MINI PURSE SEINE FISHERIES IN NORTH JAVA COASTAL WATERS

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Abstract

The pelagic fish resources of Java Sea have been exploited since long time by many gears. Among which are purse seine, payang net (a kind of Danish seine), gill net and lift net. In particular, three fleets of purse seiners linked to the size of the seine, the boat and the fishing unit, share this resources. This paper presents the development of one of them. The topics discuss the fishing activities and catch composition.

Introduction

The North coast of Java waters is one of the most productive area of fish and a densely populated area in Indonesia. Its coastal line is about 1 100 km include Madura Island. This area is well known with the abundance of scads (*Decapterus russelli* and *D. macrosoma*) and mackerels (*Rastrelliger spp.*) (Martosubroto, 1982). The coastal pelagics resources have been intensively and fully exploited (Sujastani, 1978 ; Nurhakim *et al*, 1995). The gears that have been used to exploit the small pelagic stock are Danish seine, lift net, gill net and purse seine.

Since the trawl was banned in 1980 (Sardjono, 1980), purse seine fishery has had a significant role to support the increase of fish marine production in the Java ; more than 40% of total landing of the North of Java came from this fleet (Potier and Sadhotomo, 1995a). The seiners in the North coast of Java according to size of boat, engine power and their fishing grounds can be grouped into three classes, i.e. big, medium and mini purse seiner. The big and medium seiner have been discussed by Potier and Sadhotomo (1995a, b). The definition of a mini purse seiner (MPS) in this study is a wooden boat of the size ranging from 12 to 17 meters in length, powered with one or two out board engines of 25 - 30 HP, the size of the net is 200 - 250 meters in length and 40-60 meters in depth, the mesh size of bag net is usually 3/4 inch (Yusuf, 1978 ; Subani and Barus, 1988). Their fishing grounds are close to landing base and they go out for 1 to 4 days.

The aims of this study are attempting to give the information concerning the fishing activities and catch composition of mini purse seine in different fishing grounds and to recognize the fishing overlapping grounds scads.

Materials and method

More than fifty landing places are found along the North coast of Java (Fig. 1a). However, for the purpose of this study, we just selected two landing sites, i.e. Pekalongan and Sarang. The previous studies we carried out by Research Institute for Marine Fisheries by applying the procedure of the data collection introduced by Java Sea Pelagic Fishery Assessment Project for big and medium seiners. Collected statistical data are catch composition by commercial category in weight and price by fishing boats.

In Pekalongan, mini purse seine originally came from East Java and generally apply the light fishing without ***rumpon*** (fish aggregating device). Sarang is one the big landing site of mini purse seine where the fishermen usually use typical of ***rumpon***. The fishing of mini purse seine mostly take place in fishing grounds close to the North of Pekalongan and Rembang - Sarang waters that needs steaming time of 2 - 10 hours from landing place (Fig. 1b). The trip duration usually one day or more, most one night fishing.

In Pekalongan, 3 639 landing data were recorded between February and December 1994, and approximately 6 894 from January to December 1994 at Sarang.

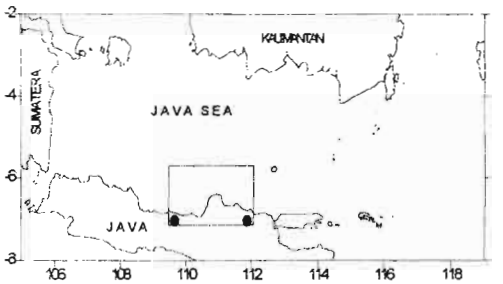

Fig. 1a. Map of fishing ground of mini purse seiners.

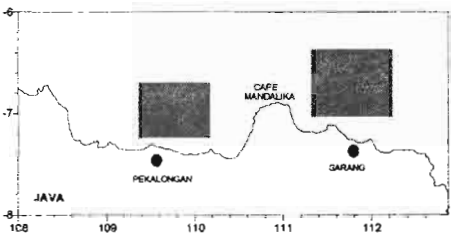

Fig. 1b. Two landing sites were selected for this study.

Results

Effort

The fishing operation of mini purse seine is seem to link with lunar calendar and fishing tactics. The fishing tactic can be classified into three groups :

1) searching and scouting school of fish, 2) light fishing without ***rumpon*** (fish aggregating device), 3) fishing with ***rumpon***. However, the fishermen usually use only one fishing tactic.

Searching and scouting school of fish is fishing tactic catching coastal tunas and mackerels. They are fishing during the day "at sight" when the fish shoals are near the surface. At night, they can catch some mackerels (*R. brachysoma*). The fishermen look for the luminescence coming from the shoals of this species (Potier and Petit, 1995).

The fishing unit of Pekalongan is carried out at night during periods of little or no moon, when the full moon (from 14th to 20th day of lunar calendar) the fishermen are not go to sea (Fig. 2a). In Sarang, the activity of fishing units were observed more regularly all lunar calendar. This is can be as a relation to the fishing tactics (Fig. 2b).

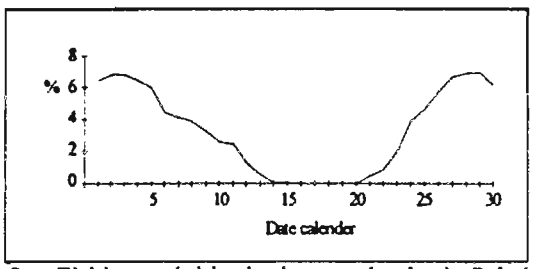

Fig. 2a . Fishing activities by lunar calendar in Pekalongan.

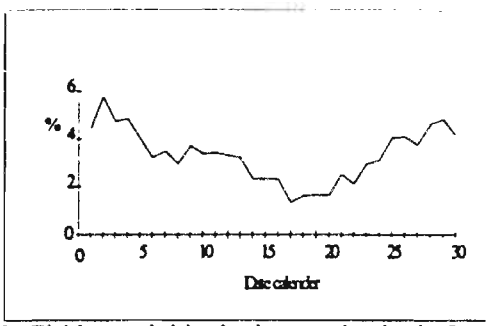

Fig. 2b. Fishing activities by lunar calendar in Sarang.

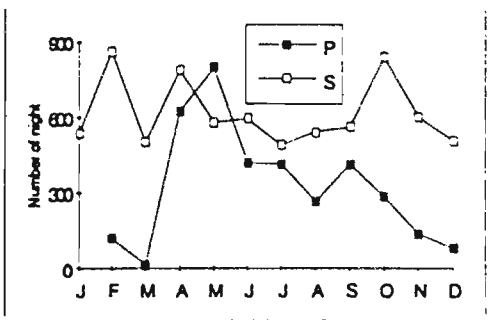

Fig. 3. Monthly fishing activities of mini purse seiners in Pekalongan (P) and Sarang (S).

The monthly number of boats using light fishing without ***rumpon*** showed great variation due to direct influence of monsoon, beside the tendency of fishermen came from East Java usually keep moving from place to place following fish migration. The peak of light fishing occurs from April to May, where as, the number of boats which land are not vary in every month (Fig. 3). Accordingly, fishing with ***rumpon*** is not affected by monsoon. The fishing area of those using ***rumpon*** is sheltered from West monsoon by cape Mandalika.

Catch composition

The main catch of mini purse seine is depicted in Table 1. Scads and indian mackerels (mainly *R. kanagurta*) were absent in catch of mini purse seiners whose fishing ground are close to the North coast of Pekalongan. The scads are the main species caught in Sarang during the northeast monsoon (August-December) almost all the boats catch on scads (*Decapterus spp.*) that reach 85-95 % from total boat landing, while sardines (*Sardinella spp.*) replace scads from March to July (Fig. 4). The CPUE of Sarang grounds was also higher than CPUE of Pekalongan grounds. It can be explained that scads enter the inshore waters close to Sarang in the northeast season and the shoals size much bigger than the others and CPUE as well.

Table 1. Catch composition of mini purse seine from Pekalongan (P) and Sarang (S) in year 1994

Common name	Scientific name	P (%)	S (%)
Scads	*Decapterus spp*	-	41.7
Indian mackerels	*R. kanagurta*	-	18.0
Indian mackerels	*R. brachyoma*	17.4	-
Sardines	*Sardinella spp*	23.8	15.2
Selar	*Selar spp.*	14.9	8.1
Rainbow sardines	*D. acuta*	1.0	
Spanish mackerel	*Scomberomorus spp*	3.1	2.1
Coastal tunas	*Auxis spp.*	10.4	12.9
Black pomfret	*Fornio niger*	5.0	1.0
Hairtail	*Trichiurus spp.*	12.7	
Squid		4.6	
Others		7.1	1.0
Total catch		1579 mt	7427 mt
Catch per night		0.5 mt.	1.1 mt

In Pekalongan, catch composition tend to be dominated by coastal pelagic species, coastal tunas, and semi demersal such as hairtail, black pomfret (in this study categories as "others"). Shift of these species caused to alter monthly catch composition (Fig. 5). On other hand, the catch composition of Sarang grounds between August and December was almost similar to those of big and Medium seiner where was operate d in the Java Sea, of which the fleets of big and medium were concentrated (Fig. 6).

The difference of catch composition both fishing grounds are possibly affected by different saline

waters, the Pekalongan grounds is more neritic and less saline, bottom sediment is mud, while Sarang grounds is clear waters and high saline, bottom sediment is sand and mud.

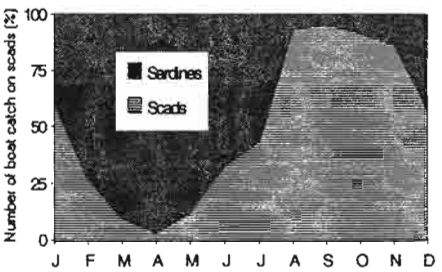

Fig. 4. Monthly percentage of number of boats catch on scads and sardines in Sarang.

In the period 1988-1994, the ratio of dominant small pelagic species to the total catch landed in Pekalonagan (657-1579 mt) between 46 and 56% consist of *S. gibbosa, R. brachysoma* and *Selar spp.* (Table 2). In Sarang, the period 1991-1994, the dominant small pelagic species contributed about 79-82% of total landings of 7433-8757 mt, which consisted of scads (30-53%), indian mackerels (13-21%), *Selar spp* (8- 16%), *Sardinella spp.* (10-18%), respectively (Table 3). Among the mackerels, *R. kanagurta* are captured in great quantity in Sarang, on the other hand *R. brachysoma* is rarely found.

Table 2. Catch composition by year in Pekalongan

Year	Indian mackerel	Sardines	Selar	Coastal tunas	Spanish mackerel	Black pomfret	Hartail
1987	11.0	18.0	19.8	7.1	1.3	9.0	2.3
1988	9.9	32.9	7.3	12.1	2.3	11.3	3.9
1989	8.4	43.1	5.0	6.3	3.7	10.9	2.1
1990	7.2	37.9	10.5	6.8	2.1	5.8	9.2
1991	13.9	19.1	16.6	11.9	3.5	11.7	7.7
1992	6.7	10.0	16.8	12.5	4.5	16.6	1.7
1993	0.6	25.4	24.0	8.8	2.8	8.7	0.1
1994	17.4	23.4	14.9	10.4	3.1	4.5	0.7

Table 3. Catch composition by year in Sarang

Year	Scads	Indian mackerel	Sardines	Selar	Coastal tunas	Spanish mackerel
1991	53.3	13.2	10.5	11.8	7.4	3.6
1992	30.1	20.7	13.5	15.6	9.4	10.6
1993	31.7	18.4	18.6	14.3	12.3	3.5
1994	41.7	17.9	15.2	8.1	12.9	2.1

The scads (*Decapterus spp.*) and mackerels (*R. kanagurta*) live in waters of salinities at least 34 per mil. They are caught during August - December when the oceanic waters enter the Java Sea (Hardenberg, 1938 ; Potier and Sadhotomo, 1995). Beck and Sudradjat (1978) reported that the higher catch rate of coastal species such as *R. brachysoma* and *D. acuta* occurred during the northwest monsoon when the salinity is lower. Hadisubroto (1975) reported that scads predominate the catch of purse seiner operated off the North of Tegal and Karimunjawa island waters during the southeast monsoon period. It appears to be a differential distribution between *R. brachysoma, S. gibbosa* in one hand and *R. kanagurta, Decapterus spp.* on the other hand, the latter being common in off-shore neritic waters. They are generally caught above the shelf where the fleet operating at further distance from land, i.e., higher salinity.

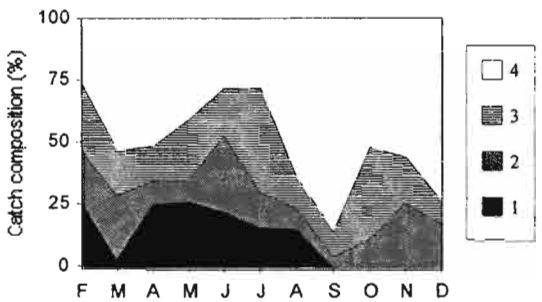

Fig. 5. Catch composition of mini purse seiners in Pekalongan, 1994 (1. *R. brachysoma*, 2. *Selar spp.*, 3. *Sardinella spp.*, 4. others).

Discussion

The hydrographic condition and characteristic of Java Sea are closely associated with the southeast and northwest monsoons. In the southeast monsoon, the high salinity (>34 per mil) enters Java Sea, and when the northwest monsoon, the salinity induced by river discharges and the low salinity waters from the South China Sea (Wyrtki, 1961 ; Durand and Petit, 1995). Additionally, win and rainfall strongly influence on activities of fisheries in the Java Sea (Potier and Boely, 1990). This condition was demonstrated by mini pourse seiners operated in the North coast of Pekalongan, when the peak northeast monsoon (December- February) the fishermen sometime have to stop fishing.

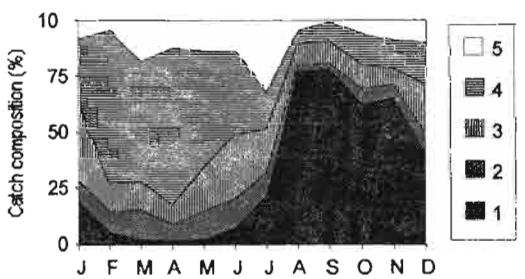

Fig. 6. Catch composition of MPS in Sarang, (1. *Decapterus spp.*, 2. *Selar spp.*, 3. *R. kanagurta*, 4. *Sardinella spp.*, 5. others).

We can notice that fish assemblage between fishing ground of the North coast of Pekalongan and coast of Sarang waters were different distribution pattern. The absence of scads from the North coast of Pekalongan waters indicates that the salinity is lower than coast of sarang waters. The difference of catch composition seems to reflect characteristics of the hydrographic condition rather than fishing tactic. So, the target species of mini purse seiners were varies according to fishing ground and monsoons. However, the scads were is easy caught whose fishermen used fish aggregating device. The dominant species composition caught by mini purse seine fleet depends on monsoon and fishing ground.

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