Trends in Fisheries Research
An International Peer-Reviewed Journal
www.sciencejournal.in

# PRIMARY PRODUCTIVITY OF THE MOSAM RIVER IN RELATION TO SEASON AND WASTE WATER DISCHARGE

**Jabde P. V. and Rokade P. B.**
R. B. Attal Arts, Science and Commerce College Georai, Dist. Beed-431127 (MS) India
drpramodrokade@gmail.com

**ABSTRACT**
Pollutants entering into an aquatic system along with agriculture run off, industrial discharge or public severs drastically alter the water quality. Posing a serious threat to the survival of the existing flora and fauna. Estimation of primary productivity of the aquatic system receiving waste is charge from various sources serves an important tool in studying the effect of this discharge on the system and also reveals alteration in its physiological status induced by the same. The productivity of Mosam , Malegoan, District Nashik, M.S., India, river was estimated for six months from surface and one and half feet deep water. The gross production ranged between 2.872 mgC/1/hr (Surface) and 20268 mgC/1/hr ($1^{1/2}$ feet) in November. The productivity was higher during July, August with depletion in September and it may be due to heavy rains.

**KEYWORDS: Pollutants,**

## INTRODUCTION
Production ecology deals with production processes and productivity by green lands, herbivores and carnivores. The production is a unit area per unit time is called productivity or production rate, which is of fundamental importance in the management of resources. Prasad and Nair (1963) carried out studies on the primary productivity in relation to fisheries of the inshore waters of the Gulf of Mannar. The primary organic production of river Godavari has been studied by Ramarao (1965), Shreenivasan (1964) of series of freshwater impoundments in Madras State.

The primary productivity of Sayaji Sarovar Lake at Baroda has been studied by Ganapati and Pathak (1969). Several literatures are available relating to the productivity study of aquatic systems such as lakes, rivers, estuaries and oceans. (Bhattathiri et al. (1976), Varshney *et al.* (1983), Somashekhar and Shreenath (1984) and Jayraj et al. (1992). Review of literature shows that no work has been done on primary productivity of Mosam River at Malegoan city, receiving the effluent discharge from spinning industries and bleaching units and for the same the present investigation has been undertaken.

## MATERIAL AND METHODS
Sample of the water for the measurement of the primary productivity were collected from Mosam River, running from the center of Malegoan city (Nashik) Maharashtra State, India by using the B.O.D. bottles of 300 ml. The primary organic production of the river water was determined by employing the 'light and dark bottle method' (Garder and Green, 1972). First of all initial concentration of oxygen was recorded in each case and then the set of bottles light and dark (blackened by paint) are incubated in bottles for 1 hr. at different times of the day (Table 1). Extreme care was taken to see that no air bubble was left inside. In situ experiments were conducted monthly in two seasons i.e. monsoon and winter from July to January from a single station called Smashanbhumi using a float from which the experimental were hung at the surface and at a depth of about $1^{1/2}$ feet. The dissolved oxygen level was estimated by standard wrinklers method as modified and described by Strickland and Parksons. Primary productivity estimated as oxygen equivalent was converted into carbon equivalent by multiplying it by the factor 0.375 (Shreenivasan, 1964).

## RESULTS AND DISCUSSION
The data showing GPP, NPP and respiration are shown in Table 1, showing the gross production ranged between 2.872 mg.c/1/hr (surface) and 2.268 mg.c/1/hr. ($1^{1/2}$ feet) in November (7-8 pm). The productivity was higher during July, August with depletion in September and it may be due to clouding and heavy rains during that period. Primary productivity generally decreases during monsoon season because of the influx of rainwater and the suspended solid particles (Shaw et al., 1989).

  

**Table 1. Gross primary, net primary production and respiration from Mosam River Malegoan (Nashik) From July to January**

| Month | Time | GPP (mg.c/1/hr) | | NPP (mg.c/1/hr) | | Respiration (mg.c/1/hr) | |
|---|---|---|---|---|---|---|---|
| | | Surface | $1^{1/2}$ feet | Surface | $1^{1/2}$ feet | Surface | $1^{1/2}$ feet |
| **July** | 8-9 a.m. | 0.907 | 0.756 | 0.453 | 0.145 | 0.453 | 0.604 |
| | 1.30-2.30 p.m. | 2.116 | 1.965 | 1.584 | 1.209 | 0.453 | 0.756 |
| | 4.30-5.30 p.m. | 1.512 | 1.36 | 1.058 | 0.453 | 0.453 | 0.907 |
| | 7.00-8.00 dusk | 1.512 | 1.209 | 0.756 | 0.151 | 0.756 | 1.058 |
| **August** | 8-9 a.m. | 1.635 | 1.515 | 0.877 | 0.453 | 0.757 | 1.061 |
| | 1.30-2.30 p.m. | 2.875 | 2.268 | 2.118 | 1.061 | 0.753 | 1.207 |
| | 4.30-5.30 p.m. | 1.964 | 1.209 | 1.51 | 0.453 | 0.453 | 0.756 |
| | 7.00-8.00 dusk | 0.756 | 0.453 | 0.151 | 0.302 | 0.604 | 0.907 |
| **September (raining low) clouding** | 8-9 a.m. | 0.756 | 0.756 | 0.453 | 0.151 | 0.302 | 0.504 |
| | 1.30-2.30 p.m. | 0.604 | 0.604 | 0.453 | 0.151 | 0.151 | 0.453 |
| | 4.30-5.30 p.m. | 0.756 | 0.756 | 0.604 | 0.302 | 0.151 | 0.453 |
| | 7.00-8.00 dusk | 0.453 | 0.302 | 0.302 | 0.375 | 0.151 | 0.302 |
| **October** | 8-9 a.m. | 0.907 | 0.756 | 0.604 | 0.3022 | 0.3026 | 0.453 |
| | 1.30-2.30 p.m. | 0.9071 | 0.9075 | 0.604 | 0.3026 | 0.3022 | 0.6048 |
| | 4.30-5.30 p.m. | 0.9035 | 0.756 | 0.453 | 0.151 | 0.453 | 0.604 |
| | 7.00-8.00 dusk | 0.756 | 0.604 | 0.453 | 0151 | 0.302 | 0.453 |

The influence of environmental factors on primary productivity is well documented. A small population under favorable conditions may have a high rate of production, whereas a large population under unfavorable conditions may have low rate of production. The factors which generally influence the production of the population are the amount of available light, temperature and concentration of essential nutrients. Wetzel (1966) observed that high rate of primary production corresponds to an increase in solar radiation, this result correspond to the present observation that primary productivity is always more during middle of the day (1.30 – 2.30 pm).

Table 1 also shows that primary productivity decreases during peak winter season (November to January). This may be due to the effect of polluted effluents carrying from domestic sources and spinning industries. Depletion in productivity as a function of stress due to tannery effluent is comparable to the results of Jayaraj *et al.* (1992). Increase in concentration of the effluent results in the further depletion of GPP.

According to Leyland and Kuwabara (1985) severe imbalance in the metal micronutrients can cause mortality, whereas marginal imbalances lead to poor health, chromium a constituent of the chrome tannery effluent (Abbasi *et al.*, 1991) could bring imbalance in photosynthesizing machinery, contaminants induced alterations in the characteristics of holding water might have directly or indirectly interfered in photosynthesis.

  

The seasonal fluctuations of NPP and respiration also show more or less similar trends as that observed in Gross Production as they are depending on the GPP. Similar observations are also shown by Bhalla *et al.* (2006).

**REFERENCES**

**Abbasi S. A., Baji V., Madhavan K. and Soni R. (1991).** Impact of chromium (VI) on catfish *Wallago attu. Indian. J. Environ. Helth.* 33: 336-340.

**Bhalla R., Lomate G. S. and Mulay M. B. (2006).** Physicochemical assessment of water in relation to primary production of planktons in Godavari river at Nashik. *Bull. Env. Sci.* 24(2): 165-169.

**Bhattatheri (1976).** Production of different tropic levels in the estuarine system of Goa. *Indian. Jr. Mar. Sci.* 5: 83-86.

**Ganapati S. V. and Pathak C. H. (1969).** Primary productivity in the Sayaji Sarovar (a man made lake) at Baroda. *Sem. On the ecology of fisheries of fresh water reserviour. I.C.A.R. New Delhi.*

**Garder T. G. and Green H. H. (1927).** Investigation of the production of plankton in the Osio Ford. *Rapp. Process-Reunions council pernt. Intern. Exploration.* 42: 1-48.

**Jayaraj V. M., Mandakini M. and Prabhakar N. (1992).** Effect of mercury and lead on primary productivity of two water bodies. *Env. Eco.* 10: 653-658.

**Leyland H. V. and Kuwabara J. S. (1985).** Trace metal in fundamental aquatic toxicology methods and application (eds) Rand, G. R., and Petrocelli, S. R. *Hemisphere, New York.* 377-416.

**Prasad R. R. and Nair P. V. (1963).** A study on organic production. I. Gulf of Mannar. *J. Mar. Biol. Assos. India.* 5(1): 1-26.

**Ramarao Y. (1965).** Primary organic production in transient estuarine eco system of river Godavari. *Proc. Ind. Set. Cong. Assos.* 51-52 Sess.

**Samshekhar R. K. and Sreenath K. P. (1984).** Effect of fungicides on primary productivity. *Indian J. Environ. Health.* 26-355.

**Shaw B. P., Sahu A. and Panigrahi A. K. (1989).** Primary productivity of the rushikalya river estuary in relation to waste water discharge from the chlor-alkali plant. *J. Eniron. Boil.* 12(2): 121-131.

**Sreenivasan A. (1964).** Primary production in three uplond lake of Madras State. *Curr. Sci.* 32(3): 130-135.

**Vershney P. K., Nair V. R. and Abidi S.A.H. (1983).** Primary productivity in near shore waters of Thal, Maharashtra Coast. *Ind. J. Mar. Sci.* 12: 27-33.

**Wetzel R. G. (1966).** Variations in productivity of goose and hypereutrophic Sylvan lake. *India. Invest. Ind. Lakes.* 7(5): 147-184.

  