

Primary Productivity Studies in Some Freshwater Reservoirs of Sangli District, Maharashtra

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Nat. Env. Poll. Tech.
ISSN: 0972-6268
www.neptjournal.com

Key Words:

Primary productivity
Freshwater reservoirs
Sangli district

ABSTRACT

Primary productivity of water body gives a quantitative information about the amount of energy available to support the bioactivity of system. The aquatic bodies namely Bhambarde, Lengre and Atpadi were selected for primary productivity studies. Experiments were carried out from August 2006 to July 2007. The gross primary productivity of Bhambarde reservoir varied from 1.49 to 5.14 O₂ mg/L/h. At Lengre reservoir, GPP value ranged from 1.56 to 5.28 O₂ mg/L/h. Atpadi reservoir showed GPP value varying from 1.31 to 4.98 O₂ mg/L/h.

INTRODUCTION

Primary productivity is an important biological phenomenon in nature on which the entire diverse array of life depends directly or indirectly. The importance of primary productivity in aquatic ecosystem is well realized for estimating the productive capacity. It shows nature of ecosystem, its trophic level and availability of energy for secondary producers.

In India, some man-made reservoirs have already been assessed for their primary productivity (Sreenivassan 1996, Pathak 1979, Singh 1998, Synudeen Sahib 2002, Hujare & Mule 2007). An attempt has been made here to study the monthly primary productivity of three man-made reservoirs of Sangli district in Maharashtra. There are no scientific data available on these water reservoirs.

STUDY AREA

Bhambarde and Lengre reservoirs are situated in Khanapur tahsil and Atpadi reservoir in Atpadi tahsil in Sangli district of western Maharashtra. The area lies between 17°19'-17.24°30' longitude and 74°37'-74.55°30' latitude.

The investigation was carried out for the period of 12 months from August 2006 to July 2007. The monthly sampling was done in the first week at one site of the reservoirs, which is disturbed area.

MATERIALS AND METHODS

Light and dark bottle method (Gaarder & Gran 1927) was employed using two hours incubation period. Samples were suspended at surface level (0.5 meter) depth. After completion of incubation period, dissolved oxygen was fixed in the field and estimated by Winkler's method in laboratory.

RESULTS AND DISCUSSION

The results of the study indicating Gross Primary Productivity (GPP), Net Primary Productivity

(NPP) and Community Respiration (CR) of the three water reservoirs of Sangli district are given in Table 1.

The gross primary productivity of Bhambarde reservoir varies from 1.49 to 5.14 O₂ mg/L/h. The highest value of GPP (5.14 O₂ mg/L/h) occurred in the month of May, and the lowest value (1.49 O₂ mg/L/h) in the month of August. At Lengre reservoir, GPP value ranged from 1.56 to 5.28 O₂ mg/L/h with the maximum value in month of May, and the minimum value in September. Atpadi reservoir shows GPP value varying from 1.31 to 4.98 O₂ mg/L/h. In this reservoir GPP increases in the month of May and decreases during September.

Singh (1990) observed GPP ranging from 1.31 g C/m²/d to 3.46 g C/m²/d in North tank and from 1.21 g C/m²/d to 4.31 g C/m²/d in South tank at Jamalpur. The maximum gross production in both the tanks was observed during summer season, and minimum during the rainy season. Khan (1980) found seasonal variation in gross primary productivity in Dharuria lake. The first peak appeared during March and the second during November. Relatively low values were noticed during monsoon.

The net primary productivity value at Bhambarde reservoir varied from 1.31 to 3.27 O₂ mg/L/h. The highest value was recorded in the month of May, and the lowest value is in the month of August. The NPP values at Lengre reservoir ranged from 1.18 to 3.43 O₂ mg/L/h. At Atpadi reservoir NPP values varied from 1.18 to 2.51 O₂ mg/L/h. In both the reservoirs the highest NPP values were recorded in the month of May, and the lowest values in the month of September.

Synudeen Sahib (2002) reported that the highest value of GPP and NPP are in the month of April at Parapper reservoir of Kollam district in Kerala. Mandal et al. (2005) also obtained the gross and net productivity fluctuating to increase from late winter and reaching peak in the late summer in Karwar lake, Bihar. Similar results were recorded by Hujare et al. (2007) in two perennial tanks from Kolhapur district. They observed highest values of GPP and NPP in the month of April, and lowest values in September.

The community respiratory values at Bhambarde, Lengre and Atpadi reservoirs fluctuated from 0.18 to 1.87 O₂ mg/L/h, 0.38 to 1.85 O₂ mg/L/h and 0.13 to 2.47 O₂ mg/L/h respectively.

Table 1: Primary productivity of the three reservoirs of Sangli district.

Months	Reservoirs								
	Bhambarde			Lengre			Atpadi		
	GPP	NPP	CR	GPP	NPP	CR	GPP	NPP	CR
August 2006	1.49	1.31	0.18	1.62	1.21	0.41	1.55	1.29	0.26
September	1.71	1.33	0.38	1.56	1.18	0.38	1.31	1.18	0.13
October	1.79	1.37	0.42	1.83	1.35	0.48	1.63	1.32	0.31
November	1.91	1.39	0.52	1.92	1.42	0.5	1.82	1.34	0.48
December	2.51	1.43	1.08	2.17	1.42	0.75	2.16	1.34	0.82
January 2007	3.22	1.83	1.39	2.32	1.48	0.84	2.51	1.39	1.12
February	3.57	2.02	1.55	2.35	1.91	0.44	3.12	1.65	1.47
March	4.15	2.43	1.72	3.92	2.78	1.14	3.81	1.87	1.94
April	4.82	3.21	1.61	4.26	2.57	1.69	4.26	2.18	2.08
May	5.14	3.27	1.87	5.28	3.43	1.85	4.98	2.51	2.47
June	2.03	1.09	0.94	2.53	2.01	0.52	3.57	2.3	1.27
July	1.78	1.39	0.39	1.79	1.25	0.54	1.6	1.31	0.29

*Values are expressed as O₂ mg/L/h.

Synudeen Sahib (2002) observed the highest values of CR in April and March at Parapper reservoir and Sasthamcotta lake respectively. Similar observations were reported by Hujare et al. (2007) in two perennial tanks from Kolhapur district.

In the present investigation the productivity increased from winter and attains the peak in summer and then declines in monsoon. Highest rate of productivity during summer was probably due to bright sunlight and higher temperature. Prasad & Nair (1963), Sreenivassan (1964) and Singh et al. (1996) have reported highest rate of productivity during summer. Vijaykumar (1994) showed similar observations that increase in water temperature and alkalinity from March onwards accelerated the primary production.

CONCLUSION

The productivity depends on the availability of nutrients. Bhambarde, Lengre and Atpadi reservoir have low primary productivity. Littoral plants are scarce. Based on the results, it can be concluded that the reservoirs are oligotrophic in nature.

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