Trial monitoring of fishers in the Mekong Delta, Viet Nam

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ABSTRACT

The Mekong Delta in Viet Nam supports large capture fisheries, but catches have not been accurately documented. Official statistics cover large commercial gears, for which catches may be under-reported. Some socioeconomic surveys of households provide better coverage, but results from questionnaires are of unknown accuracy. This is because respondents may be unable to recall details of fishing activity and catches, or may be unwilling to report accurately. This paper reports on the results of monitoring the catches of 13 fishers, carried out as a trial over a one-year period from key sites in the delta. Full-time professional fishers were selected who mostly used larger gears, including *Days* (stationary trawls or *Dais*), trawls, push nets, traps and gill nets. The objective was to document the daily and seasonal variation in catches and to make recommendations for long-term monitoring. The fishers filled in logbooks on a daily basis concerning their catches noting species, total weight and size range. They were also interviewed after the study about their recall of catches over the period of the study.

The fishers caught between 0.9 and 30 tones/year; the highest annual catch was from one fisher who used a push-net; other trawlers or push-netters caught 2.5 to 6 tones/year, and fishers who used *Days* caught 0.8 to 2.4 tones/year. All catches showed seasonal peaks, the timing of which varied with gear type. Dominant species included large predators like *Wallago attu* and *Micronema* spp., smaller cyprinids, estuary fish such as threadfins (Polynemidae) and shrimps (*Macrobrachium* spp.).

Based on our data, individual fisher's catches recorded at weekly intervals provided estimates of their annual catches within - at worst - 28% of the true values. There was no particular day of the week that gave high or low estimates, so systematic (rather than random) sampling over time was considered acceptable. However if sampled at 14 or 28-day intervals, annual estimates may have been up to 80% and 110% different from true values. For total catches from these 13 fishers monthly sampling provided an estimate to within 23% of true value, as individual high or low estimates tended to cancel each other.

During interviews, the fishers who had lower catches tended to underestimate their catches, whilst the fishers who caught the most tended to overestimate their catches. Summed over the 13 fishers the estimate of total catch was approximately twice the actual catch. Surveys should include both interviews and follow-up monitoring for accurate estimates of quantities.

KEYWORDS: Mekong Delta, Viet Nam, catch assessment, white fish, and black fish

INTRODUCTION

The Mekong River enters Vietnamese territory through two branches (at this point it is called the Cuulong River). These two branches of the Mekong River are known as the Tien River and the Bassac River or Hau River. Both these rivers are approximately 230km in length. Both rivers create a large delta with an area of approximately 39,000km^2 that covers over 13 provinces in Southern Viet Nam. Two mainstreams enter the sea after passing through nine estuaries that are linked to a complex network of canals that regulate flooding and drainage.

Annual flood flows from the Mekong River are usually highest in September and October and are about the order of 25,500 m^3/s in total. When the floodwaters reach a certain volume, water spills

over the banks. This creates an immense area of floodplain along the lower mainstream estimated to cover about 1,400,000 ha to 1,900,000 ha (depending on the annual flood level). Eighty per cent of the Mekong's average annual runoff enters the delta, whereas the Bassac River contributes only about 20 per cent of its average annual runoff. Floodplains in this region are considered to be very important areas for feeding and growth for a large number of fish species in the Mekong River. These areas are highly productive for fisheries and are strongly affected by the annual flood pulse of the Mekong River system.

The water current in the Mekong Delta is affected by the tidal regime of the Eastern Sea and the Western Sea (Thailand Gulf) and cause water to flow upstream during high tides. The tide of East Sea is strong with an amplitude of about 3.5 to 4.0 m and occurs on a semi-diurnal basis. The tide from the West Sea is smaller with an amplitude about 0.8 to 1.0 m and takes place under an irregular diurnal regime. Tides in the East Sea strongly influence the dry season flow and salinity levels in the Mekong River. Tides in the West Sea influence the dry season flow and salinity levels in the channels of the Ca Mau Peninsular. Because of the topography of river bases, and channels with low slopes, the tide comes far into inland water. The 4g/l saline level typically penetrates 40 to 45 km upstream along main rivers in the Mekong Delta

The Fish Catch Monitoring Study in the Mekong Delta was started in July 2003. This paper reports the results of monitoring catches of 13 fishers, carried out as a trial over a full one-year period from key sites in the delta. The fishers selected were full-time professional fishers who mostly used larger gears, including *Days* (stationary trawls or *dais*), trawls, push nets, traps and gill nets.

The general objective of the study was to obtain information on Lower Mekong Basin (LMB) countries to act as an input to management. The specific objectives of the study were to: 1) Use fishers as indicators of trends in fisheries of the LMB countries, and 2) Identify the best ways to collect data in a long-term monitoring programme. There were three goals to the study. These were: 1) To collect accurate data from fishers using logbooks and by interviewing, 2) To determine the extent of short-term and long-term, and 3) To determine species composition in some catches.

METHODS AND MATERIALS

Log books and the use of local ecological knowledge (LEK)

A workshop was held on 28 July 2003 in Cantho Province, Viet Nam. All fishers recruited for the study were selected by local government officials. The objectives of the Catch Monitoring Study were explained to the fishers, and they were shown how to fill out blank forms. Each person was supplied with one Fish Photo Flip Chart, one 2 kg-scale, one 30cm ruler, one notebook, one ball point pen and blank data sheets. Fishers started the work on the following day after returning home from the workshop.

Monitoring stations

Initially, 18 stations were chosen for monitoring along the Mekong and Bassac Rivers, and also in the Plain of Reeds and at Long Xuyen. Thirty-three professional fishers, operating various kinds of fishing gears along the rivers were recruited for the study. However, 20 fishers were eliminated during the study because their data were not considered reliable.

All 13 monitoring stations along the Mekong Rivers were located from upstream areas down to the estuaries.
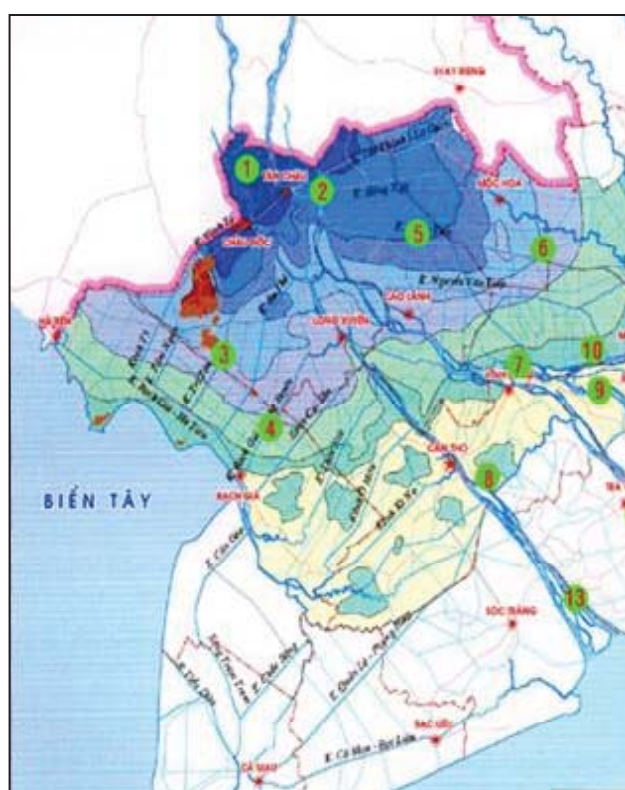

Figure 1: Map of the monitoring stations in the Mekong Delta

RESULTS

Fisher information (by interview)

Personal and family data:

    Viet Nam educational system as follows:

    Level 1 = Primary school (from grade 1 – 5)

    Level 2 = Secondary school (from grade 6 – 9)

Level 3 = High school (from grade 10 – 12)

University (4 years more)

Schooling level of fishers: Secondary school 69.23 per cent. Primary school 23.08 per cent, High school 7.69 per cent Very few fishers had received training in aquaculture (15.38 per cent) or fisheries (7.69 per cent)

Most fishers had gained their fishing knowledge having been taught by their parents. Number of years of fishing experience: 12 – 51 years; average 28 years. All fishers were married and have 1 to 4 children. Children were fishers to at 53.8 per cent. Fisher wife job: housewife 92.3 per cent; housewife – fish seller 15.38 per cent

Property ownership and other personal information (Non fishery)

House size average: 70 m^2. Wood and tin roof 69.23 per cent; thatch 23.08 per cent; brick-cement 7.69 per cent. Electricity 84.62 per cent. Road Type: Dirt 46.2 per cent; gravel 15.4 per cent; bitumen 38.5 per cent. Fishers have motorcycle: 53.84 per cent, television: 84.62 per cent. Fishers with no land 53.85 per cent. Average area of land owned average 0.4 ha.

Fishing gears

Boat length: 6 – 12 m, engine power: 4 – 24 HP. Only Mr. Nguyen Van Ro (Tam Nong, Dong Thap) has a larger engine at 120 HP for push net, so his catch is the highest in the area.

No license for aquaculture. 15.38 per cent of fishers have a fishing license and pay annual tax (US$6 to 10/gear/year).

Fishing history

Income mainly from fishing 85 per cent, from others 15 per cent (aquaculture, agriculture, fruit garden, animal farming). Fish catch: sold 90 per cent, eaten 5.5 per cent; aquaculture feed 4 per cent and other animal 0.5 per cent.

Best catch in the year (kg/year): 300 to 18,250 kg/year; average 5,561 kg/year. Fishing worse now: 76.9 per cent. Very bad: 15.4 per cent Normal 7.7 per cent. The reasons causing changes in fishing: by pollution: 53.8 per cent; more fishers, illegal fishing gears: 50 per cent.

The environment changed in their lifetime: worse: 76.9 per cent; better 23.1 per cent (because widening and deepening of irrigation canals has created better habitat for fish). Main environmental reasons: pesticides from rice field, dike, salinity affected, toxic pollutant from agriculture, canal development, canal system releases acid sulphate soil, canals, processing waste product, waste from poultry, cattle, human activities.

Fishing occurred nearly all year round. The scale and intensity changed with seasons and the fishing gears. The main catch season is from the rainy season to beginning of the dry season. Fishing scale is greatest in the flood season. Fishing took place everywhere in the flooded areas with all kinds of fishing gears. Whereas, fishing in the dry season occurred only in river and deep channels

According to the local fishers, fish catch in the Mekong Delta currently has a tendency to decrease to about 50 per cent less than that during the past 15 years.

Fish species during the study

Two hundred and forty species were identified from all stations during the 12-month monitoring period. Dominant species included large predators belong to Bagridae, Siluridae, Polynemidae, smaller cyprinids, and shrimps. Table 5.2.1 showed 10 dominant species with high total weight.

Table 1. *The weight of dominant species*

No	Vietnamese name	Taxa	Sum of Total Weight (tonnes)
1	Tren	*Micronema apogon*	4.98
2	Me vinh	*Barbonymus gonionotus*	4.09
3	Linh	*Henicorhynchus* spp.2	3.83
4	Tom	*Macrobrachium* sp.	3.69
5	Phen	*Polynemus longipectoralis*	3.64
6	Thieu	*Paralaubuca typus*	3.2
7	Lang	*Hemibagrus* spp.3	3.03
8	Danh	*Puntioplites* spp.4	2.73
9	Leo	*Wallago attu*	2.11
10	Chot	*Mystus* spp.5	2.02

Total weight by habitat

In terms of ecological characteristics, these fish can be divided into 3 groups:

- White fishes (migratory species)

- Black fishes (swamp fishes group)

- Brackish water fishes group

White fish dominated in all water bodies, particularly in the rivers. Black fish are mainly found in rice-fields and canals. Some marine and estuary fish migrate into river and canal.
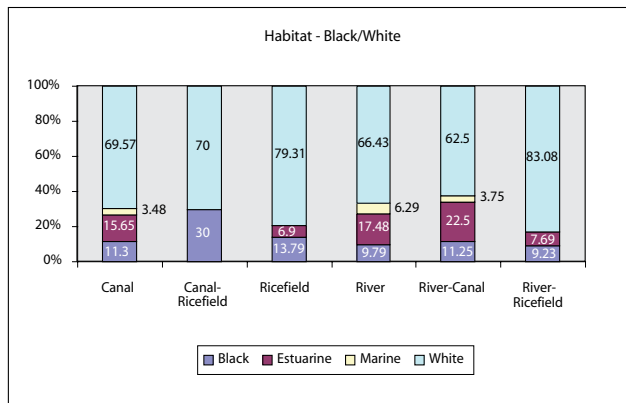
Figure 2. Habitat use for black, white, estuarine and marine fish shown
as per cent by weight in fishers catches.

Total catch of inland fish is highest, then estuary fish and marine fish is least (Figure 2). The indigenous species were highest by weight in the total catch (Figure 3).
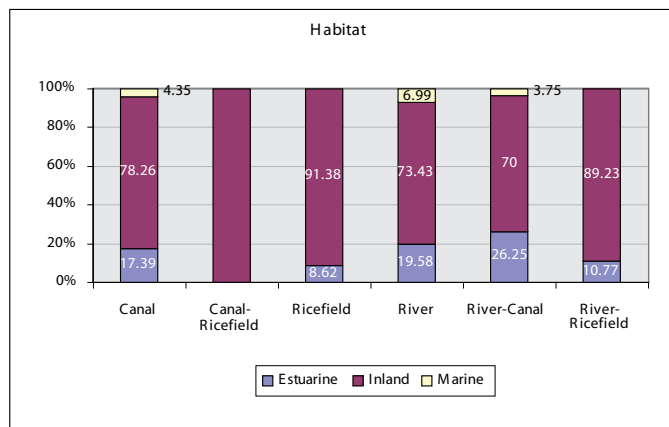

Figure 3. Habitat use for inland, estuarine and marine fish shown as
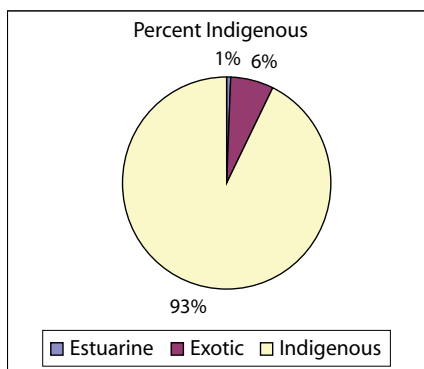per cent by weight in fishers catches

Figure 4.   Percentage of estuarine, exotic and other species

Total catch by feeding type

Carnivorous species are dominant in all water bodies. Omnivorous species are also important and herbivorous species less so (Figure 5)
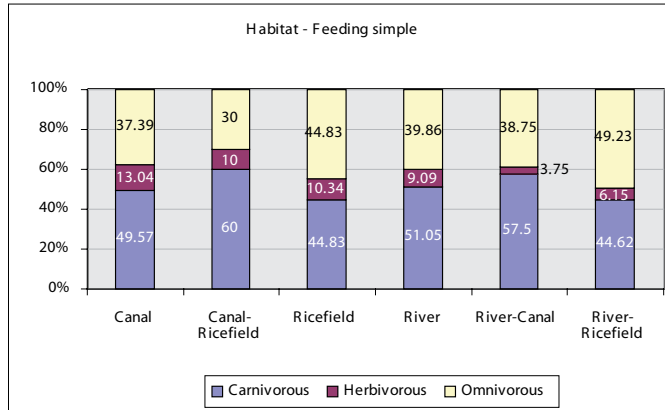

Figure 5.   Habitat by type of feeding

Total catch per hour by habitat

Total catch per hour was always high in canals and rivers (Figure 6).
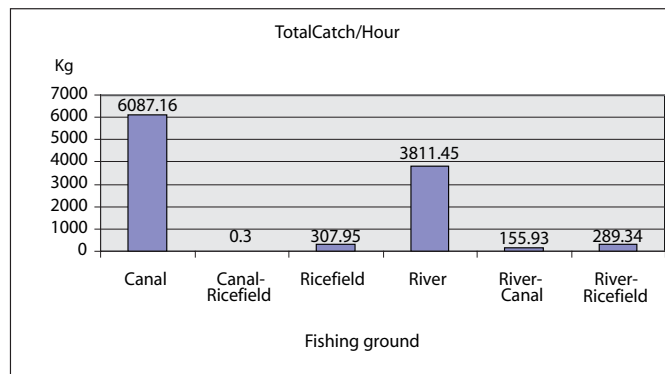

Figure 6.   Total catch by fishing ground

Sum of the total catch per year for all fishers

The fishers caught between 0.89 to 29.6 tonnes/year. The highest annual catch was from one fisher who used a push net. Other trawlers or push-netters caught 2.5 to 6 tonnes/year, and fishers that used *Days* caught 0.8 to 2.4 tonnes/year (Table 2).

Table 2. *Sum of total catch by the gear for each fisher*

No	Fisher Name	Gear	Sum of Total Catch (g)
1	Nguyen Van Ro	Push net	29.65
2	Nguyen Van Hanh	Push net, trap net	12.18
3	Nguyen Van Viet	Frame trawl	6.34
4	Le Van Rong	Frame trawl	3.82
5	Cao Van Nam	Frame trawl	3.01
6	Vo Van Hoa	Frame trawl	2.85
7	Pham Hong Quon	Frame trawl	2.55
8	Tran Thanh Sang	Day	2.40
9	Nguyen Van Lam	Day	1.27
10	Pham Van Mat	Gill net, trammel	1.20
11	Nguyen Huu Loi	Trap net, push trawl	1.20
12	Nguyen Van Thong	Day	0.93
13	Nguyen Van Quyt	Day	0.89

Catch by fishing time

The timing of fishing varied with gear type. In general:

- Push net and trawl net: 5 - 7 fishing hours per day

- *Day*: 3 – 6 hrs per day

- Gill net: 1 – 12 hrs per day

- Trap net: 12 – 24 hrs per day

Total catch by fishing gear/day

Total catch by push net is highest, followed by trawl, Day, and trap net. Gill net is least (Figure 7)
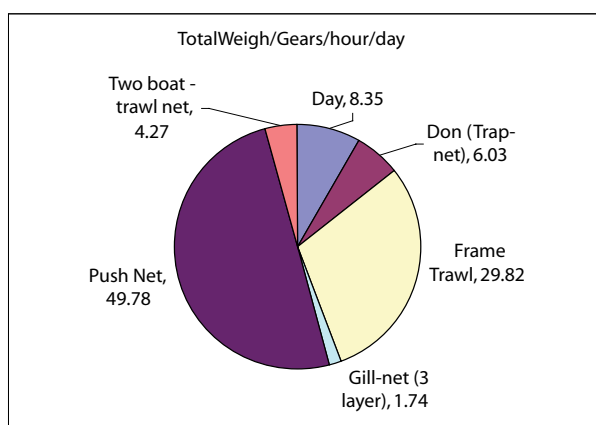

Figure 7. Total catch by fishing gear/day

Total weight per fishing gear/hour

Total weight caught by push net per hour is highest. Frame trawl high also. Others are less. (Figure 8).
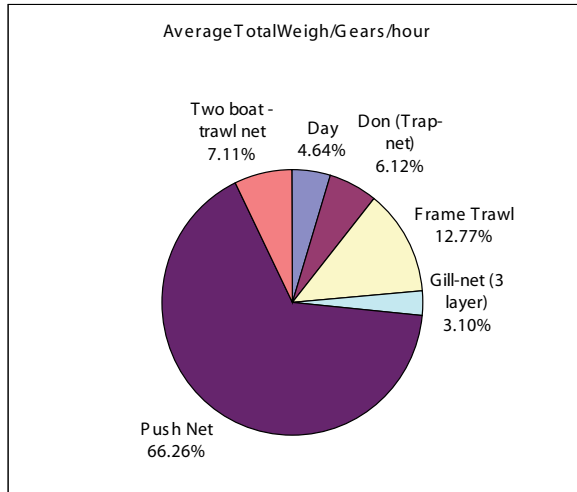

Figure 8. Total weight of catch per hour by different fishing gears

DISCUSSION

1. There was no particular day of the week which would give high or low estimates, so systematic (rather than random) sampling over time would be acceptable. Annual estimates using sampling intervals of 14- or 28-day may be up to 80% and 110% different from true values. Monthly sampling would give an estimate of total catches within 23% of true value, as individual high or low estimates tend to cancel each other. Reducing sampling frequency from daily to weekly has little effect on the estimate of the annual mean

2. The Fish Photo Flipchart used for LEK for Mekong Delta lacked many kinds of fish in the Mekong Delta, Viet Nam. Besides, it had many errors, such as no name (local, scientific), no size, false colour caused incorrect identification.

3. Sampling technique actually not represent for the total catch. Too large or too small fish are not recorded. For future study, the sub sample need to establish as follows:

4. Select the large and small fish to analyse and record first.

5. Separate each group to weigh, then take 10% randomly each group

6. Analysis the sub sample (combine all groups)

CONCLUSIONS

There were 240 species (172 taxa) identified at all stations during the 12 month monitoring in Mekong Delta, Viet Nam. Of these, 10 species were dominant—*Micronema apogon, Barbonymus gonionotus, Henicorhynchus* spp.2, *Macrobrachium* sp., *Polynemus longipectoralis, Paralaubuca typus, Hemibagrus* spp.3, *Puntioplites* spp.4, *Wallago attu, Mystus* spp.5.

White fish are dominant in river and flooded rice fields. Black are found fish mainly in rice fields and canals. Some marine and estuary fishes migrate into rivers and canals during the dry season. Carnivorous species are dominant in all water bodies. Omnivorous the next most numerous, followed by herbivorous. Inland fisheries recorded the greatest total catch, followed by then estuarine and then marine species.

The total catch per year in Mekong Delta was 0.89 - 29.6 tonnes/year. The fishing gears recovering the largest annual catches were push-netters and trawlers. The small mesh size of these fishing gears killed a large amount of small fish and other aquatic organisms. In addition they damage the benthic fauna living at the river bottom.

The fish catch monitoring study in Mekong Delta was carried out a few years ago and needs to be undertaken more regularly. Results of these studies could be used to assess and to protect the natural fisheries resources.

REFERENCES

Ministry of Fisheries, (1996) Fisheries resources of Vietnam. (in Vietnamese).Hoang

Duc Dat, Thai Ngoc Tri, (2001) Fish fauna and fisheries in Dong Thap Muoi area. Ministry of Science -Technique and Environment. (in Vietnamese)

Mai Dinh Yen, Nguyen Van Trong, Nguyen Van Thien, Le Hoang Yen, Hua Bach Loan, (1992) Freshwater in the South of Vietnam. Science -Technique Publisher Hanoi. (in Vietnamese)

Sverdrup-Jensen, S. (2002) Fisheries in the Lower Mekong Basin: Status and Perspectives. MRC Technical Paper No. 6, Mekong River Commission, Phnom Penh. 103. ISSN: 1683-1489

Vu Vi An and Doan Van Tien, (2003) Catch Monitoring Sudy in Mekong Delta, Viet Nam. Paper presented at the Technical Symposium (November, 2003. Pakse, Laos)