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PRIMARY PRODUCTIVITY OF KHANDEPAR RIVER, GOA

P.V. DESAI

Department of Zoology, Goa University, Taleigao Plateau, Goa-403 203, India

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ABSTRACT

The net primary productivity values varied between 0.225 gC/m³/day to 0.75 gC/m³/day. The maximum value was recorded in December and minimum in March. The gross productivity varied between 0.57 gC/m³/day to 1.2 gC/m³/day. The low gross productivity was seen in monsoon.

INTRODUCTION

For any aquatic environment primary productivity is considered as an important phenomenon as the entire heterotrophic community depends upon it. Deevy (1957), Frey (1969), Hepler (1964), Leith and Whittaker (1975), Lewis (1973), (1974), Melak and Kilham (1971), Patra *et al.* (1984), Sinha (1969), Subha Rao (1974), Talling (1965), Verghese (1992) have reported primary productivity of aquatic bodies. But there are very few reports on the primary productivity of rivers, especially there is hardly any report on the primary productivity of any river (Non esturine) from Goa. Hence and attempt was made to study the primary productivity of Khandepar river of Goa.

MATERIALS AND METHODS

The primary productivity of the Khandepar river (74°20 '30"E, 15°25 '50"N) was estimated fortnightly in the year 1993–94. The depth of the river at the sampling site was 6-10 meters (Six meters in post monsoon and 10 meters in monsoon season). Primary productivity was studied by the "Light and Dark bottle method) Gaarder and Gran, 1927) using a three hour incubation period. All the samples were suspended at 0.5 meter depth. After the completion of the incubation period dissolved oxygen was fixed and estimated by unmodified Winkler's method (Ellis *et al.*, 1948). Following formula was used for the calculation :

$$P = \frac{LB - DB}{T} \times F \text{ where}$$

Table 1. Primary productivity of Khandepar River, Goa. 1993-94

Month	Transparency cm	Temp OC	Gross Prod. gC/m³/day	Net Prod. gC/m³/day	Net/Gross gC/m³/day	Respiration gC/m³/day	Respiration % Gross Prod.
Aug. 93	16	26	0.37	0.35	0.94	0.02	5.40
Sept. 93	18	26.3	0.75	0.45	0.60	0.3	40.0
Oct. 93	20	27.6	1.05	0.45	0.42	0.6	57.14
Nov. 93	21	27.4	0.6	0.45	0.75	0.15	25.0
Dec. 93	24	26.9	0.825	0.75	0.90	0.075	9.9
Jan. 94	24	26.5	0.75	0.60	0.80	0.15	20.0
Feb. 94	24	27.3	0.60	0.30	0.50	0.30	50.0
Mar. 94	24	28.5	0.58	0.225	0.38	0.355	61.20
Apirl 94	25	29.2	0.90	0.60	0.66	0.30	33.33
May 94	23	30.1	0.90	0.60	0.66	0.30	33.33
June 94	20	28.0	1.2	0.60	0.50	0.60	50.0
July 94	12	27.0	0.375	0.33	0.88	0.045	12.0

Abbreviations : Temp. = Temperature, Gross Prod. = Gross productivity, Net Prod. = Net productivity.

P = Gross photosynthesis mg C/L/hour
LB = Dissolved oxygen value of light bottle mg O_2/L
DB = Dissolved oxygen value of Dark bottle mg O_2/L
F = Ratio of molecular weights of carbon and oxygen (0.375)
T = Incubation time (hours)

RESULTS AND DISCUSSION

The monthly values of gross and net productivity along with the transparency and water temperature data are given in Table 1. The net primary productivity values varied between 0.225 gC/m³/day to 0.75 gC/m³/day. The maximum value was recorded in December and minimum in March. The Khandepar river exhibited a single peak in net primary productivity, especially in December. The gross productivity varied between 0.37 gC/m³/day to 1.2 gC/m³/day. The low gross productivity was seen in monsoon.

The net and gross ratios varied between 0.38 to 0.94 while respiration varied between 5.4 to 61.2% of the gross production. In the present work no relationship between temperature and productivity was seen. Usually the tropical water bodies show more productivity than temperature (Deevy, 1957; Talling; 1965; 1966; Frey, 1969; Lewis, 1973).

Helper (1964) and Sinha (1969) reported a single peak in primary production and the present studies are in agreement with this as a single distinct peak was seen in December. But interestingly the second highest net productivity was seen in January and then in summer months (April - May - June) indicating a steady state net productivity. The low productivity in monsoon could be attributed to a quite low transparency though a direct relationship between transparency and the productivity was not seen. Patra *et al.* (1984) observed seasonal primary production of river Mahanadi at Sambalpur while Subha Rao (1974) has shown monsoonal influence on production in the Bay of Bengal. In the present study monsoonal influence on the productivity is quite notable.

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