Fish larvae during the dry season in the Tonle Sap River

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ABSTRACT

Drift of fish fry and larvae from the Great Lake only occurs at certain times of the year in the Tonle Sap River near to Phnom Penh. This study aims to examine fish larval drift during the dry season and their numbers in the Tonle Sap River. Larval and juveniles fish were collected three times per week, four times per day (06:00, 12:00, 18:00 and 24:00 hours) from January to April 2004 using a *Bongo* net. The results indicated that some species may have recently spawned in the Tonle Sap River, or the Great Lake, prior to sampling. Three species were found to be most abundant. These were *Brachygobius mekongensis* (21%) *Sundasalanx praecox* (18%) and *Clupeoides borneensis* (26%). Together these three species accounted for 65% of the total number of species occurring in samples. We examined 35 larval fish species, occurring in 18 families in the Tonle Sap River. Only a small number of the *Pangasius* genus were found, and then only during the middle of April.

KEYWORDS: Tonle Sap River, larvae, sampling, species occurrence, Cambodia

INTRODUCTION

The Tonle Sap River connects Cambodia's Great Lake and the Mekong River. It joins the Mekong in Phnom Penh, where the Mekong splits into two branches; the Mekong mainstream and the Bassac River. A remarkable hydrological phenomenon takes place during the annual flooding of the Mekong River. Forced by enormous quantities of water transported down the Mekong, the Tonle Sap River changes direction and flows upstream to the Great Lake for about 4 months, until the floods subside and the river resumes its normal course. The spawning grounds and distribution of fish in the dry season (January to April) in the Tonle Sap River is poorly documented. Mainly, it is only the smaller species of fish that spawn in the Tonle Sap during the dry season months. Previous studies have shown that greater numbers of fish spawn in the Tonle Sap River and the Great Lake during the rainy season months (Chevey 1930, Chea et al., 2002, Tung Bao and Tuan 1998, Tung 2002). The results indicated that floods are important ecological events in the life cycle of fish. Knowledge about fish eggs and larvae of freshwater fish is of great importance to the establishment of management regimes and fisheries protection rules and regulations. The main objectives of this study were to examine larvae that apparently spawn in the dry season, and to determine their relative abundance in the Tonle Sap River.

MATERIALS AND METHODS

Sampling locations

Samples were collected in the Tonle Sap River at Phnom Penh (Figure 1)

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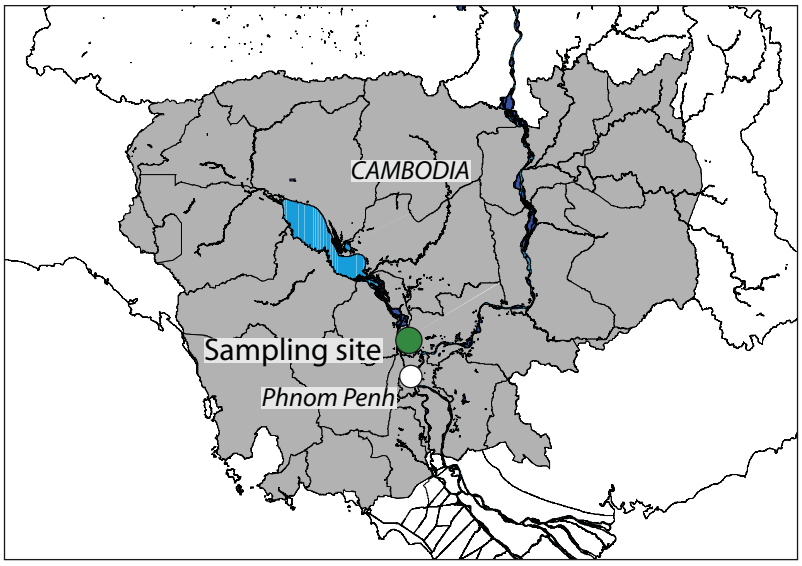

Figure 1. Sampling location

Sampling time

Samples were collected three times per week and at four times per day on sampling days (06:00, 12:00, 18:00 and 24:00 hours) by a *Bongo* net. The dimensions of the *Bongo* net were 1 metre in diameter at the mouth; 5 metres in length and 1 mm mesh size. The net was placed 2 meters below the water surface (Figure 2). Fish larvae and juveniles were preserved immediately after capture in 8 per cent formalin solution.

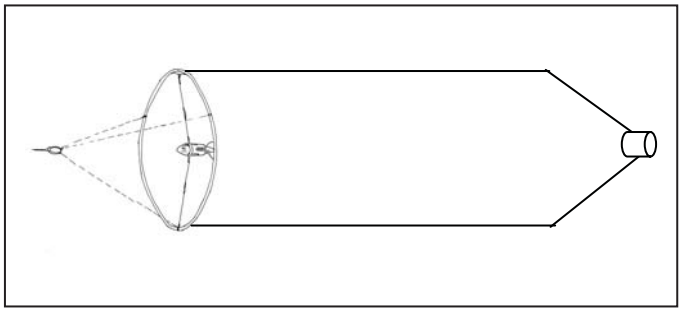

Figure 2. The Bongo net used for collecting fish larvae

Fish larvae identification

Fish larvae and juvenile fish species were identified using Rainboth (1996), Termvidchakorn (2003) and Chevey (1930).

Counting and sub-sampling

All fish larvae from each sample were counted and preserved. Sometimes a sample consisted of several thousand tiny larvae mixed with lots of organic material. In such cases, we resorted to sub-

sampling. Sub-sampling carried out using the following procedure:

Weigh the total sample. Take three sub-samples from different parts of the sample. Weigh each sub-sample individually. Identify all species in the sub-sample and count them. Estimate the number of larvae in the full sample according to the following formula:

$$Ntotal = \frac{N1}{W1} + \frac{N2}{W2} + \frac{N3}{W3} * \frac{Wtotal}{3}$$

N_{total} = Number of larvae fish in the sample

N_1 = Number of larvae fish in the sub-sample one

N_2 = Number of larvae fish in the sub-sample two

N_3 = Number of larvae fish in the sub-sample three

W_{total} = Weight of larvae fish sample

W_1 = Weight of sub-sample one, W_2: Weight of sub-sample two, W_3: Weight of sub-sample three

Flux velocity calculated by the expression:

$V = ((n*f)/999999/t$; $V1 = [((n*f)/999999)*\phi 2 *\pi]/4$

Where: V= flux velocity (m/s); V1= volume, n = number turns of flow meter; f = calibration factor of flow meter (26.873); t = time of exposure

RESULTS

Over the period of study, we counted 6,485 fish larvae represented in 35 families caught during sampling in the Tonle Sap River. Three families were found to be most important. These were Clupeidae (26.18%), Gobiidae (30.38%) and Sundasalangidae (17.83%). *Clupeoides borneensis* was the most abundant species (Table1). Larvae of the *Tetraodon* genus were found in January. Larvae of *C. borneensis* were found from January to February and larvae of *B. mekongensis* were found in February. In addition, larvae of *Sundasalanx praecox* were found from February to March and larvae of the Pangasidae family were encountered during the middle of April (Table 2 and Figure 3).

Table 1. *Numbers and frequencies fish of larvae/fry collected in the Tonle Sap River from January to April 2004*

Species name	Number	% of total number	Frequency	(%)Frequency
Homaloptera zollingeri	20	0.31	10	2.05
Parambassis sp	314	4.84	30	6.16
Parambassis wolffii	175	2.70	7	1.44
Parambassis ranga	96	1.48	13	2.67
Channa micropeltes	33	0.51	5	1.03
Clupeichthys aesarnensis	9	0.14	6	1.23
Clupeoides borneensis	1678	25.88	96	19.71
Corica laciniata	11	0.17	5	1.03
Botia lecontei	2	0.03	1	0.21
Amblypharyngodon chulabhornae	23	0.35	1	0.21
Cyclocheilichthys furcatus	2	0.03	2	0.41
Henicorhynchus spp	334	5.15	34	6.98
Hypsibarbus lagleri	2	0.03	1	0.21
Parachela oxygastroides	2	0.03	2	0.41
Puntioplites proctozysron	6	0.09	1	0.21
Rasbora paucisqualis	14	0.22	9	1.85
Rasbora sp2	4	0.06	1	0.21
Rasbora spilocerca	7	0.11	4	0.82
Sikukia stejnegeri	2	0.03	2	0.41
Puntius partipentazona	1	0.02	1	0.21
Oxyeleotris marmorata	300	4.63	31	6.37
Lycothrissa crocodilus	1	0.02	1	0.21
Acentrogobius viridipunctatus	3	0.05	1	0.21
Brachygobius kabiliensis	1356	20.91	71	14.58
Glossogobius sparsipapillus	611	9.42	41	8.42
Xenentodon cancila	3	0.05	3	0.62
Mastacembelus armatus	9	0.14	1	0.21
Pristolepis sp.	26	0.40	8	1.64
Pangasianodon hypophthalmus	59	0.91	1	0.21
Pangasius conchophilus	7	0.11	1	0.21
Pangasius larnaudiei	7	0.11	1	0.21
Pangasius siamensis	47	0.72	1	0.21
Sundasalanx praecox	1156	17.83	76	15.61
Ichthyocampus carce	14	0.22	8	1.64
Tetraodon sp.	151	2.33	11	2.26
Total	6485		487	

DISCUSSION

We found that larvae of *S. praecox, B. mekongensis, C. borneensis, G. sparsipapillus* and *Tetraodon* spp., in the Tonle Sap River from January to March 2004. This suggests that they may spawn during the dry season months. However, they may of course spawn at other times of the year also. We have identified the juvenile life-cycle stages of 35 species of fish, represented in 18 families of fish in the

dry season months of January to April 2004. We also observed *Puntius partipentazona* larvae in the Tonle Sap River, and some larval stages of the Pangasiidae family in the middle of April 2004 in the Tonle Sap River.

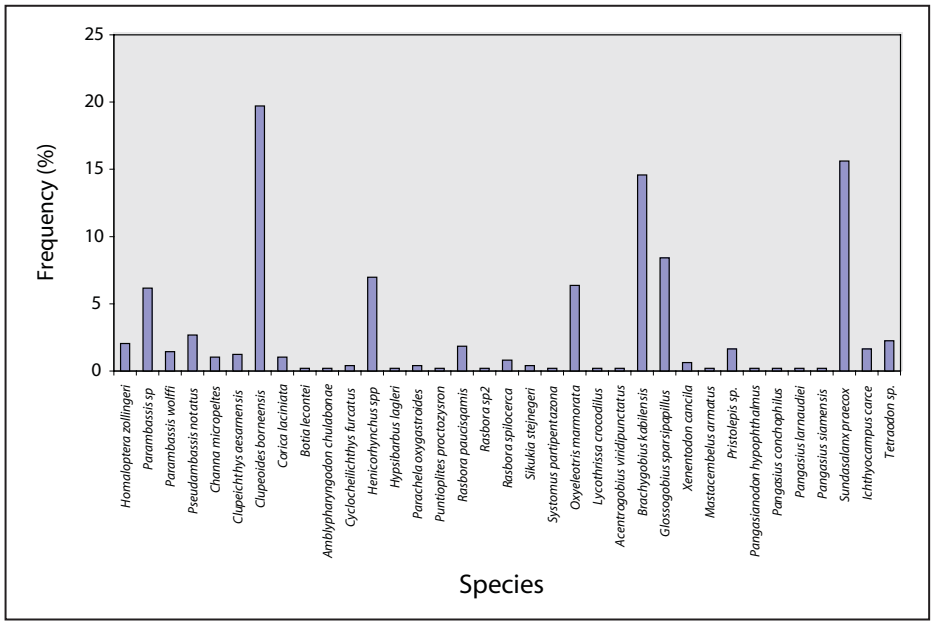

Figure 3. Species and frequencies of fish larvae collected from the Tonle Sap River from Jan. to Apr. 2004.

Table 2. *Overview of fish larvae collected by family from the Tonle Sap River from Jan. to Apr. 2004.*

Family	Total No. of individuals	Total No. of individuals (%)	Frequency (%)
Gobiidae	3	0.05	0.21
Hemiramphidae	3	0.05	0.62
Chandidae	175	2.70	1.44
Clupeidae	1698	26.18	21.97
Engraulidae	1	0.02	0.21
Cobitidae	2	0.03	0.21
Cyprinidae	397	6.12	11.91
Syngnathidae	14	0.22	1.64
Sundasalangidae	1156	17.83	15.61
Balitoridae	20	0.31	2.05
Chandidae	410	6.32	8.83
Channidae	33	0.51	1.03
Eleotridae	300	4.63	6.37
Gobiidae	1967	30.33	23.00
Nandidae	26	0.40	1.64
Pangasiidae	120	1.85	0.82
Mastacembelidae	9	0.14	0.21
Tetraodontidae	151	2.33	2.26
Total	6485		

ACKNOWLEDGEMENTS

The authors would like to thank Assessment of Mekong Capture Fisheries Component, MRC Fisheries Programme for financial support. We also thank the Department of Fisheries for providing facilities for this study.

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