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# Seasonal variations in the bottom sedimental macro-nutrients and its impact on the bio-chemical profile of fresh water molluscan *Pila globosa*

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## Abstract

*The study was carried out to determine the nutrient content of important molluscs. Pila globosa, the commonly available fresh water molluscan species was selected for the ananlysis, and to investigate the size and seasonal variation of Protein, Carbohydrate, and Lipid contents from Koothaippar wetlands, between August 2013 to January 2014, covering three Seasons, Pre – Monsoon (August and September), Monsoon (October – December) and Post Monsoon (January). Low amount of protein was recorded in premonsoon season (0.0933 mg) and maximum in Postmonsoon season (0.1363mg). Minimum amount of carbohydrate was recorded in premonsoon (0.0733mg) and maximum in Postmonsoon (0.0933mg). Minimum amount of lipid present in Monsoon and Postmonsoon season (0.08mg). Total quantity of protein in region I, and low values of protein present in monsoon (0.081mg) and high during Postmonsoon season (0.153mg). The low amount of carbohydrate was present in premonsoon season 0.0643mg and maximum in monsoon season (0.161mg) in region II. This paper highlights the preliminary investigation of the bottom sedimental macro nutrients and the influence of these sedimental characteristics on the nutritive profile of Pila golobosa in two regions of Koothaippar lake ecosystem.*

**Keywords**: *Pila globosa*, Biochemical analysis, bottom sediment, Macro nutrients, Koothiappar Wetland, Tiruchirappalli.

## Introduction

*Pila globosa*, a common species from the phylum Mollusca, class Gastropoda, and family Ampullariidae. This species live in permanent and temporary stagnant water bodies and uses dry areas for breeding. Adults survive the dry season buried in the soil. These are delicious and protein rich in importance next to fishes and prawns. Nutritive value of these species can be readily assessed by estimating the levels of Protein, carbohydrate, and lipid in their body tissue[1]. Totally out of the 415 families in phylum Mollusca, only 257 families are represented in the Indian subcontinent and of these, freshwater Mollusca are represented by 210 species under 52 genera and 21 families[2]. Freshwater molluscs play an important role in aquatic ecosystem, providing food for many fish species[3]. Pila globosa is commonly used as food by some people; it is one of the most preferred gastropod species and also valuable source of nutrition for ducks and hybrid fish. Soup prepared from the flesh is highly used in medicine, which has the curative properties for asthma, arthritis, joint swelling, rheumatism and in quick healing of wounds. They are cleaned and kept in water for a few hours and then the water is used like an eye drop to cure conjunctivitis. The use of freshwater molluscs as protein – rich food is very much in practice in a number of countries viz. India[4]. They constitute a natural resource of sizable magnitude in many parts of the world. They are an age, old group represented among the early fossils, a group of great diversity in size, distribution, habitat and Utility[5]. *Pila globosa,* Indian apple snails are endemic to South India and are found in semi arid regions of Andhra Pradesh. The snail gets exposed to temperature above 40°C during summer months and in some condition enter into aestivation summer sleep when water bodies dry up. Being cold blooded animals they get exposed to range of temperature during a day- night cycle[6]. So, the distribution of molluscan species in a particular habitat and the nutritive profile of the specific species is believed to be greatly influenced by the physical characteristics and macro nutrient contents of the bottom sediments over the lake ecosystem. Since *Pilaglobosa* is the most common Molluscan form over the study area available for Asian Openbill Stork for feeding, this is taken as a study parameter with the designed objectives. Therefore this study was designed: i. to investigate the influential characteristics of bottom sediments, especially the macro nutrients across the season and ii. to quantify the seasonal variations in the bio-chemical profile of the most common molluscan species - *Pila globosa.*

**Study area:** Koothaippar Lake is situated in Tiruchirapalli District, Tamilnadu, South India, about 15 km south of Tiruchirapalli (10°47'50''N; 78°46'16''E) is one of the important seasonal wetland which supplies water for irrigation (Figure-1). There are many small villages, and towns on all sides of the lake. There are totally eight outlets in both the regions of the lake through which more than twenty five thousand acres of fields are getting irrigation, besides lending it for aquaculture practices. The crops cultivated using the water from the lake are paddy, sugarcane, groundnut and betel. The lake is under the control of PWD and the Forest Department has no direct role to

play with reference to its fauna and flora. This lake is an attraction for a variety of birds, Molluscs, insects and plants. Koothaippar lake and its watershed are situated in the rain shadow region of Southwest Monsoon (June – August) and receive Northeast Monsoon (September – December) only. The climate is subtropical. Hot weather prevails in the months of March to May, and the Maximum temperature varies from 38$^{o}$ C to 40$^{o}$ C.

**Study period:** Data were collected from August 2013 to January 2014, so as to cover six months, three season *viz.,* Pre-Monsoon (August and September), Monsoon (October – December), Post—Monsoon (January).

## Material and methods

**Molluscan studies:** Specimens were collected by hand picking method from dry parts of the regions and where water was shallow scoop net was used. All samples were transported to laboratory in large plastic bottles. The freshwater molluscs were washed, counted, photographed and identified using the key of Subba-Rao[7]. 1$^{3}$(1 X1 X 1) foot, quadrats were laid at the foraging ground and molluscan samples were collected, separated and the dead and live were brought to the laboratory for further identification. Quadrats are small plots of uniform shape and size, placed randomly in selected foraging sites for sampling purposes. The number of quadrats laid, was based on the size of the foraging ground.

**Quantitative estimation of protein:** 30 mg of the given tissue was homogenized with 1 ml of distilled water. It was taken in a clean centrifuge tube. Simultaneously two test tubes were taken. To one test tube 1 ml of BSA (standard protein solution) was taken and in another test tube, 1 ml of distilled water was taken. 4 ml of biuret reagent was added to all the three tubes. They were allowed to stand at room temperature for 30 minutes. The colour developed in the supernatant and the standards were measured at 540nm in spectrophotometer against a reagent blank[8].

**Quantitative estimation of carbohydrate**: 50 mg of the given tissue was homogenized with 5ml of 5% TCA. The homogenate was centrifuged at 2,500 rpm for 5 minutes. 1 ml of supernatant was taken in a clean test tube and was labelled as samples. 1 ml of distilled water and 1 ml of standard glucose solution were taken in 2 separate test tubes. They were labelled as blank and standard respectively, to all the test tubes, 15 ml of anthrone reagent was added. Then the test tubes were kept in a boiling water bath for 50 minutes. After cooling in the dark place for 30 minutes, the OD of the standard and sample were measured at 620nm using the blank in a spectrophotometer[8].

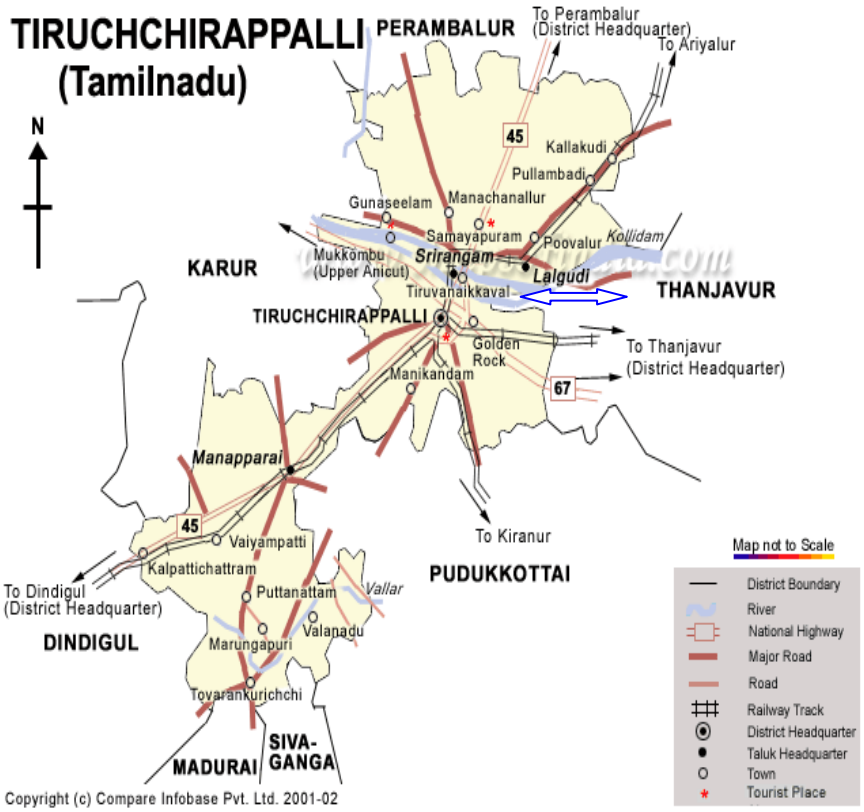


**Figure-1:** Map showing the study area.
⟺ Arrow indicates the location of the lake Koothaippar at Tiruchirappalli.

**Quantitative estimation of lipid:** 25 mg of the given tissue was homogenized with 5ml of chloroform: methanol mixture. To this 0.5ml of sodium chloride was added and the contents were mixed well and centrifuged at 3000 rpm for 10 minutes to get biphase condition. Using a syringe the lower phase was separated which was free from fluff. The volume was made to original quantity of 5ml with chloroform. 0.5ml of the extract was measured into c clean test tube and left to dry in a water bath. The dried lipid was dissolved in 0.5ml of concentrated sulphuric acid. Then it was boiled in the water bath for 10 minutes and cooled to room temperature. Two other test tubes were taken. In one test tube 1ml of cholesterol standard was taken and in another test tube 1ml of distilled water was taken. 2.5ml of vanilline reagent was added to the sample, standard and blank test tubes. These test tubes were allowed to stand at room temperature for 30 minutes. The OD of the standard and sample were measured at 580nm in a spectrophotometer using blank[8].

## Results and discussion

**Bio–Chemical Profile of *Pila globosa* in Region I and Region II:** Low amount of protein was recorded in premonsoon season (0.0933 mg) and maximum in Post-monsoon season (0.1363mg) (Figure-2). Minimum amount of carbohydrate was recorded in premonsoon (0.0733mg) and maximum in Post-monsoon (0.0933mg) (Figure-3). The minimum amount of lipid present in Monsoon and Post-monsoon season (0.08mg) (Figure-4). Total protein content was recorded in region I, and low values of protein were found during monsoon (0.081mg), high in Post-monsoon season (0.153mg). Low amount of carbohydrate was present in premonsoon season 0.0643mg and maximum in monsoon season (0.161mg) in region II. The present paper highlights the preliminary investigation of physico–chemical characteristics of bottom sediment two regions of Koothaippar lake ecosystems.

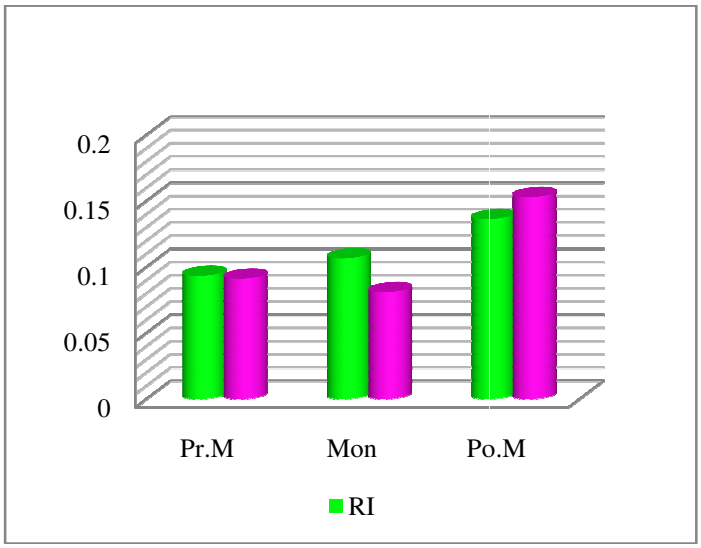


**Figure-2:** Seasonal variations in the total Protein Profile of *Pila globosa* in region I and Region II.

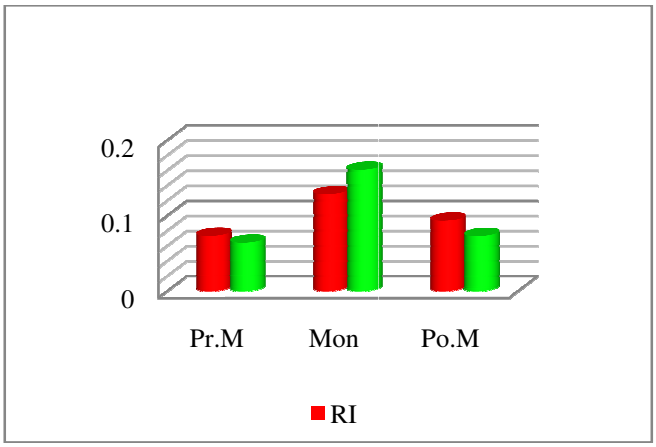


**Figure-3:** Seasonal variations in the total Carbohydrate Profile of *Pila globosa* in region I and Region II.

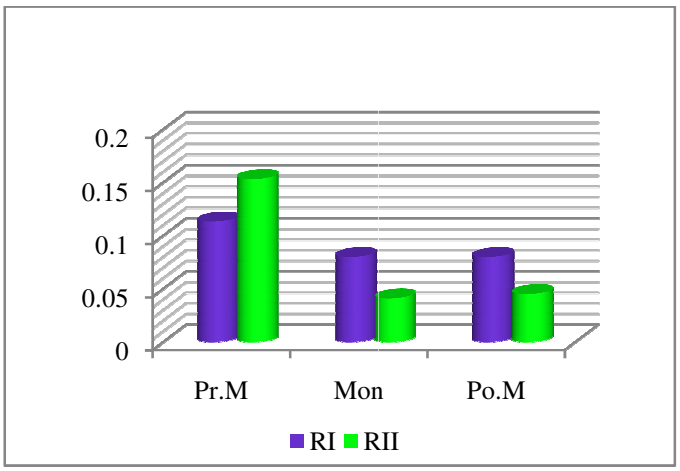


**Figure-4:** Seasonal variations in the total Lipid Profile of *Pila globosa* in region I and Region II.

**Variations of Bottom Sedimental Macro Nutrients in Region I and Region II: Bottom Sedimental Nitrogen:** Lowest amount of nitrogen was recorded in pre-monsoon (45.57) seasons and maximum in monsoon season (72.56) in Region I and the lowest amount of nitrogen was noted in (59) pre-monsoon season and maximum in (81) Post-monsoon seasons in Region II (Figure-5).

**Bottom Sedimental Phosphorous:** Levels of phosphorous was recorded minimum in Monsoon season (1.33kg/h) and maximum was recorded in Post-monsoon season (5.56 kg/h) from Region I and minimum values of phosphorous was recorded in (1.5kg/h) Monsoon season and maximum in Post-monsoon season (10.06 kg/h) from Region II (Figure-6.).

**Bottom sedimental potassium**: Potassium level was found to be minimum in Pre-monsoon season (232.5gm/h) and maximum in Monsoon (261.1gm/h) in region I, and from Region II it was recorded minimum in Post-monsoon season (241gm/h) and maximum in pre-monsoon season (277gm/h) in Region II (Figure-7).

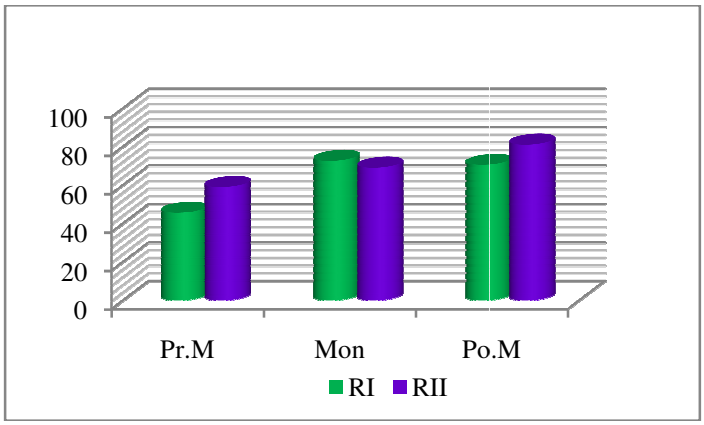


**Figure-5:** Seasonal variations in the total bottom sedimental Nitrogen content in region I and Region II.

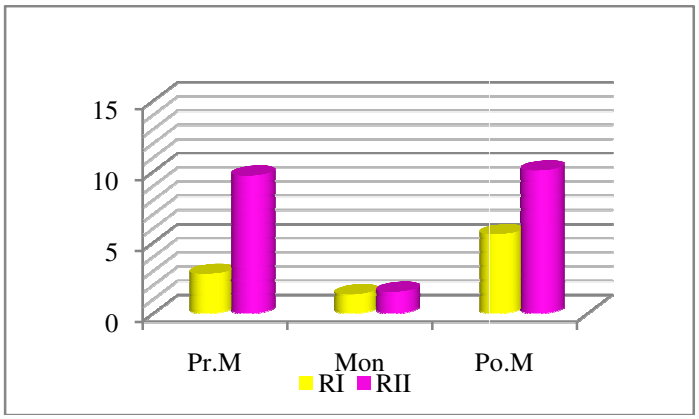


**Figure-6:** Seasonal variations in the total bottom sedimental Phosphorous content in region I and Region II.

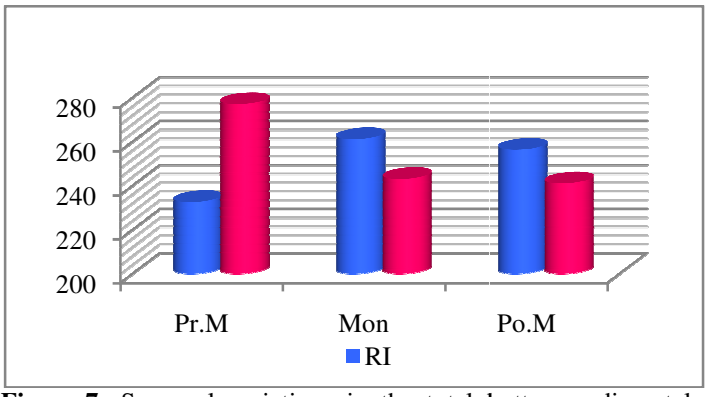


**Figure-7:** Seasonal variations in the total bottom sedimental Potassium content in region I and Region II.

Enrichment of macro nutrients in animal flesh is directly related to the place where it grows and certainly the macro element characteristics influence the quantity of those organism[9]. Distribution of the freshwater molluscan form *Pila globosa* and its bio-chemical profile is directly influenced by the nutritional aspects of the bottom sediments. Present study, indicates that the major macro nutrients of the bottom sediments of this lake, like Nitrogen, Phosphorous and Potassium and their significant levels and seasonal variations influences greatly the nutrient aspects of this molluscan species over the lake.

## Conclusion

The present paper highlights the preliminary investigation on the bottom sedimental macro nutrients and the influence of these sedimental characteristics on the nutritive profile of *Pila golobosa* in two regions of Koothaippar lake ecosystem. It indicates that the major macro nutrients of the bottom sediments of this lake, like Nitrogen, Phosphorous and Potassium and their significant levels and seasonal variations, influences greatly the nutrient aspects of this molluscan species over the lake. It shows a direct proportion of levels of these nutrients in the soil and corresponding seasonal variations in the quantity of bio-chemical profile of the molluscan species *Pila globosa.*

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## References

**1.** Padidela Swapna and Thummala R.R. (2015). Proximate, Amino acid, Fatty acid and mineral analysis of Bivalve Parreysia Cylindrica from Waddepally and Kaleshwaram Lake. *World Journal of Pharmacy and Pharmaceutical sciences*, 4(4), 1388-1401.

**2.** Subba Rao N.V. and Dey A. (1989). Freshwater Mollusca in Aquaculture. Handbook of Freshwater Molluscs of India, 225-232.

**3.** Thorp James H. and Covich Alan P. (2009). Ecology and classification of North American Freshwater Invertebrate. Academic Press, 331-429.

**4.** Rao Subba N.V. (1993). Freshwater Molluscs of India. *Recent Advances in Freshwater Biology*. New Delhi. Anmol Publication, 2, 187-202.

**5.** Raveendran (2016). Molluscan Diversity in Keezhathottam of Thanjavur District, Tamil Nadu, India with special Reference to Gastropods and Bivalves. *International Journal of Zoology and Applied Biosciences,* 1, 141-143.

**6.** Malleswar Dharanikota (2014). Activities of selected enzymes in various Tissues of Pila globosa under Heat shock. *International journal of Environment sciences*, 3(6), 11-15.

**7.** Rao Subba N.V. (1989). Handbook freshwater molluscs of India. Zoological Survey of India. The Radiant Process Private Limited. Calcutta, 1-283.

**8.** Nazir Ahmed T.A. (2007). A practical manual for M.Sc. Zoology. M.M.A. Publication. 269-A, Bharathisalai, Karikkadu, pattukkottai, 159-161.

**9.** Maheswari A.S. and Thiyagesan K. (2014). Macro nutrients (N, P & K) Profile of the bottom sediments of koothaippar wetlands in Relation to sediment pH, electrical conductivity, Atmospheric and water temperature. Biochem. cell. Arch., 14(2), 343-347.