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# Drift of fish fry and larvae in five large tributaries of the Tonle Sap-Great Lake system in Cambodia

THACH Phanara\*, CHEA Tharith and Kent G. HORTLE

Assessment of Mekong Capture Fisheries Component, Mekong River Commission and Inland Fisheries Research and Development Institute Department of Fisheries, PO Box 582, Phnom Penh, Cambodia

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## ABSTRACT

Drift of fish fry and larvae has been studied for several years in the Mekong, Tonle Sap and Bassac Rivers near Phnom Penh (Tharith and Touch 2001), (Tharith, Sopath and Thach 2002), (Tharith, Thach and Hortle 2003), (Tharith, Thach and Hortle 2004), (Tharith, and Thach 2006). These studies have shown that important spawning areas are in the Mekong and major tributaries upstream of Kratie. The larvae and fry resulting from spawning in these areas colonize the Tonle Sap - Great Lake floodplain system. There are no comparative data for the many tributaries of the Tonle Sap-Great Lake system from other studies. This pilot study was carried out to investigate the abundance of larvae/fry in these tributaries during the period of rising waters, which is when fish fry and larvae are abundant in the Mekong. Larvae and juvenile stages of fish were collected from June to December 2005 (during the wet season and early dry season) in five large tributaries. We sampled at sites 20 to 50km upstream of the seasonally flooded areas. We used a small seine net, 1.5m long, 1.2m deep with 1mm mesh size and we sampled for about 4 hours when we visited each site. Sites were visited once in June and in July, and twice in August, September and December. In the five tributaries under investigation, we identified 131 species, and there were on average 55 to 70 species in the samples from each tributary. The abundance and number of species appeared to be related to the size of the tributary and the quality of the habitat. Some tributaries still have riparian forests that are intact and good water quality in their upper reaches, or have good floodplain habitat. The numbers of most species in samples increased over the period of the study, probably because of spawning in the tributaries. The fish fauna of each tributary was quite distinctive with only two tributaries, Staung and Chinit, having similar fish fauna. The fry of the main commercial species (e.g. *Henicorhynchus* spp. and Pangasid catfishes) which are very abundant in the drift from the Mekong are rare or absent in the tributaries. If spawning of these fish in - and migration from - the Mekong are affected by development, the Tonle Sap tributaries are not likely to provide a replacement source of fry for these key species.

KEYWORDS: fish fry, fish larvae, Tonle Sap, Mekong, Staung, Sangker, Pursat, Sen, Chinit, Great Lake

## INTRODUCTION

Migration is one of the most important events in the life cycle of many fish species and other animals. Migratory behavior of many fish species is intimately linked to current flows in the area where any particular fish population is found. The overall direction of fish movement with respect to the current may change many times during the life cycle of any particular species. The Sangker and Pursat Rivers flow into the southwest side of the Great Lake. The Staung River flows into the northeast side of the Great Lake. The Sen River enters the Great Lake near the Tonle Sap. The Chinit River enters the Tonle Sap River downstream of the Great Lake from the northeast.

## OBJECTIVES

- To identify of larval and fry fish in five tributaries.

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\* Development Institute and Mekong River Commission Department of Fisheries, PO Box 582, Phnom Penh, Cambodia

- To examine species abundance in each tributary.
- The relative of specie numbers in each site.

## METHODS

Sampling was carried out around the Great Lake in five large tributary rivers. These were the Sangker, the Pursat, the Staung, the Sen and the Chinit River. We sampled 20-50km upstream of the seasonally flooded areas.

Fish larvae were collected from June to October 2005. Sampling took place for about 4 hours when each site was visited. Samples were collected by a small seine net, 1.5m long, 1.2m deep and with 1mm mesh size. Samples were preserved immediately in 8 per cent formalin solution.

### *Fish larvae identification*

Fish larvae and juveniles were identified from various sources of literature; Rainboth (1996), Termvidchakorn (2003) and Chevey (1930).

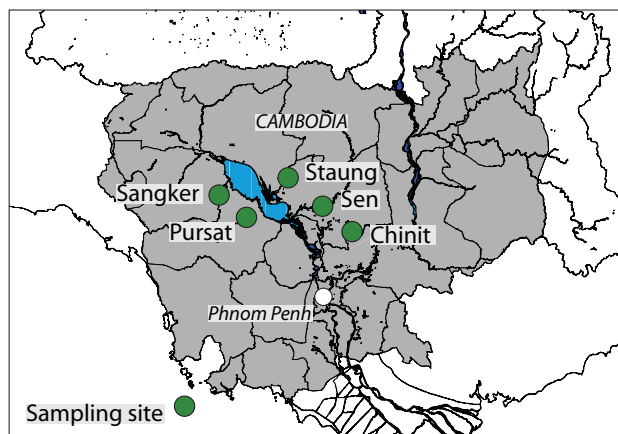


Figure 1. Sampling sites were 20 to 50 km upstream from the Great Lake



Figures 2 and 3. Sampling activities (left) and larvae/fry fish caught by small seine net (right)

## RESULTS

Over the period of study, we have identified the following regarding larvae/fry:

1. Seventy-three species, in 18 families in the Pursat tributary
2. Fifty-four species, in 11 families in the Staung tributary
3. Seventy-one species, in 17 families in the Chinit tributary
4. Seventy-three species, in 20 families in the Sangker tributary
5. Eighty-five species, in 20 families in the Sen tributary

Eighteen species were found to be present in all five tributaries, and amounted to greater than 0.76 per cent of the total numbers of species recorded in all five tributaries (Table 1). The numbers of these species differs by site. The Chinit and Sen River have an above-average numbers of species, and two sites in the Staung and the Pursat tributaries have a below-average numbers of species. The most abundant families were Clupeidae, Sundasalangidae and Cyprinidae. Early life-cycle stages of *Henicorhynchus siamensis* were found in the Sen River. The species *Chela laubuca* was only found at a juvenile stage in the Staung River in August.

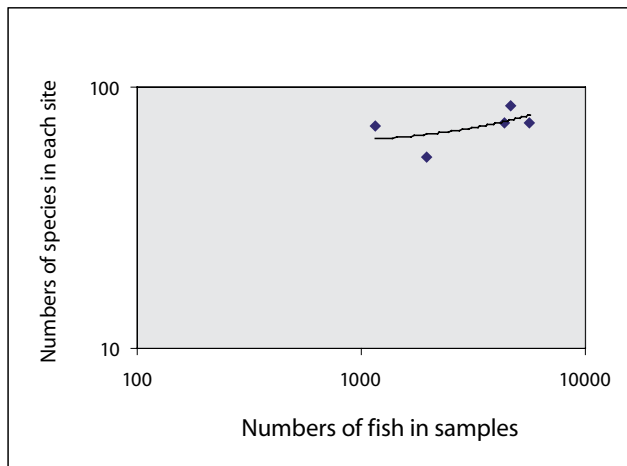


Figure 4. Numbers of species in each tributary related to the numbers fish in samples

For the sites at the Sen and Chinit tributaries, the line indicates that these tributaries have an above-average number of species (Figure 4).

For the sites at the Pursat, Sangker and Staung tributaries, the line indicates that these tributaries have a below-average number of species (Figure 4).

Table 1. Species abundance in each tributary

Species name	Quantities	Chinit	Pursat	Sangker	Sen	Staung
<i>Acantopsis sp.1</i>	420	136	33	46	68	137
<i>Acantopsis sp.2</i>	217	111	32	15	53	6
<i>Amblypharyngodon chulabhornae</i>	169		18	15	9	127
<i>Clupeoides borneensis</i>	5090	42	605	3707	600	136
<i>Esomus longimanus</i>	221	19	75	14	6	107
<i>Esomus metallicus</i>	201	26	80	60	5	30
<i>Hypsibarbus malcolmi</i>	539	2			537	
<i>Labiobarbus kuhli</i>	151	12		29		110
<i>Mystacoleucus marginatus</i>	1674	11	327	33	1303	
<i>Mystacoleucus sp.</i>	444		112	332		
<i>Opsarius koratensis</i>	614	56	40	463	13	42
<i>Parachela oxygastroides</i>	1019	43	7	41	173	755
<i>Parambassis siamensis</i>	686	56	131	5	344	150
<i>Rasbora aurotaenia</i>	582	207	13	128	234	
<i>Rasbora dusonensis</i>	259	13	1	224	7	14
<i>Rhinogobius mekongianus</i>	213				213	
<i>Sundasalanx n sp.</i>	2371		2348	18	5	
<i>Xenentodon cancila</i>	132	22	6	72	12	20

Table 2. Numbers of species by family at each site

Family	Chinit	Pursat	Sangker	Sen	Staung	Total Numbers of species
Akysidae	*	1		1	1	3
Anabantidae	*	*	1	*	*	1
Bagridae	2	*	3	5	3	13
Balitoridae	2	2	4	1	3	12
Belonidae	1	2	2	2	2	9
Belontiidae	1	3	2	*	*	6
Chandidae	1	2	1	2	1	7
Channidae	*	*	1	*	*	1
Clupeidae	3	3	2	2	3	13
Cobitidae	9	10	10	10	7	46
Cyprinidae	40	37	33	41	27	178
Eleotridae	*	1	*	1	*	2
Gobiidae	*	*	1	2	*	3
Gyrinocheilidae	1	*	1	1	*	3
Hemiramphidae	1	1	2	1	1	6
Mastacembelidae	3	4	3	4		14
Moxotidae	*	1	1	1	*	3
Nandidae	1	1	*	*	1	3
Notopteridae	*	*	1	*	*	1
Pangasiidae	2	1	2	2	*	7
Phallostethidae	*	1	*	*	*	1
Polynemidae	*	*	*	1	*	1
Schilbeidae	1	*	*	*	*	1
Siluridae	1	1	1	4	5	12
Sisoridae	*	1	*	*	*	1
Soleidae	1	*	1	2	*	4
Sundasalangidae	*	1	1	1	*	4
Tetraodontidae	1	*	*	*	*	1

Note: \* species not present at sampling site.

## DISCUSSION

We think that some juvenile fish species, during their migrations from the Mekong, have been affected by various water-related development projects. We consider that during the period of rising water, many species of fish migrate from the Great Lake into the Sen River for spawning. For example, juvenile *Henicorhynchus* spp. were found in the Sen River during our study. However, the intensity and duration of fish migrations at specific locations can be very different. Sometimes, the sampling produced only a single specimen, whereas in other cases sampling over a period of a few days produced hundreds or even thousands of specimens, and at different stages of development. For *Henicorhynchus* spp., the migrations appear to be particularly complex as observed in the Sangke tributary and at other sites. For one particular species (*Chela laubuca*) migrations only seemed to occur during juvenile stages in the Stung tributary.

## ACKNOWLEDGEMENTS

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