

MONTHLY VARIATION OF PRIMARY PRODUCTIVITY OF OBAR POND REWA (M.P.), INDIA

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Abstract: The present study deals with the primary productivity of Obar pond. The investigation was done from January 2012 to December 2012. The Ober pond is situated in village Ober, tehsil hanumana, district Rewa (M.P.). This pond was constructed by R.M. Mishra of village Ober about 150 years ago. It is situated on eastern border of Madhya Pradesh and lies at latitude of 24°43'13" N and longitude of 80°2'53" S. Ober pond is manmade small sized perennial and spread in about 10 acres area. It is located in midway between Rewa and Varanasi on N.H-7. The maximum depth of this pond 20 feet. The pond water is domestic purposes, irrigation, aquaculture etc. The surrounding area of pond semi urban semi agricultural. The result of the study indicated high levels of primary productivity, especially in September 2012 during the post monsoon period. The NPP/GPP ratio and respiration in terms of percentage of gross production was also computed. The productivity pattern in Obar pond is bimodal with ups in May and September. The magnitude and higher values of primary productivity suggest that Obar pond in eutrophic in nature.

Keywords: Obar pond, Primary Productivity.

I. INTRODUCTION:

The productivity of an ecosystem refers to rate of production i.e. the amount of organic matter accumulated in any unit time. The study of a more complex life communities or biomass considered as trophic association for food cycle the food chain or food web, it is concerted essentially with the dynamic structure of the system whereby regulation is effected, rather than with the actual operation of the regulation process on individuals within the populations. The production ecology results from and increasing preoccupation with the supply or production of food and ultimately with the flow or exploitation or energy within trophic cycles.

A characteristic of community that has become of considerable importance that is productivity the number of individuals or biomass is a community at any one

time is the standing crop. At beginning of the of the year or reproductive period the standing crop is usually small but as reproductive and growth take place there is an increase in the amount of organic matter making up the biomass of the community. The production of organic matter per unit of time and area is productivity.

Production ecology concerns with the rate at which the energy is stored in the green plants by photosynthesis or chemo-synthesis. It is well known that the ultimate source of energy on the earth is only the sun which is needed by photosynthetic organisms which are capable far tapping of solar radiation. The rate by which the energy is stored by green plants is called primary productivity and by some heterotrophic organisms is called secondary productivity. The total energy tapered in a time and space is called Gross Primary Productivity some of the energy is lost during the respiration of primary producers. In net primary productivity, the organic matter used in respiration is excluded from the gross production during photosynthesis.

Primary productivity is the rate at which the sun's radiant energy is stored by photosynthetic and chemosynthetic activities of producers (phytoplankton, algae and macrophytes in water) in the form of organic substances (Odum, 1971). Biological production in any aquatic body gives direct correlation with its physico-chemical status which can be used as trophic status and fisheries resource potential. Primary production studies are of paramount interest in understanding the effect of pollution on system's efficiency. High rates of production both in natural and cultural ecosystems occur when physicochemical factors are favorable (Sultan *et al.*, 2003).

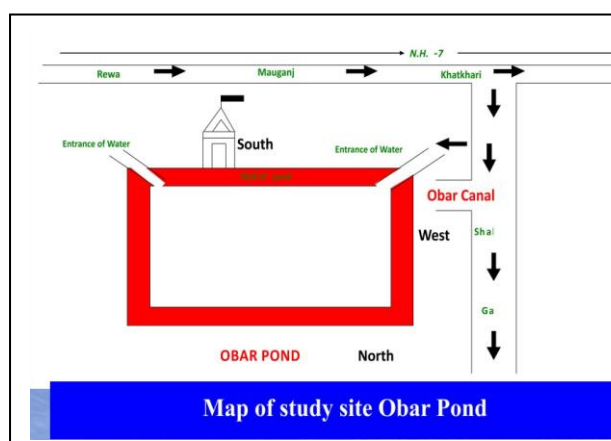
Several ecologist have given their valuable suggestion is production ecology of fresh water bodies, grassland, herbaceous system etc. The total organic contents produced by the produces is known as G.P.P., whereas the part of organic contents utilized in metabolism is known as C.R.R. and the remaining part of organic contents is known as N.P.P.

The rate of production in various habitats have been estimated by different methods in fresh water bodies and it is observed that there is a wide range in the percentage of primary product, that is lost through respiration. In most of the studies related to production ecology of generally it have been found that the presence of Lux intensities, nutrient cycle and physico-chemical characteristics of water body also influence the production.

In the present study is going to centralize on Ober anthropogenic pond of Rewa district in central India. The Ober pond is situated in village Ober, tehsil hanumana, district Rewa (M.P.). This pond was constructed by R.M. Mishra of village Ober about 150 years ago. It is situated on eastern border of Madhya Pradesh and lies at latitude of 24°43'13" N and longitude of 80°2'53" S. Ober pond is manmade small sized perennial and spread in about 10 acres area. It is located in midway between Rewa and Varanasi on N.H-7. The maximum depth of this pond 20 feet. The surrounding area of pond semi urban semi agricultural. Pond, Dams and Lakes are one of the important sources of potential production in the world. Physical, chemical, and biological aspects influence primary productivity directly and the fish production indirectly. Its water is used for washing of cloths, bathing of animals, discharge of domestic wastes and for irrigation in fields. All these increasing anthropogenic activities in and around aquatic systems and their catchment areas have largely contributed to deterioration of water quality leading to their accelerated eutrophication. Eutrophication is a potent threat to the biodiversity of aquatic environment; environ ecological status of freshwater dams and physico-chemical parameters in fresh water bodies. The purpose to perform the present study is to assess the primary productivity and to understand the phenomenon of eutrophication to discover better possibilities of pisciculture in the pond. The ever increasing importance of this lake makes the present study extremely relevant.

II. MATERIAL AND METHODS:

During the present investigation monthly variation in primary productivity was studied at surface of the pond at four sites between January 2012 to December 2012. The primary productivity was estimated by "light and



dark bottle method as described Mandal (1992).

III. RESULTS AND DISCUSSION

The primary productivity in the present study has been dealt with under two headings viz. gross primary productivity (GPP) and net primary productivity (NPP), community respiration, NPP/GPP ratio and respiration percentage of GPP were also computed. Due to gross similarities in primary productivity of the sites the average values have been taken in to consideration for interpretation. Monthly variations in primary productivity of Obar pond is shown in graph no.1 to 3.

Gross Primary Productivity (gm/m³/d)

The highest value of G.P.P. in Obar pond water was recorded 5.20 gm/m³/d in the month of July 2012 at the sampling site C, while the lowest value of G.P.P. was recorded 1.70 gm/m³/d in the month of January 2012 at the sampling site E.

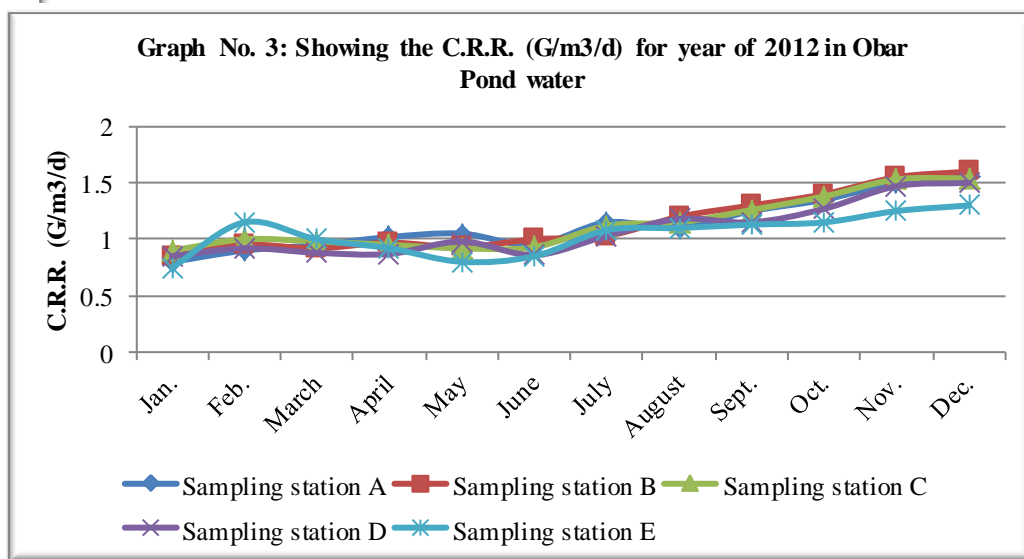
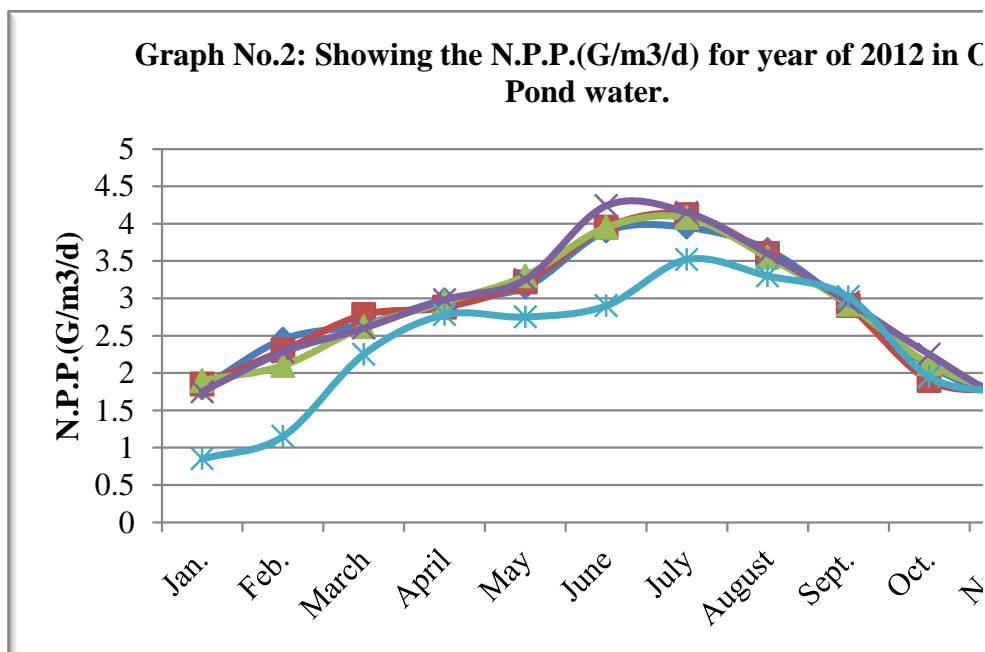
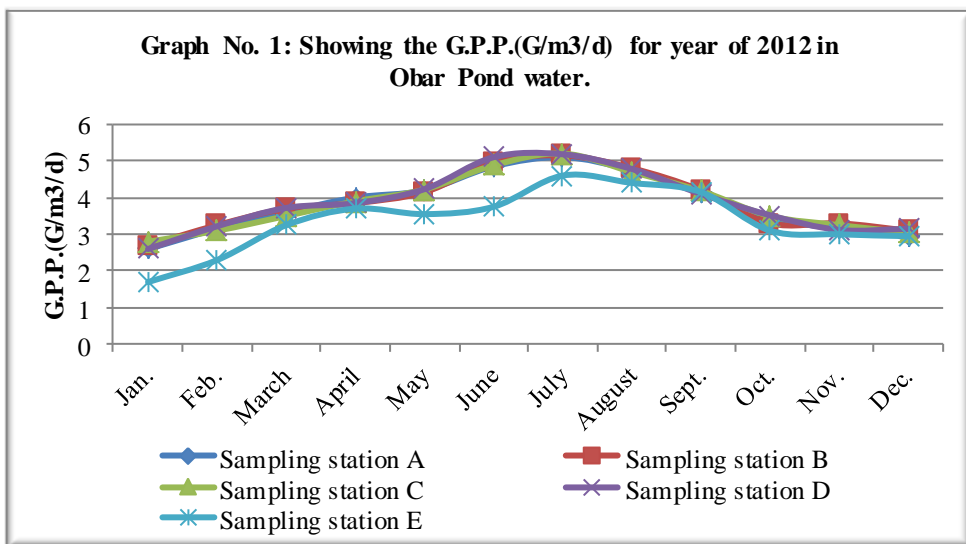
Net Primary Production

The highest value of N.P.P. in Obar pond water was recorded 4.24 gm/m³/d in the month of June 2012 at the sampling site D, while the lowest value of N.P.P. was recorded 0.75 gm/m³/d in the month of January 2012 at the sampling site E.

Community Respiratory Rate (C.R.R.)

The highest value of C.R.R. in Obar pond water was recorded 1.60 gm/m³/d in the month of December 2012 at the sampling site B, while the lowest value of C.R.R. was recorded 0.75 gm/m³ in the month of January 2012 at the sampling site E.

These results are in accordance with Vijayaraghavan (1971) and Sultan *et al.*, (2003) also found same result. Probably, during summer the temperature raised, which enhances the release of nutrients from sediments through bacterial decomposition. The excessive amount of nutrients along with higher temperature favors the maximum growth of aquatic flora, which ultimately favors the primary productivity. Sultan *et al.*, (2003) reported that temperature, solar radiation and available nutrients may be important limiting factors for primary production and contributing to seasonal variation in any aquatic ecosystem.



The highest rate of productivity during summer may be due to bright sunshine with high temperature, high phytoplankton density and algal blooms. The winter lows could be attributed to the reduced photoperiod coupled with low light intensity, temperature and scarce phytoplankton. The lowest values of primary production in monsoon could be related to dilution effect and over cast sago which are known to reduce the photosynthetic activity. Phytoplankton abundance is followed by zooplankton peak (Mazhar; 1992). Less abundance of phytoplankton during monsoon might be due to turbidity and grazing pressure exerted by zooplankton (Rao et.al. 1999). The primary productivity of Obar pond shows a bimodal pattern of fluctuation with ups in May and September. This confirms the finding (Prasad et.al. 2003). The bimodal pattern in the fluctuation of productivity values in the present work has been invariably reported in case of many entropies bodies. The community respiration exhibited a significant annual variation in Obar pond and that too is in bimodal pattern in conformity (Kund; 1992). So, this investigation reveals that Obar pond is an eutrophic. This indicates better possibilities of pisciculture in this pond and also need better management and restoration. Today many lake managers have adopted the option of increasing macrophyte abundance in order to restore entropic waters Lane (2002); the duck weeds have strong potential as indicators of water quality and eutrophication (Ansari et. al. 2004).

IV. CONCLUSION

By critical analysis of results of present study following conclusion may be drawn. It is concluded from the present investigation that the quality of the Obar pond water system is continuously degrading and trophic level is eutrophic stage. The prime source of water pollution in this pond, are municipal, domestic and agricultural wastes. Deterioration of water quality and eutrophication are assuming alarming state in Obar pond, due to casual attitude of people concerned with development of urban population. Therefore, there is an urgent need of regular monitoring of water quality to govern the status and diverting the city sewage away from the lake to preserve the flora and fauna of this ecosystem. If waste input is not checked then it will severely impair water dynamics and will cause eutrophication of the entire system. Overall, coordinated efforts of various stakeholders and proper community involvement are the primary needs to restore the ecological subsystem of the lake and to make it useful for further social and economic exploration.

ACKNOWLEDGEMENT:

Authors are highly obelized to Dr. Devendra N. Pandey. Prof., of Zoology Govt. S.K.N. (P.G.) College Mauganj, Rewa (M.P.) for completion of this work.

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