motorized boats are used in this fishery, fishing may be extended to much deeper fishing grounds for better catches and revenue.

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