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ORIGINAL ARTICLE

# Seasonal Availability Of Freshwater Prawn Macrobrachium SPP. In Thamiraparani River In Tamil Nadu, India

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**Abstract:**

*Freshwater prawns are important in the capture and culture fisheries scene and are extensively distributed in freshwater and estuaries of the world mostly in tropical and sub tropical belts. A report on the prawn fishery of the perennial river Thamiraparani. The river Thamiraparani originates as Agastyamalai (Pothigai hills) on the eastern slopes of the western ghats at an altitude of 2000 M and it confluences with the Bay of Bengal at Gulf of Mannar after traversing a distance of 120 kms. Thamiraparani river has been considered as the second perennial river of Tamil Nadu. This river basin has been known to contain more potentials of freshwater prawns. Thamiraparani is the chief river of the Tirunelveli district which has a large network of tributaries. The seasonal availability of freshwater prawns were observed in four stations of Thamiraparani river basin. Environmental factors is an important, one which controls all the biological reactions of the aquatic organism. This basin rainfall is highly benefitted by the North-east monsoon (October to December). The availability of prawns is dependent only in and after monsoon periods. In this basin totally 8 species are collected. The present paper deals with the seasonal availability of the freshwater prawn is discussed.*

**KEY WORDS:**

Freshwater prawn, Macrobrachium sps. Thamiraparani river, Seasonal availability

## INTRODUCTION

Freshwater prawns are found in most inland freshwater areas lime lakes, rivers, swamps, irrigation channels, canals and ponds as well as estuarine areas (Banerjee, 2003; Arumugam and Charles, 2012). The Palaemonidae includes 60 species under the genus Macrobrachium. There are more than 25 species under the former family which is commercially important whereas the latter with 20 species judicious utilization of these resources is of prime importance (Reddy, 1996; Soundarapandian et al., 2008; Jayachandran and Indira, 2010). Macrobrachium is chosen for culture for the ease with which they mature, mate and spawn in captivity (Wickins, 1976). This prawn farming, all over the world has registered increase in the past decade. In India, a spurt in freshwater prawn farming activities can be seen in the recent years (Nambudiri, 2003). The freshwater prawn farming is popular in South East Asian countries but it has not

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gained much progress in India, until recently, although freshwater prawns are a high priced product and have a high market demand in both domestic and export markets (Radheyshyam, 2009). Macrobrachium prawn farming has the potential to revolution, the rural aquaculture, considerable employment and income could be generated, there by bringing prosperity to rural poor people (Parameshwaran, 1994; Murthy et al., 2008). Freshwater prawn culture has occupied a significant position in inland aquacultural practices. Although India has vast freshwater resources for aquaculture, these are generally being exploited for carp and other finfish culture that too in a limited scale. The practice of culturing prawn in ponds is flourishing because growing prawn in ponds is proving a more useful practice than to catch them from lakes, rivers, canals or streams and estuaries (Banarjee, 2003).

Prawn culture has come to occupy an important position in India in view of the export value. The culture of marine prawns in the coastal areas need construction of ponds with high investment, where as the infrastructure facilities such as seasonal tanks and ponds are readily available for the culture of freshwater prawn as in the case of inland fish culture (Nalluchinnapan, 1985). Tamil Nadu is estimated that about 1,58,100 ha. of freshwater bodies in the form of tanks, ponds, lakes, rivers, reservoirs, etc. are available in the state so, many Macrobrachium species available in Tamil Nadu water bodies (Arumugam, 2011). Thus, there is a vast scope for freshwater prawn culture possibilities in Tamil Nadu, but only in certain pockets where freshwater prawn culture is being practiced and only few farmers concentrate regularly (Vijila, 2003).

## MATERIALS AND METHODS

### Sample collection

The river Thamiraparani originates at Agastyamalai (Pothigai hills) on the eastern slopes of the Western Ghats at an altitude of 2000 m and it confluences with the Bay of Bengal at Gulf of Mannar after traversing a distance of 120 kms. The total area of the basin is 5969 Sq. Km. of which hilly catchment area (Western Ghats) is 688 Sq. Km. Thamiraparani is the chief river of the Tirunelveli district which has a large network of tributaries which includes the Peyar, Ullar, Karaiyar, Servalar, Pampar, Manimuthar, Varahanathi, Ramanathi, Jambunathi, Gadananathi, Kallar, Karunaiyar, Pachaiyar, Chittar, Gundar, Aintharuviar, Hanumanathi, Karuppanathi and Aluthakanniar (Anonymous, 2003 and Ganesh, 2006). The stations of Thamiraparani River Basin fixed for sample collection for the study period are Papanasam Reservoir, Manimuthar Reservoir, Pillaiyarkulam Anicut and Punnaikayal (Map 1).

Prawns were collected by using a scoop net. A bag shaped nylon net with mesh size of approximately 1mm is attached to the frame by needle work. The scoop net is held by one hand and is pushed forward – upward along the bottom or along a stem. Collected prawns were fixed in 1-2% formalin in the collection spot. Then they were taken to the laboratory and preserved in 5-10% formalin. Later the specimens were identified using relevant literatures and the original description of Henderson and Matthai, (1910); Holthuis, (1950); Charles, (1984, 1996); Jalihal et al., (1988); Jayachandran, (2001); Mariappan and Jasmine, (2006); Valarmathi, (2009).

## ENVIRONMENTAL CHARACTERS

The environmental factors play a major role in the breeding season of freshwater prawns (Valarmathi, 2009). The seasonal abundance of all the Macrobrachium prawn species collected regularly from Thamiraparani river basin influenced by the main environmental factors such as rainfall, temperature and relative humidity were studied. These environmental factors were collected from PWD, Water Resources Organization in Taramani, Government of Tamil Nadu.

## STATISTICAL ANALYSIS

To evaluate the statistical significance of the prawn species and environmental factors was applied by analysis of variance (one-way ANOVA) and if significant differences were found ($P<0.01$) the least significant differences, Duncan Multiple Range Test was applied (SPSS Software).

## RESULT

The Thamiraparani is in the far south of India. The Thamiraparani is one of the only two perennial rivers in Tamil Nadu, the other being Cauvery. The seasonal availability of freshwater prawns were observed in four stations of this river basin such as Papanasam Reservoir, Manimuthar Reservoir, Pillaiyarkulam Anicut and Punnaikayal. In this basin a large number of prawns are collected in Manimuthar Reservoir. There are 8 species are collected in this river basin. Papanasam 42 km. from Tirunelveli. This plave is on the western ghats of Pothigai hills. It is close to the Papanasam falls on the banks of the Thamiraparani river. M. malcolmsonii, M. idae, M. nobilii, and M. lamarrei are available in this reservoir. Manimuthar Dam 47 km. from Tirunelveli. The Manimuthar reservoir was built across Manimuthar river. The main objective of the reservoir is to supplement the supplies to the Thamiraparani ayacut. The following prawns are available in this station viz. M. malcolmsonii, M. lamarrei, M. rude, M. nobilii and M. idea. The Pillaiyarkulam Anicut across Chittar river. This river is the tributaries of Thamiraparani. It is in the Therkuvagaikulam village in Tirunelveli taluk on the right side of the anicut a supply channel called Pillaiyarkulam channel takes off. This anicut contains three prawns namely M. lamarrei, M. scabriculum, and M. idea. Punnaikayal is a coastal village in Alwartirunagari block in Tuticorin district. Mangrove forests border the northern side of the Punnaikayal estuaries. M. malcolmsonii, M. lamarrei, M. rosenbergii, and M. idella has been collected in punnaikayal (Table 1). M. lamarrei is available in all the study areas and throughout the year. This prawn is abundantly available in Pillaiyarkulam study area. In August to December months a maximum number of M. malcolmsonii are collected in Punnaikayal study areas. M. idae is the dominant species of Papanasam Reservoir. A maximum number M. idae is collected during the July to February periods in this basin. During the months July to January a maximum number of M. scabriculum are collected in Pillaiyarkulam Anicut. A maximum number of M. nobilii and M. rude were collected in October to December. M. rosenbergii and M. idella are available in Punnaikayal study areas because this study area confluence of sea water. October to December months a maximum number of M. rosenbergii was collected.

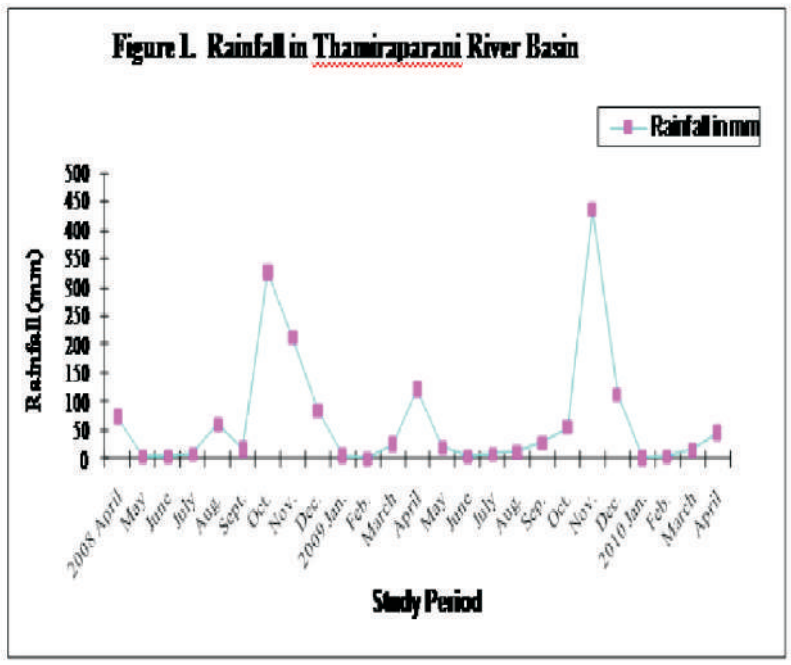
**Table 1. Macrobrachium prawns collected in Thamiraparani river basin**

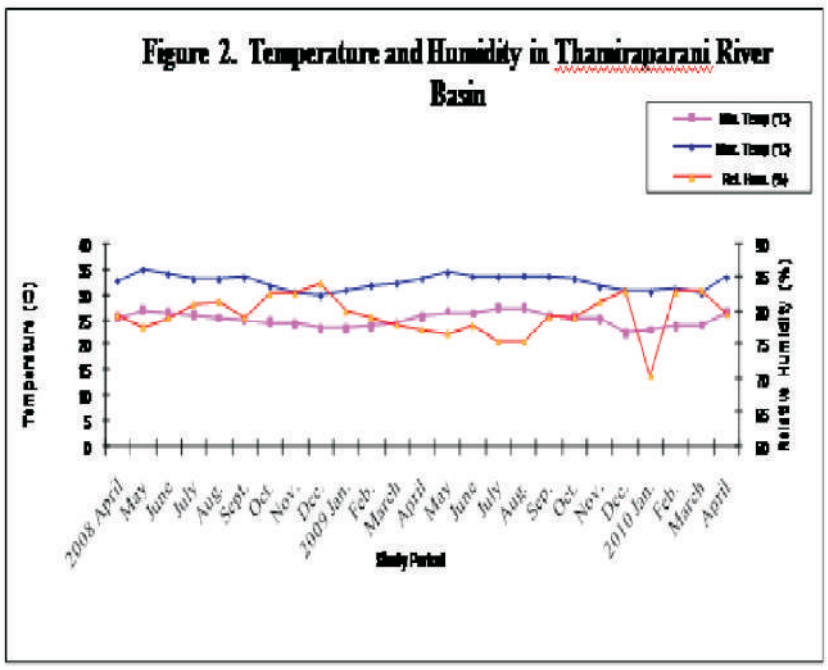
| Sl. No. | Thamiraparani River System | Freshwater Prawns |
|---|---|---|
| 1. | Papanasam Reservoir | *M. lamarrei*<br>*M. malcolmsonii*<br>*M. idea*<br>*M. nobilii* |
| 2. | Manimuthar Reservoir | *M. lamarrei*<br>*M. malcolmsonii*<br>*M. rude*<br>*M. nobilii*<br>*M. idae* |
| 3. | Pillaiyarkulam Anicut | *M. lamarrei*<br>*M. scabriculum*<br>*M. idae* |
| 4. | Punnaikayal | *M. lamarrei*<br>*M. malcolmsonii*<br>*M. idella*<br>*M. rosenbergii* |

Thamiraparani river basin has an total area of 5,969 sq. kms. spread over in two districts namely Tirunelveli and Thoothukudi. Thamiraparani river basin has an average monsoon rainfall, maximum and minimum found to be 434.33mm and 2.78mm respectively. In this basin rainfall is highly recorded in Tiruchendur raingauge station 581.0mm during the North-east monsoon of November 2009. The average monsoon rainfall of maximum and minimum is found to be 434.33mm and 2.78mm respectively. This basin is highly benefitted in North-east monsoon periods (October to December) with a maximum of 434.33mm. November 2008 and December 2009 recorded 210.08mm and 112.09mm respectively (Table 2 and Figure 1). In North-east monsoon Alagaipandiapuram, Ambasamudram, Cheranmadevi, Kalakadu, Palayamkottai, Kayalpattinam, Kayathar, Thoothukudi, Tiruchendur and Vilathikulam raingauge stations are getting more amount of rainfall. North-east monsoon plays a very significant role in water potentials of this basin. The average temperature minimum and maximum is found to be 22.49°C and 34.84°C respectively. Generally the temperature is low during December to February and high during May and June. The relative humidity is high during the monsoon periods. The relative humidity minimum and maximum is found to be 75.50% and 84.20% respectively (Table 2 and Figure 2).

**Table 2. Temperature, Rainfall and Humidity of Thamiraparani River Basin from April 2008 to April 2010**

| Year and Month | Temperature | | Rel. Hum. (%) | Rainfall (mm) |
|---|---|---|---|---|
| | Min. Temp (°C) | Max. Temp (°C) | | |
| 2008 April | 25.58 | 32.73 | 79.51 | 117.17 |
| May | 26.87 | 34.84 | 77.75 | 34.96 |
| June | 26.53 | 33.98 | 79.01 | 47.44 |
| July | 25.93 | 32.98 | 81.17 | 241.64 |
| August | 25.38 | 32.95 | 81.50 | 160.24 |
| September | 25.19 | 33.25 | 79.17 | 150.91 |
| October | 24.59 | 31.66 | 82.65 | 337.37 |
| November | 24.24 | 30.50 | 82.69 | 186.27 |
| December | 23.51 | 29.83 | 84.20 | 34.95 |
| 2009 January | 23.34 | 30.91 | 80.00 | 0.40 |
| February | 23.97 | 31.83 | 79.10 | 0 |
| March | 24.50 | 32.15 | 78.14 | 98.19 |
| April | 25.77 | 33.06 | 77.35 | 100.34 |
| May | 26.68 | 34.20 | 76.73 | 139.96 |
| June | 26.29 | 33.44 | 77.93 | 102.48 |
| July | 27.27 | 33.38 | 75.50 | 104.36 |
| August | 27.44 | 33.60 | 75.52 | 65.93 |
| September | 25.89 | 33.44 | 79.21 | 109.06 |
| October | 25.53 | 33.08 | 79.10 | 125.03 |
| November | 25.26 | 31.50 | 81.55 | 327.65 |
| December | 22.49 | 30.84 | 83.07 | 56.93 |
| 2010 January | 23.21 | 30.55 | 70.42 | 0.10 |
| February | 23.95 | 31.00 | 83.03 | 1.32 |
| March | 24.12 | 30.24 | 83.14 | 54.49 |
| April | 26.40 | 33.29 | 79.65 | 40.75 |




Environmental factors rainfall, temperature and relative humidity show a positive and negative correlation (significant at 1, 5% level) in some species with different study areas (Table 3). Since ANOVA P value is less than 0.01 there is significance between species in all study areas at 1% level.

**Table 3. Correlation co-efficient of species between the Environmental factors in Thamiraparani River Basin**

| Study Area | Species | Minimum Temp. | Maximum Temp. | Relative Humidity | Rainfall |
|---|---|---|---|---|---|
| Papanasam Reservoir | *M. malcolmsonii* | -0.400 | -0.509* | 0.337 | 0.443 |
| | *M. lamarrei* | -0.121 | -0.267 | 0.222 | 0.515** |
| | *M. idae* | -0.658** | -0.662** | 0.293 | 0.424* |
| | *M. nobilii* | -0.199 | -0.338 | 0.357 | 0.476* |
| Manimuthar Reservoir | *M. malcolmsonii* | -0.209 | -0.416 | 0.469 | 0.517* |
| | *M. lamarrei* | -0.508* | -0.604** | 0.353 | 0.632** |
| | *M. rude* | -0.276 | -0.318 | 0.661** | 0.372 |
| | *M. nobilii* | 0.091 | -0.155 | 0.170 | 0.436 |
| | *M. idae* | -0.276 | -0.414* | 0.112 | 0.642** |
| Pillaiyarkulam Anicut | *M. idae* | -0.624** | -0.665** | 0.508** | 0.460* |
| | *M. scabriculum* | -0.571** | -0.599** | 0.110 | 0.445* |
| | *M. lamarrei* | -0.615** | -0.599** | 0.126 | 0.157 |
| Punnaikayal | *M. malcolmsonii* | -0.239 | -0.217 | 0.451 | 0.397 |
| | *M. rosenbergii* | -0.645** | 0.754** | 0.355 | 0.531* |
| | *M. lamarrei* | -0.570** | -0.677** | 0.533** | 0.553** |
| | *M. idella* | -0.568** | -0.547** | 0.324 | 0.596** |

**Note:**
1. ** denotes significance at 1% level.
2. * denotes significance at 5% level.
3. Different alphabets between species denotes significance at 5% level using Duncan Multiple Range Test.
4. ± - Standard Deviation.

**DISCUSSION**

Freshwater prawn farming is highly profitable and brings considerable socio-economic benefits to the communities, environmental and social conflicts in India (Kutty, 2005). The commercially

important freshwater prawn of India, undoubtedly occupies a dominant place by virtue of the magnitude and the value of the fishery support (Ramakrishna, 1978). It is now fully realized that inclusion of freshwater prawn in our aquaculture system will make it more productive and highly economical, besides helping increase of a healthy ecosystem (Bhamik, 2001). Comparatively a large number of prawns are collected in Manimuthar Reservoir than other study areas. Next Papanasam Reservoir are collected large number of prawns and next, Pillaiyarkulam Anicut. At last a minimum number of prawns are collected in Punnaikayal. M. lamarrei is available in all the study areas. M. malcolmsonii is available in Papanasam Reservoir, Manimuthar Reservoir and Punnaikayal but not available in Pillaiyarkulam Anicut. In August to December months a maximum number of prawns are collected in Punnaikayal study areas. M. idae is available in Papanasam Reservoir, Manimuthar Reservoir and Pillaiyarkulam Anicut but not available in Punnaikayal. M. nobilii is available in Papanasam Reservoir and Manimuthar Reservoir but not available in other two study areas. M. rude is only available in Manimuthar Reservoir not available in other study areas. M. scabriculum is only available in Pillaiyarkulam Anicut but not available in other study areas. During the months July to January a maximum number of M. scabriculum are collected in Pillaiyarkulam Anicut. M. rosenbergii and M. idella are available in Punnaikayal study areas. In large number of M. malcolmsonii, M. lamarrei, M. rude, M. idea and M. rosenbergii were collected comparing with other species. Southwest monsoon periods are getting very less amount of rainfall. The collection of species is very low numbers during these periods. Northeast monsoon plays a very significant role in water potentials of this basin.

The fluctuation in population abundance of caridean prawns may be related to environmental and biological factors because most Macrobrachium prawns show seasonal reproductive patterns. Studies of freshwater prawn populations provide an important information on species dynamics, as well as for protection of natural biodiversity. Freshwater prawn farming has the potentiality to rural aquaculture - considerable employment and income could be generated, thereby bringing prosperity to rural poor (Parameshwaran, 1994). The present work reveals the distribution and seasonal availability of 8 species freshwater prawn in Thamiraparani river basin namely, M. lamarrei, M. idae, M. rude, M. nobilii, M. scabriculum, M. idella, M. malcolmsonii and M. rosenbergii. Thamiraparani river is one of the perennial rivers of Tamil Nadu. The Thamiraparani river basin abounds in varieties of freshwater bodies such as rivers, lakes, tanks, reservoirs, perennial and seasonal ponds, stagnant pools etc. In this basin high water potential is available and also maximum number of prawns are observed in Northeast monsoon periods.

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