MASS MORTALITY OF *MACROBRACHIUM* JUVENILES IN RIVER CAUVERY, SOUTHERN INDIA

P. Mariappan and Chellam Balasundaram

Crustacean Aquaculture and Behaviour Unit, Department of Animal Science, Bharathidasan University, Tiruchirapalli, Tamil Nadu 620024.

Introduction

Abiotic and biotic factors greatly influence the survival and growth of a community in a given ecosystem. Temperature, pH, dissolved Oxygen, salinity and substrate are the major abiotic parameters studied widely in aquatic crustacean communities (Flynn & Hobbs, 1984; Lodge & Hill, 1994). In the red swamp crayfish, *Procambarus clarkii*, an ambient temperature rise above 32.2° C resulted in enhanced mortality due to temperature induced premature onset of premolt (Culley & Duobins-Gray, 1990). In signal crayfish *Pacifastacus leniusculus*, light intensity exerts a direct effect on survival (Nystrom, 1994). Like abiotic factors a number of biotic factors also exert an equally important effect on survival and regulation of the population dynamics (Hill *et al.*, 1993; Ranta & Lindstrom, 1993). Habitat destruction by human activities contributes a substantial mortality of aquatic community (Pandian, 1980).

This paper reports the occurrence of mass mortality of freshwater prawns in the vicinities of Grand Anicut in river Cauvery near Tiruchirapalli between May and June 1998.

Study Area and Methods

River Cauvery, one of the major perennial rivers of Indian peninsula, originates from the Brahmagiri Hills of the Western Ghats in the Coorg District of Karnataka State and flows in southeasterly direction across the plateau. It enters into Tamil Nadu as Hogenakal falls and runs towards east to form the delta where it splits into numerous tributaries crisscrossing the delta before draining into the Bay of Bengal (Anonymous, 1993a). Mettur Dam the major reservoir of river Cauvery in Tamil Nadu is the only water provider to the Cauvery Delta. The reservoir opens on 12 June for irrigation and is closed during 28 January every year. However, since 1974 the date of opening is extended even up to 29 July due to inter state disputes in water sharing (Anonymous, 1993b) and the amount of water available varies widely from 70 to 250 TMC. On discharge from Mettur Dam the released water takes 90 +/- 5 hours to reach the Grand Anicut complex where from the water is discharged through five branches i.e., Cauvery, Vennar, Ullar, Grand Anicut and Uyyakondan Canal for irrigation (Anonymous, 1993b). Following the closing of the Mettur Dam, in January a minimum flow of water prevails up to the Grand Anicut. Beyond Grand Anicut, the tributaries run an average distance of 120 kms before confluencing with the sea. In this stretch even the minimum flow is absent except in Ullar and the bed in the other tributaries dries up completely during the months of March through July. At this time fishing operation is intensified with shore seines and cast nets up to March to exploit marketable fishes and prawns. There are permanent water holes situated near the riverbanks where further fishing is done by pumping out the water. Since the minimum flow of water is reduced stagnant temporary puddles of irregular shape and size numbering 10-15 per acre are formed (about 0.25-1m in depth and 3-20m in perimeter) which dry up subsequently. The younger fishes and prawns trapped in these puddles suffer total mortality and decay.

Seven puddles near Grand Anicut were randomly selected and immediately after the water body became dry the number of dead prawns and fishes were counted. Totally 6248 prawns and fishes were collected which includes 6204 (99.29%) juveniles of prawns and only 44 fishes (0.70%). Prawns were further sorted species wise; *Macrobrachium lamarrei* and *M. nobilii* were the two species available in this collection. *M. lamarrei* (82.93%) is more abundant than *M. nobilii* (16.35%) (Fig. 1). No other species were available at the time of collection. The mean value of the samples recorded in the seven puddles are 82.27 +/- 2.81 for *M. lamarrei* and 16.32 +/- 2.62 for *M. nobilii*.

The dial variations in temperature recorded in the puddles showed a minimum of 25° C at 0600 hrs, which increase up to a maximum of 38.5° C between 1300-1600 hrs. Such increase in temperature along with reduced dissolved oxygen led to mortality before drying up of the puddle. Fish mortality due to hypoxia and high temperature was recorded in a shallow freshwater lake recently (Venugopalan *et al.*, 1998). To circumvent this unusual situation of total drying up in the tail end area in between the Grand Anicut and estuary which leads to such mass mortality a minimum flow of water must be maintained round the year up to the estuary to ensure the stability of a viable ecosystem.

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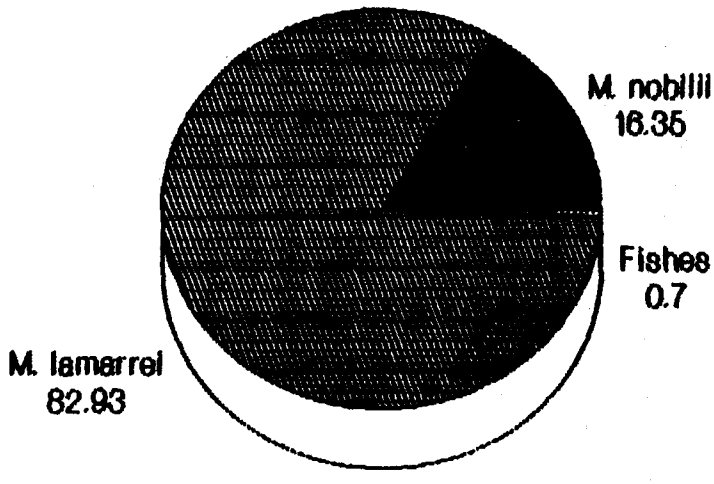

Figure 1. Percent mortality of prawns and fishes found in the freshly dried puddles (n=7)

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References

Anonymous (1993a). The Grand Anicut. In: *Selected papers on irrigation* (Ed. A. Mohanakrishnan), Irrigation Management Training Institute, Tiruchirapalli. Publication no: 9, Pp. 103-124.

Anonymous (1993b). Mettur Dam-Engineer's pride. In: *Selected papers on irrigation* (Ed. A. Mohanakrishnan), Irrigation Management Training Institute, Tiruchirapalli. Publication no: 9, Pp 174-203.

Culley, D.D. and L. Duobinis-Gray (1990). *Culture of the Louisiana soft crawfish: a production manual.* Louisiana Sea Grant College Programme, Louisiana State University, Baton Rouge, USA.

Flynn, M.F. and H.H. Hobbs (1984). Parapatric crayfishes in southern Ohio: evidence of competative exclusion? *J. Crust. Biol.*4: 382-389.

Hill, A.M., D.M Sinars and D.M. Lodge (1993). Invasion of an occupied niche by the crayfish *Oreconectes rusticus*: potential importance of growth and mortality. *Oecologia.* 94: 303-306.

Lodge, D.M and A.M. Hill (1994). Factors governing species composition, population size and productivity of cool-water crayfishes. *Nordic J. Freshw. Res.* 69: 111-136.

Nystrom, P. (1994). Survival of juvenile signal crayfish (*Pacifastacus leniusculus*) in relation to light intensity and density. *Nordic J. Freshw. Res.* 69: 162-166.

Pandian, T.J. (1980). Impact of dam-building on marine life. *Helgolander wiss Meeresunters.* 33: 415-421.

Ranta, E. and K. Lindstrom (1993). Body size and shelter possession in mature signal crayfish, *Pacifastacus leniusculus. Ann. Zool. Fenn.* 30: 125-132.

Venugopalan, V.P., K. Nandakumar., R. Rajamohan., R. Sekar., and K.V.K. Nair (1998). Natural eutrophication and fish kill in a shallow freshwater lake. *Curr. Sci.* 74: 915-917.