

with their feeding habits. The above analysis confirms that scattering layer recorded in the South China Sea is usually a concentrated zooplankton layer. The occurrence of scattering layer may be used to indicate either the depth where thermocline occurs or the vertical movement of zooplankton, the knowledge of which has important application to the development and exploitation of fisheries resources.

#### 4. ACKNOWLEDGEMENTS

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## CURRENT STATUS OF FISHERIES INCLUDING STATISTICS

SEAFDEC/SCS. 73: S-1

### Current Status of Fisheries Development in South China Sea Area

by

Tadashi Yamamoto

FAO Fishery Statistician

FAO Regional Office for Asia & Far East

#### Abstract

A brief review of current status of fisheries development in South China Sea is made based on fishery statistics currently available. The results are summarized as follows:

- (1) During the past decade the number of inboard powered boats operating in South China Sea area increased by 470%. Furthermore, a good number of fishing boats exceeding 100 gross tons have also appeared.
- (2) During the same period there appeared a massive explosion of trawl fishery in every country.
- (3) The present level of marine fishery production in the area is supposed to be some 4 million metric tons valued at about US\$800 million. Although numerous fisheries exist trawl, purse seine and drift gill net fisheries have played a leading role and these three fisheries alone produced 55% of the total marine catch in the area.

#### 1. INTRODUCTION

The present paper briefly reviews the current status of fisheries development in South China Sea area with a hope that it could serve, to some extent, as a background paper to the Technical Seminar on South China Sea Fisheries Resources. However, the author admits that due to scarcity and unreliability of national fisheries data currently available various reviews made in the paper are

undoubtedly not conclusive.

Owing to the nature of the seminar various reviews made in the present paper are referred to marine fisheries in South China Sea and those in Malacca Strait and the southern half of Formosa Strait.

#### 2. ENLARGEMENT OF FISHING FLEET DURING THE PAST DECADE

Fishing boats in the area under study are broadly classified into three categories, i.e. (1) Non-powered boat, (2) Outboard powered boat and (3) Inboard powered boat. Table 1 shows how the number of fishing boats for each of those categories has been changed during the past decade.

Although nothing can be clearly mentioned due to the incompleteness of data comparable among countries, the structural change of fishing fleet in the area can be summarized as follows:

- (1) As for non-powered boat and outboard powered boat there is a clear sign that the number of these boats is decreasing although the tempo is rather slow. Whereas, as for inboard powered boat a marked increase of such boats is noted. As a matter of fact, during the past decade the number of non-powered boats increased by 22%, whereas that of inboard powered boat increased by 470%.
- (2) However, an increasing rate of the number of inboard powered boat differs among countries.

Table I. Number of Fishing Boats in 1960, 1965 and 1970

	Non-Powered			Outboard Powered			Inboard Powered		
	1960	1965	1970	1960	1965	1970	1960	1965	1970
Total <sup>1/</sup>	67,135	63,148	52,533				14,766	31,911	69,717
China (Taiwan) <sup>1/</sup>	5,917	4,871	3,480	—	—	—	5,541	8,167	10,515
Hong Kong	6,969 <sup>2/</sup>	2,503	...	—	—	—	2,353 <sup>2/</sup>	6,097	...
Philippines <sup>3/</sup>	261	327	223	—	—	—	1,238	2,066	2,061
Vietnam <sup>4/</sup>	37,477	46,240	42,612	...	...	...	2,684 <sup>4/</sup>	12,240 <sup>4/</sup>	42,603 <sup>4/</sup>
Khmer <sup>5/</sup>	18,908	19,200	...	70	250	...	135 <sup>2/</sup>	1,100	...
Thailand	...	16,584	8,313	...	...	10,448	...	...	8,760
W. Malaysia	14,608	10,182	5,277	3,938	3,908	2,164	5,002	8,374	12,865
Sarawak	...	...	1,572	—	—	881	...	...	1,003
Sabah	6,813	440	300	—	2,000	2,320	141	875	1,400
Singapore	2,059 <sup>2/</sup>	1,088	361	620 <sup>2/</sup>	434	298	160 <sup>2/</sup>	189	273
Sumatra <sup>6/</sup>	...	...	35,352	...	...	...	...	...	3,974

<sup>1/</sup> Only a sum of China (Taiwan), Philippines, Vietnam, W. Malaysia, Sabah & Singapore.

<sup>1/</sup> No. of fishing boats for Taiwan as a whole.

<sup>2/</sup> 1958 figures.

<sup>3/</sup> Only No. of commercial fishing vessels exceeding 3 gross tons.

<sup>4/</sup> Includes No. of outboard powered boats.

<sup>5/</sup> Includes No. of fishing boats in inland waters.

<sup>6/</sup> No. of fishing boats based in Sumatra.

— Not available.

... Available, but the figure is not available.

Table II. Number of Trawlers in Around 1971

Country or State	Type of trawlers	Total	Number of Trawlers by Tonnage Class					Year referred
			Less than 10GT	10-20	20-30	30-50	50 & over	
China (Taiwan)	Otter	1,506	703	340	—	463	—	1970
	(Pair)	195	—	—	—	—	195 <sup>1/</sup>	1970
Hong Kong <sup>2/</sup>	(Otter (Stern))	60	—	—	—	—	60	1972
	(Pair (Modern))	140	—	—	—	—	140	1972
	(Pair (Native))	180	—	—	—	—	180	1972
Philippines <sup>3/</sup>	Otter	653	14	68	90	163	318	1970
Vietnam <sup>4/</sup>	Pair	Ca. 3,000	...	...	—	Ca. 3,000	—	1972
Khmer	Otter	219	33	166	15	5	—	1972
Thailand <sup>5/</sup>	(Otter)	2,401	...	...	843	1,056	502	1971
	(Pair)	530	—	—	216	314	—	1971
W. Malaysia <sup>4/</sup>	Otter	4,272	—	Ca. 3,600	—	Ca. 600	—	1971
Sarawak	Otter	400	—	...	...	...	...	1972
Sabah	Otter	294	—	...	...	...	...	1971
Singapore	Otter	118	—	...	...	...	...	1970
Sumatra	Otter	Ca. 200	—	...	—	Ca. 200	—	1972
Total		14,168						

<sup>1/</sup> Out of 195 trawlers 152 were 100 G.T. and over.

<sup>2/</sup> Exclude shrimp trawlers in shallow waters.

<sup>3/</sup> No. of baby trawlers is excluded.

<sup>4/</sup> No. of baby trawlers is included.

— Not available.

... Available, but the figure is not available.

a. Countries or states where a marked increase of inboard powered boat was achieved were: China (Taiwan), Hong Kong, Vietnam, West Malaysia and Sabah.

b. Countries or states where an increase of inboard powered boat was moderate were: Philippines, Sarawak and Singapore.

c. Countries or states where an increase of

inboard powered boat was rather slow were: Sumatra and Khmer.

(3) During the past decade fishing capacity in South China Sea area has increased not only in terms of the number of inboard powered boats but also in terms of the size of fishing boats, although statistical data that clearly indicates such a trend are not available. For example, the size of some

trawlers in China (Taiwan) and Thailand has exceeded 100 gross tons. Average size of trawlers in Vietnam which was less than 10 gross tons in around 1960 has now become 20 gross tons.

### 3. MASSIVE EXPLOSION OF TRAWL FISHERIES IN RECENT YEARS

As seen below, the historical development of trawl fisheries in South China Sea area is still young.

Nevertheless, as seen in Table 2 a massive explosion of trawl fisheries is noted in every country, the total number of trawlers in the area as a whole being 14,000. It must be stressed that this is really a notable fact in the history of fisheries development in South China Sea area.

The author does not have enough time to describe how the trawl fishery was developed in each area. However, he may illustrate some particular features of trawl fisheries in each country or state during the course of the Seminar.

Country or State	Approximate Year when Trawl Fishery Appeared
China (Taiwan)	before 1960
Hong Kong	before 1960
Philippines	before 1960
Vietnam	1955
Khmer	1970
Thailand	1960
W. Malaysia	1965
Sarawak	1968
Sabah	1962
Singapore	1965
Sumatra	1967

Table III. Total Marine Catch by Countries or States and by Major Type of Fisheries  
— South China Sea —

	Total	Important Fisheries throughout Countries				Locally Important Fisheries			Other Fisheries	Year referred	
		Sub-total	Trawls	Purse Seine	Drift net <sup>5/</sup>						
Total	3,750.0 (100)	2,091.4 (55)	1,545.6 (41)	314.3 (8)	231.5 (6)		487.5 (13)		1,171.1 (32)		
China (Taiwan) <sup>1/</sup>	225.4 (100)	122.2 (54)	112.8 (50)	4.4 (2)	5.0 (2)				103.2 (46)	1970	
Hong Kong	73.8 (100)	58.2 (79)	48.0 (65)	4.5 (6)	5.7 (8)	Longline	10.4 (14)		5.2 (7)	1971	
Philippines	892.4 (100)	222.7 (15)	135.6 (15)	86.7 (10)	0.4 (0)	Bag Nets (Lift net)	125.5 (14)	Moro-Ami (2)	16.8 (2)	527.4 (69)	1970
Vietnam <sup>2/</sup>	516.4 (100)	387.3 (75)	258.2 (50)	51.6 (10)	77.5 (15)				129.1 (25)	1970	
Khmer <sup>3/</sup>	39.4 (100)	31.5 (80)	27.2 (69)	3.5 (9)	0.8 (2)				7.9 (20)	1971	
Thailand	1,246.2 (100)	799.3 (64)	658.9 (53)	75.1 (6)	65.3 (5)	Sea Mussel collecting	288.8 (23)		158.1 (13)	1971	
West Malaysia	317.9 (100)	219.5 (69)	112.2 (35)	88.5 (28)	18.8 (6)	Bag Nets (stow net)	26.0 (8)	Lift Nets (6)	15.7 (6)	56.7 (17)	1971
Sarawak <sup>4/</sup>	25.5 (100)	19.8 (77)	12.8 (50)	—	7.0 (27)				5.7 (23)	1971	
Sabah <sup>4/</sup>	57.8 (100)	38.1 (67)	38.1 (67)	—	...				19.7 (33)	1971	
Brunei	1.9 (100)	...	...	...	...						
Singapore	15.2 (100)	5.8 (38)	5.8 (38)	—	—	Trolling	4.3 (28)		5.1 (34)	1971	
Sumatra <sup>2/</sup>	340.0 (100)	187.0 (55)	136.0 (40)	—	51.0 (15)				153.0 (45)	1970	

Units: 1,000 metric tons; figures in parenthesis are % against the national total catch.

<sup>1/</sup> Only catches which were supposed to be caught in South China Sea and Formosa Strait are given.

<sup>2/</sup> Catch by types of fisheries is approximation made by the author.

<sup>3/</sup> Total catch of 39.4 thousand metric tons includes an estimate of 7.9 thousand metric tons which is supposed to be caught by subsistence fisheries.

<sup>4/</sup> Trawl's catch officially disclosed does not include trash fish.

To make trawl's catch comparable among countries the quantity of trash fish estimated is included.

<sup>5/</sup> Only catches which were supposed to be caught in Malacca Strait are given.

<sup>6/</sup> Drift net includes both Spanish mackerel and Indo-Pacific mackerel (Rastrelliger) drift nets.

<sup>7/</sup> The types of locally important fisheries will be more than those listed here if a careful study is made further for each country.

#### 4. CURRENT LEVEL OF FISHERIES PRODUCTION IN SOUTH CHINA SEA AREA

Owing to a great difference on the reliability of catch statistics among countries there is a great danger to give the magnitude of fisheries production in the area. However, an attempt was made to do so based on catch data currently available in each area, and the result is given in Table 3.

From figures given in Table 3 particular natures of marine fisheries in South China Sea area may be summarized as follows:

**(1) Magnitude of Total Marine Fisheries Production**

The magnitude of total marine fisheries production throughout the area is now supposed to be some 3.75 million metric tons excluding catches taken by China Mainland and North Vietnam. If 250 thousand metric tons of catches is assumed for those two areas, the total marine fisheries production for the South China Sea area would be some 4 million metric tons.

If an average price of US\$0.2 per Kilogramme or US\$200 per metric ton is assumed, the total value of fisheries production for the area as a whole would be some US\$800 million.

**(2) Major Fisheries**

Due to the tropical nature of the waters a variety of fishes are caught by a number of different types of fishing gears. However, as seen in Table 3 major types of fisheries which play a leading role in the total fisheries production are very limited. Trawl, purse seine and drift gill net fisheries are those which more or less commonly appear in each country, producing 55% of the total marine catch in the area. Besides those three

major fisheries each country or area has its own locally important fisheries, the examples of which are given in Table 3.

Of the three major types of fisheries trawl fisheries alone produce 41% of the total marine catch. However, one must be aware that 60 to 80% of trawler's catch is trash fish which is not edible by human being. Thus, out of 1.5 million metric tons of fishes caught by trawlers only 450 thousand metric tons of fishes are supposed to have been consumed by human being.

The share of purse seine and drift gill net fisheries to the total marine fishery production is at present only 8 and 6% respectively though these are commercially important fisheries in the area. This implies that there is a certain possibility to increase fish production with those fishing gears provided that further exploitable pelagic resources are available.

Finally, it may be worthwhile to stress that long line fishery either in the form of a drift or bottom long line has hardly been developed in the area with the exception of Hong Kong and Singapore. The reason may be that a rapid and massive development of trawl fisheries in the area has hampered the development of this fishery. However, in the light of the fact that a long line can be effectively used in untrawlable areas like coral reef, rocky sea area, etc. and the cost of constructing the gear is far cheaper than that for purse seine and drift gill net, the possibility of exploiting untouched fisheries resources with this gear should be explored.

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#### Fishery Statistics Required for the Stock Assessment of Fisheries Resources in South China Sea Area

by

Tadashi Yamamoto  
FAO Fishery Statistician  
FAO Regional Office for Asia and the Far East

#### Abstract

Existing national marine fishery statistics and proposals for the improvement are reviewed under the following headings;

- (1) Definition of Catch
- (2) Measurement of Gross Tonnage
- (3) Standardization of National Statistical classifications
  - i. Tonnage classification
  - ii. Species classification
  - iii. Fishing Gear Classification
- (4) Establishment of Fishing Area Classification in

#### South China Sea Area

- (5) Types of Statistical Tables Required for International Comparison.

In designing any statistical survey the first thing to do is (1) to establish clear definitions or concepts for survey items and classifications to be used in the survey and (2) to work out statistical tables which might well meet the requirements of users. These kinds of works are particularly important when international comparison of fishery statistics is required. Therefore, reviews and proposals hereunder are made along the above line with respect to some pertinent points.