SEAFDEC

**THE THIRD REGIONAL WORKSHOP ON SHARED STOCKS
IN THE SOUTH CHINA SEA AREA**

Kuala Terengganu, Malaysia 6 - 8 October, 1997

SEAFDEC/MFRDMD/WS/97/CR. 8

COUNTRY STATUS REPORT
VIETNAM

SMALL PELAGIC FISHERIES OF
VIETNAM

By:

DR. CHU TIEN VINH[1]
and
DR. VU HUY THU[2]

[1]Research Institute of Marine Products (RIMP), Vietnam

[2]Fisheries Resources Environment Conservation Department
10, Nguyen Cong Hoan STR,
Hanoi - SR. Vietnam

1. INTRODUCTION

Recognizing the prominent role of the Fisheries in supplying the needed animal protein food and creating employments for the Vietnamese peoples, the Government of Vietnam has given high priority to the sustainable development of the Fisheries Sector and decided that the Fisheries Sector should be the first to function under a full market economy.

Due to the new policy and sufficient supports of the Government, over the last decades the Vietnamese Fisheries Sector, especially the Marine Fisheries has had a growth in total production volume of 4-6% per year, providing approximately 40% of the total intake of animal protein (About 17.6 kg per capita). The total marine fish landings of Vietnam in 1995 reached about 929,000 MT with the export value of fisheries productions estimated at about US$551.2 million.

There are 54 provinces in Vietnam, of which 28 are coastal ones and conventionally are divided into four Regions, namely: The Tonkin Gulf, Central, South-Eastern and South-Western waters. The differences in the bottom topography, oceanographic conditions and natural fisheries resources between regions are reflected in the structure of the operating Fishing fleet as well as the fishing gears and methods being used.

The Marine Fisheries of Vietnam is classified as a Small-Scale Fisheries which is characterized by muti-species, multi-gears and multi-vessels including both motorized and artisanal fishing boats. In general, fishing activities are strongly dependent on the monsoon system which caused seasonal and special distributions of demersal and pelagic fisheries resources.

The fisheries resources in the coastal areas of Vietnam (within 50m water depth stratum) are generaly believed and reported be heavily exploited. There are indications that the waters beyond 50 m depth still contain relatively rich fisheries resources, especially of pelagic fishes.

The Government and Ministry of Fisheries of Vietnam are commited to ensuring that the Marine Fisheries should be developed in accordance with the capacity and characteristics of the living resources and their habitats to sustain exploitation. This means that the process of reduction of fishing efforts in the coastal and increase in offshore areas must be based on knowledges of the carrying capacities of the fisheries resources and a parallel monitoring and evaluation of the fisheries resources utilizations.

During the first and second SEAFDEC/MFRDMD Workshops on shared stocks in the South China Sea area held in 1994 and 1995 in Malaysia, status of the data collection and some biological parameters and fisheries status of shared stocks of *Decapterus, Rastrelliger* and Tunas in coastal seawaters of Vietnam have been presented (Chung B.D; Vinh C.T & Duc N.H; 1995). This paper deals with the small pelagic fisheries and their management measures of Vietnam.

2. STATUS OF FISHERIES

Natural Resources

Up to now, 2038 species of fishes belonging to 320 Orders, 198 families, 717 Genera have been identified in seawaters of Vietnam, of which about more than 100 species are of economic importance (Thi N.N. 1991). According to the ecological features, they can be divided into 4 Groups, namely: Pelagic, Semi-Pelagic, Demersal and Coral Reef.

The Pelagic Group consists of about 260 species accounting for 13% of the total number of species and they are commonly inhabiting in supper layers of the water columns. Among the pelagic fishes, species belonging to the oceanic sub-group account for 32.2% while neritic ones 67.8%.

The following small pelagic species are of economic importance in terms of catches: *Decapterus maruadsi, D. lajang, D. kurroides; Sardinella aurita, S. jussieu; Rastrelliger kanagurta, R. brachsoma; Scomberomorus guttatus, S. commerson; Selar crumenopthamus, S. mate; Stolephorus commersonii, S. indica; Selaroides leptolepis; Megalaspis cordyla; Sphyraena jello, S. obtusata; Trichiurus lepturus; Mugill spp.; Thunnus tonggol; Auxis thazard, A. rochei; Euthynnus affinis, Katsuwonus pelamis, Formio niger; Pampus argenteus*. In terms of value *Pampus argenteus, Formio niger, Decapterus* spp. *and Rastrelliger* spp. are most important.

The Marine fish standing stock of Vietnam is estimated at about 4-4.2 million MT with the Potential Yield of about 1,700,000 MT and of which the pelagic fish resources accounted for 41.6% (1,740,000 and 694,000 MT respectivelly). Estimations of standing stock and potential yield of small pelagic fishes in seawaters of Vietnam are given in Table 1.

Table 1: Standing stock and Potential Yield of small pelagic fishes in Seawaters of Vietnam

Regions	Standing stock (MT)	Potential Yield (MT)	%
Gulf of Tonkin	390,000	156,000	22.4
Central	500,000	200,000	28.7
South-Eastern	524,000	209,600	30.1
South-Western	316,000	126,000	18.2
Offshore Seamounts	10,000	2,500	0.6
Grand total	1,740,000	693,500	100.0

Catch - Efforts

No statistical data on catch and efforts for each pelagic species available, of total fisheries production, small pelagic fishes catches accounted approximatelly for 40%. Results of bottom trawl catch of research vessels (2350 Hp) carried out in seawaters of the South Vietnam during 1979-1985 are shown in Table 2.

Table 2: Catch per Unit of Effort (CPUE) for some pelagic species

ord	Species	Catch (Kg)	Number of Hauls	Catch per Haul (Kg)	Catch per Hour (Kg/h)
1	*Decapterus maruadsi*	55,062.9	423	130.2	87.6
2	*D. lajang*	4,057.8	114	35.6	32.4
3	*D. kurroides*	23,859.0	151	158.0	182.1
4	*Sardinella aurita*	1,773.5	77	23.0	17.4
5	*S. jussieu*	2,237.5	106	21.1	17.3
6	*Megalaspis cordyla*	5,169.6	182	28.4	17.8
7	*Rastrelliger kanagurta*	9,235.7	323	28.6	20.2
8	*Scomber japonicus*	11,135.8	31	359.2	269.1
9	*Scomberomorus guttatus*	1,479.2	171	8.7	6.1
10	*S. commersoni*	4,501.8	345	13.1	8.8
11	*Formio niger*	2,175.3	208	10.5	7.0
12	*Pampus argenteus*	327.2	38	8.6	6.0
13	*Selaroides leptolepis*	30,954.2	462	67.0	42.3
14	*Selar crumenopthamus*	5,135.9	213	24.1	16.9
15	*Caranx mate*	8.96	7	2.0	1.3
16	*C. malam*	1,462.8	107	13.7	9.4
17	*C. chrysophrys*	315.2	39	8.1	6.0
18	*C. malabaricus*	2,904.9	283	10.3	8.7
19	*Trichiurus lepturus*	790.0	45	17.6	17.3
20	*Sphyraena jello*	1,886.8	109	17.3	10.1

Fishing Fleet and Gears

In 1994 the total number of motorized fishing vessels was estimated at about 65,000 units with a total engine capacity of approximately over 1,400,000 Hp of which fishing vessels with engines smaller than 10 Hp accounted for approximetaly 50%, with engines of 11-33 hp - 34% and with engines more than 33 Hp - only 15%. Besides, about 15,000 artisanal fishing boats are operating.

The distribution of motorized fishing vessels in terms of units and engines capacity along the coastal regions is shown in Fig. 1 & 2. It is clear that approximately half of the fishing fleet operating off the coast of central region, where pelagic fisheries resources are relatively abundant.

A variety of fishing methods are being used in Vietnam. The number of fishing gears and their distribution are given in Table 3.

Table 3: Number and distribution of fishing gears in seawaters of Vietnam

Fishing gears Groups	Tonkin Gulf	Central	South-Eastern & South-Western	Total
Trawling	586	19,221	1,850	21,657
Purse Seines	57	3,489	394	3,940
Lifting net	85	4,861	14	4,940
Gill net	3,982	24,333	3,312	31,627
Lines	1,613	17,452	975	20.040
Set net	1,825	911	8,659	11,395
Grand total	8,148	70,267	15,204	93,619

Purse seines, Drift Gillnets, Lifting nets and Trawling are the major fishing gears for catching small pelagic fishes. As seen in Table 3, fishing gears that used for catching pelagic fishes were almost concenrated in Central region of Vietnam. Due to scattered distributions of small pelagic fishes, artificial devices such as electric, kerocine light as well as fish aggregating devices (FAD) are being used.

3.   FISHERIES BIOLOGY

Fish schools behavior and migration

Number of pelagic fish schools varies by seasons of the year, small-sized schools are dominant and accounted for 82.4% of total number of schools, medium-sized schools - 15.0%, big-sized schools - 0.7% and very big-sized - only 0.1%. About 56.4% of fish schools appear within depth stratum of 20-50m, 25.7% within depth of 50-100m, 2.8% within depth of 100-200m and only 0.6% within depth beyond 200m.

In the Northeast monsoon period, number of fish schools were estimated at two times more than in Southwest monsoon period.

Many pelagic fishes eventually have day-night migration pattern. At the day time they are distributed near the bottom and at night time they are scatterelly distributed in waster columns and in surface layers. It has seen very clearly for fishes belonging to *Decapterus, Rastrelliger* and *Sardinella* Genera.

Biological characteristics and population parameters of some small pelagic species

Biological characteristics and population parameters of some small pelagic species available in seawaters of Vietnam are summerized and given in Table 4.

Table 4: Main biological characteristics and population parameters
of small pelagic species available in seawaters of Vietnam

Species	Captured Body Length (mm)	Coefficents a & b in Length-weight Relationship Equation	L∞ (mm)	K	to	Z	M	F
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Decapterus maruadsi	60-239	Central Tonkin Gulf: a = 0.00001340 b = 2.5330	243	0.32	0.89		0.98	0.75
		Southern part a = 0.0001005 b = 2.6020	262	0.52	0.79		1.19	0.80
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Decapterus kurroides	200-390	For Male: a = 0.00219 b = 3.4577	Male: 443	0.18	0.697			
		For Female: a = 0.00343 b = 3.3309	F.m.: 411	0.22	0.40			
S. jussieu	120-149							
S. aurita	175-230	a = 0.0112 b = 2.9071						
Rastrelliger kanagurta	67-295	a = 0.084 b = 2.330						
Selaroides leptolepis	60-190	a = 0.00006 b = 3.1432	218.6	0.58	0.52	1.63	0.7	0.47
Auxis thazard	240-290	a = 0.00164	605.8	0.98	0.11	1.94	1.56	0.38
Euthynnus affinis	200-640	a = 0.00058 b = 2.698	510.0	0.50		1.00	0.48	0.52
Thunnus tonggol	260-680	a = 0.000731	722.2	0.899	0.128	1.30	1.03	0.27
Katsuwonus pelamis	410-650	a = 0.000114 b = 2.710	720.8	1.10	0.08	0.54	0.26	0.28
Stolephorus commersonii	30-100							
Sphyraena obtusata	220-310							

In general, most of small pelagic species in seawaters of Vietnam have relatively short life-span (4-5 years old), the under exploitation stock consists mainly of fishes of 2-4 years old. The growth rate was estimated very high during the first year of life and age at first maturity is commonly recorded at the end of the first year. The spawning migrations of almost species of pelagic fishes have been from March to September.

Distributions of abundance of neritic Tunas

Distributions of relative abundance (in terms of weight) of neritic tunas caught by driff gillnets in off shore Vietnam in the Southwest and Northeast monsoons 1996 are shown in Figures 3-6.

4. OCEANOGRAPHIC PARAMETERS RELATED TO MARINE FISHERIES

Rich oceanographic data are available in seawaters of Vietnam. All data were collected throught the research activities conducted by Research Institutions of Vietnam alone or in coolaboration with oversea research organizations. Based on these data the Physical, Hydrological and Dynamical Atlas of the South China Sea have been completed. The Atlas contained the seasonal and spatial distributions of temperature, salinity, conditional density, dissolved oxygen, current, wave by standard stratums.

The dynamics of fisheries resources in seawaters of Vietnam are found deeply influenced by oceanographic conditions, especially by Upwelling phenomenon which was observed along the coast of Ninh Thuan-Binh Thuan Provinces (South of Central Vietnam) in Winter and Summer seasons (Figures 7-8). During the Southwest monsoon (SW) the upwelling is stronger than in Northeast monsoon (NE).

During SW monsoon, the surface water is flown affshore, cool water originaling from depth of 80-100m upwells close to shore, the thermohaline layer (or pyanakline-sized) was observed closer to the surface water and shore. The fish schools (mostly small-sized) usually migrated and dispersed in nearshore water (particularly near the thermohaline layer) for spawning and and feeding.

During NE monsoon, the upwelling was observed in offshore water and the downwelling may occur in shore water. The thermohaline layer was observed near the bottom, in this period relatively bigger fish shools were recorded.

Generally, the forming and migrations of fish schools in upwelling area are closely related to fluctuations of the thermohaline layer near the sea bottom. Fishes are found rather more abundant in peripheries of an upwelling than in center.

5. CONCLUSIONS AND RECOMMENDATIONS

Small-pelagic fisheries are considered to be very important for small-scale fisheries of Vietnam, however due to heavy exploitation in nearshore waters and somewhere destructive methods of fishing (with explosives, poisons) are being still taken place, the resources seemed to be decreased. Therefore we should have to reduce fishing presures on nearshore fishing grounds by limiting entry into fisheries, prohibiting destructive methods of fishing, enlarging mesh size of fishingnets being used and to conduct research activities on new fishing grounds as well as new target species in offshore. In addition, proper and effective methods of fishing should be used.

Stock assessment of small pelagic resources remained an important and difficult issues. Acoustic method and Virtual Population Analysis (VPA) in FISAT (FAO-ICLARM STOCK ASSESSMENT TOOLS) are considered usefull and suitable in tropical waters.

Fisheries statistical systems are urgently needed to be eshtablished at all fish landing sites along the coast, and fisheries biologists should be involved into this activities.

The relationship between ocenanographic factors and distributions, behaviour as well as biological features of fishes should be further studied in detail. In addition, remote sensing method in fisheries research need to be developed.

Collaborative research on studies of shared stock in general and fisheries resources and marine environmental related should be conducted the sooner the better.

6. REFERENCES:

Bui Dinh Chung, Chu Tien Vinh, Nguyen Phi Dinh. 1995. Some biological parameters and fisheries status of shared stock *Decapterus, Rastrelliger* and Tunas in coastal seawater of Vietnam. Proceedings of The Second Regional Workshop on Shared stock in the South China Sea Area. Kuala Terengganu, Malaysia. 18-20.7.1995.

Bui Dinh Chung, Chu Tien Vinh, Nguyen Huu Duc. 1997. Marine living resources studies. Basis for development of Marine Fisheries Sector of Vietnam. Proceedings of Research Institute of Marine Products (RIMP).

JICA and MOFi. 1996. Interim Report on the Marine Resources Study in Vietnam.

Nguyen Van Luc, Vo Van Lanh. 1995. Ecological effects of coastal strong upwelling on marine fish resources in seawaters of the South of Central Vietnam. Proceedings of the First Symposium on Marine Biology. Nha Trang. Vietnam. 27-28.10.1995.

Dao Manh Muon, Nguyen Van Viet. 1991. Prilimilary results of study on affect of EL-NINO on current in seawaters of Vietnam. Proceedings of The First Symposium on Marine Science of Vietnam. Hanoi, 28-30.11.1991.

Le Duc To, Doan Van Bo. 1991. Dynamics of marine fishes resources related to the periodical action of the upwelling phenomenon in seawaters of Thuan Hai. Proceedings of The Third Symposium on Marine Sciences of Vietnam. Hanoi, Vietnam. 28-30.11.1991.

Vu Huy Thu, Tran Van Bun. 1992. Marine fisheries resources in seawaters of Central Vietnam. Ministry of Fisheries of Vietnam (MOFi).

Vietnam Fisheries - A. National Overview of Fisheries and Aquaculture. The First Donor Coordination Meeting for Fisheries. Hanoi. 9.12.1996.

Chu Tien Vinh. 1994. Status of Fishery Information and Statistics in Asia. Proceedings of the Regional Workshop on Fishery Information and Statistics in Asia. Bangkok, Thailand. 18-22.1.1994.