

## INLAND FISHERY MANAGEMENT IN SONGKRAM RIVER, THAILAND

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### 1.0 Introduction

Thailand has 25 large basins, each with code. Khong Basins is one of 25 with code 02. Khong Basin in Thailand has 3 subbasins, Kok in Chiengrai-Chiengmai provinces Huaymong in Nongkai and Songkhram Basin covering 33 amphoes in 4 provinces, i.e. Udon Thani, Nongkai, Sakonakorn and Nakornpanom with area of 13,451 m<sup>2</sup> most of the area are stepped plain and low-lying floodplains (KhonKaen University, 1997). Songkhram river originates from Phuphan hill with altitude 300 m above MSL. The river passes north crossing Udon Thani province and diverts southeasterly to Sakonakorn and Nongkai provinces and drain into Sri Songkhram area of Na Korn Panom province and confluent with Khong river in Chaiburi with total distance of 430 km (Asian engineering consultant limited *et. al.*, 1992).

### 2.0 Hydrology

The rainfall of upper Songkhrom Basin is about 1600-2700 mm annually, 1000-2200 mm annually for lower Basin with average 1300-2450 mm annually. About 90% of rainfall is in rainy season, e.g. May-September with highest rainfall of 50-60% of the year in August-September. The surface water run violently due to different altitude of 300 m above MSL for a distance of about 230 km at lower Songkhrom Basin which is 150 m above MSL. The lower Songkhram Basin has a length of 200 km. Before confluencing between Songkhram and Khong rivers, there is slight difference in altitude. Also due to meandering of lower stream and diverting of stream near the confluence with Khong river and intrusion of water from Khong river into Songkhram river for a distance of 100 km in early rainy season, it causes strong flow of upper Songkram to unable to drain into Khong river, this results the overflow into tributaries and low-lying areas of 500,000 Rai in lower Songkhram Basin (Asian engineering consultant limited *et. al.*, 1992).

### 3.0 Ecosystems

Due to difference in geography and variation in flood regime in different seasons, it results in 3 types of ecosystem, namely, riverine, flood plain and lacustrine (Boonyaratpalin *et.al.*, 2002)

#### **4.0 Water Quality**

Physical properties of water in low-lying area (Boongtham) during flood period is noted for high total suspended solid (TSS) and total dissolved solid (TDS) over the peak and stable periods. This is due to presence of vegetation in flood area that cause the lower velocity of running water and precipitation and reduction in TSS and TDS. High turbidity is noted in Songkhram Basin during flood period, which is higher than in dry period. However, TSS and TDS are lower than in drought period due to less amount of water and higher concentrations of nutrients.

The chemical properties of water in catchment area are not different between the draing and stabilized periods, i.g. pH 5.2-5.4, alkalinity 15 ppm which are lower than in the river with pH 7.0 and alkalinity 19.3 ppm for the discharge period and become higher to pH 7.4 and alkalinity 36.3 ppm in dry period. The low pH in floodplain area is due to the presence of plant debris, animal excreta that are decomposed during flood period by microorganisms, causing lower pH and the presence of natural food for young fish life. (Boonyaratpalin *et.al.*, 2002)

#### **5.0 Plankton and Benthos**

The study in 2002 in floodplain area showed the presence of 195 species of phytoplankton constituting 121 species of green algae and 78 species of desmids thrive the weak acidic water and low level of hardness. The phytoplankton density was 815 units/ml or equivalent 0.32-1.28 g/m<sup>3</sup> biomass which is 12 and 1.5 times higher than in Songkhram river, respectively.

152 species of zooplankton were found in Songkhram Basin with average density 250 organisms/l mainly over 100  $\mu$  in size. The diversity was greater for the catchment area than for Songkhram River. The benthos of 27 families was found with highest abundance of Tubifex sp. There was similarity in distribution between the benthos in Songkhrom river and the catchment area. However, the density for benthos in low-lying was cross 1225 organisms/m<sup>2</sup> while for Songkhrom river, the density was 195 organisms/m<sup>2</sup>.

#### **6.0 Fishery**

The Songkhram River is well known in fisheries context due to its high bio diversity and high productivity, both of which are due to the relatively pristine environment. Songkhram is not dammed, and the floodplains along the river are relatively undisturbed. Many species migrate from the Mekong up the Songkhram to These floodplains. These features provide the basis for high fish productivity that benefits the people along the Songkhram, its tributaries and floodplains. Boonyaratpalin *et al.* (2002) reported the presence of 149 fish species in 33 families in lower Songkhram Basin. 61 out of 149 species are in cypricidae with very high diversity index (Shanon-Weiner) of 4.96 and 91 kg/ha fish production. However we noted high production potential in lower Songkhrom Basin. About 1,400 tone of fish were harvested annually. Comparing the fish harvested from large reservoirs during 2000-2002, the harvest was larger than from 3-5 reservoirs. For example, the estimated harvest was larger than average fish harvest during 2000-2002 from Bhumiphool, Sirikit reserroirs, Pasak Cholasith, Srinakarind and Vachiralongkorn put together.

## **7.0 Livelihood**

The structure and environment of flat area of the basin with large wetland area during wet season lead to the limitation uses for many agricultural activities. In many communities, a traditional rice crop is commonly done during dry season and fishing is becoming of the main activity of local people. In the Baseline Fisheries Study conducted by the Assessment of Mekong Capture Fisheries Component of MRC in 1999-2000 found more than 60% of total households in the lower basin were involved in fishing and high percentage of part time fishing households as shown in Fig1. High number of local inhabitants involve in fisheries altogether with long history of development, local management in fisheries is found in this area such as fishing gears used, fishing habitat, fish preservation, fish processing (Pla Ra) and etc. Fish is a major source of the daily protein intake of over 80 per cent of the people in the Songkhram. Smaller fish, which may be of little commercial value, provide dietary calcium as their soft bones are chewed and eaten. Evidence of fishing as a key livelihood activity.

Fig 1: Percentage of part time fishing households from Baseline Fisheries Study of the AMCF, MRC in 1999-2000.(Sjorslev et.al.,2000)

## **8.0 Fish Migrations and Traditional Milk of the Songkhram**

Fish migrations are an important feature of river ecology in most major tropical rivers. Migration pattern of fish in the Songkhram is same as the other area for completing their life cycle. This cycle is also influences the local inhabitant livelihood. Long-distance migrations within main river and tributaries referred to as 'longitudinal' whilst those from the main river and tributaries into flood plain areas during the flood season and back again during the dry season are referred to as 'lateral'. During the flood season, larvae of many species may scatter in the big flood plain area of the Songkhram. Lateral migrations from flood plains back to the river are often followed by longitudinal migrations within the main river channel and found in big group at the same time downstream migrate back to the Mekong. About three months of the year (June to August), pushing water upstream from the Mekong into the Songkhram cause many Mekong species migrate upstream the Songkhram to complete their life cycle. Huge area of flood is an important breeding, spawning and nursing grounds for many species. Boonyaratpalin et.al.(2002) notes 59 larvae fish species in flood area. During upstream migration, the fishermen do fishing by specific gears to catch the big fish. Young fish are swept in with the water and thrive in the flooded plains. When the water level rapidly drops in the Mekong during the beginning dry season (from September to October), the flow reverses once more and the fish migrate back to their refuges downstream. The difference in hydrological condition not only lead to fish migration but also to fishing gear developed to use in different season and management style.

## **9.0 Fishing Ingenuity**

Enormous ingenuity has been demonstrated in the design and construction of fishing gears in the Songkhram River Basin. Local fishermen apply their knowledge and experience of fish behavior and characteristics to the invention of new gear designed specifically to target certain species. These selective fishing gear are different kind of trap. The reason

that trap is used to catch some fish species is that they have different shapes its or placed at different levels in the water or different bait used.

Local people make the most use of this downstream mass migration and are ready with their gears. Some kinds of big gears such as Bagnet (Tong) and lift net on raft (Yo Yai) were developed to this huge production in a short time of water receding. Huge quantities of fish are caught in bag net along the river to be consumed mainly locally and sale to other province in the Northeast. When migration is at its peak (few days in the period September to October) the bags are emptied every 2 to 3 hours. Each bag may hold up to 500 kilograms of fish, though on days when few fish are migrating the frequency of lifting is much less (2 times a day). Composition of fish eatch at night time are valuable catfish and feather back, fish eatch at daytime are relatively lower value scale fish or cyprinid.

The Barrier Net situated at the month of canal, the mesh size are every small and the fishing period from water receding till dry out that it is extremely unlikely that a species inhabiting the area and have to migrate into Songkharm river can avoid being caught by these fishing gears.

## **10.0 Gender Issues**

It is common for women to be involved in the fishing and related activities. In the lower part of the basin that capture is important found of highly involvement. In some villages found of women do fishing more often and 1/3 found accompany their husbands in fishing. In the Songkhram, especially in the lower area, women tend to fish in river more often but in the upper part women tend to go fishing in rice fields, swamps and small streams.

Women in the Songkhram river area found highly involve in fishery, especially in small purse seine which is operated by husband and wife, fish sorting, processing, preserving and fish marketing. The local pattern of management is to preserve fishery product for their household consumption through out the year and also for sale. Last few years, many village women form the group in order to join their knowledge, labor and investment for processing in the rural development program of *One Tambon One Product*. (OTOP) In this particular case, they can ask for support from the government and non-government organizations for new technology in producing valuadded product and assist in ,funding support to the group.

Women are found highly involved in fish marketing that benefit the fishing activities in this area. Fish production, both fresh fish and processing fish (pla ra) are not sold only in the Songkhram River but also export to Bangkok and many parts of Thailand

## **11.0 Fishery Management**

Fishes have been main food for Thai since ancient time “Eat rice, eat fish” s0, the fishery resources are managed for sustainability by the issue of Fisheries Act 1947 that specify the conservation areas, concessioned areas or aquaculture and require licenses from authorities. The licenses must comply with the conditions prescribed in the permit and public area that anyone can fish. Types and size of gears are restricted. The gears should not obstruct communication or affect the fish stock. The Act also prohibit the activities

that lead to the dryness of water source. The Act categorizes the fishing gears into 2 types: license, non-licensed. The licensed fishing gears have following details:

1. Kind, dimension and mesh size of fishing gear which in permitted in fisheries
2. The distance between each stationary gear;
3. Fishing gear and method of fishing in spawning and breeding grounds and seasons
4. Kind of fishing gear or implement which is absolutely forbidden in fisheries such as poisoning

The results of Top-down management is not effective as some types of fishing gears, e.g. bag net which is not allowed, are still used in Songkhram Basin (Table 1). Bag net is vary efficient in fish catching and is operated only about one and half months a year. The position of gears are governed by the water velocity. Barrier nets are highly destructive to fish stocks and should be changed. It is still commonly used because thy are auctioned to the Tambon Administrator Organization and the sale in used for public benefits. In the local community fishery management,(Table 2) the local people are unaware of the conservation practices such as the fine mesh sizes of barrier net which set across the mouth of the canal and fish untill water in canal dry out. Smaller fishes are harvested and used unprofitably and left no for tuture fish generations.

The problems of Top-down management and local community fisheries management and Constitutional Law 1999 regarding the decentralization policy, the Department of Fishery has a policy to manage the fishery resources in Songkhram Basin in the form of Co-Management about Government and community to dissolve the conflict and to find out the best solution fishing gear used, stock enhancement and best regulation which is practical and can serve the aim to preserve and conserve fishery resources, which are staple food of people in Songkhrom River Basin.

Table 1: Types of Main Fishing Gears in Songkhram Basin as Classified by Fishery Act

<b>Vernacular name</b>	<b>Licensed</b>	<b>Non-licensed</b>	<b>Not allowed</b>
Barrier net			+
Stationary trawl net, set bag net			+
Beach seine net	+		
Set bamboo trap (2.5 cm.)		+	
Big lift net, raft mount lift net, crane lift net	+		
V-shape dip net, boat dip net	+		
Bush-pile&lure		+	
Drift gill net	+		
Large bamboo trap		+	
Small bamboo trap		+	
Bush-pile&lure		+	

Table 2: Fisheries Management and its Feature in the Songkhram by Community

Type of Management	Feature of Management
Conservation zone	<ul style="list-style-type: none"> <li>• A common type of local management found in many villages</li> <li>• Have the rule and local enforcement</li> <li>• Aim to preserves and conserve fishery resources</li> </ul>
Fishing gear development and prohibition	<ul style="list-style-type: none"> <li>• More than 34 types of gears are used for fishing.</li> <li>▪ Long history of fishing gear development including the lesson learn for fishing habitat</li> <li>▪ Illegal gears are prohibited such as electricity and chemical.</li> </ul>
Fishing right	<ul style="list-style-type: none"> <li>• Traditional fishing rights</li> <li>• Long history develops the fishing right.</li> <li>• Preserving the valuable role played by social communities</li> <li>• Giving the right of fishing to private and take benefit from the fishing right for local community development. This fishing right is mainly control by the local authorities and no villager is allowed to harvest any resources. This is to avoid conflict between villagers and private operators.</li> </ul>
Conflict management	<ul style="list-style-type: none"> <li>• Group and network strengthening to reduce conflict in 3 levels; between user groups (different gears used, between user group and community, and communities and outside, especially the government)</li> </ul>
Woman group	<ul style="list-style-type: none"> <li>• Group strengthening to produce new products with the support from local communities and also investment from outside.</li> </ul>

## 12.0 Conclusion

There is no single efficient fisheries management system. The successful system must be based on cultural, physical factors, economic and scientific information. In addition, the system must be established and implemented by stakeholder and government officer, or so call co-management system. Fisheries resources in the Songkhram is the common property that need management system to ensure that resources will conserved and provide high and equal benefit to the local people for sustainable uses.

## 13.0 Reference

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