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STUDIES ON THE PRIMARY PRODUCTIVITY OF SULUR POND, COIMBATORE, TAMIL NADU

S. Umavathi, K. Logankumar, S. Subhashini and S. Logaswamy
P.G. and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore - 641 029, Tamilnadu

ABSTRACT

Among the environment, water is considered to be the most important since it forms the medium for aquatic life. Freshwater ecosystems are more productive and could be managed more effectively for human uses to supply drinking water and channel of water disposal and intercommunication. Present study is undertaken to estimate the productivity of freshwater Sulur pond located in Coimbatore district, Tamil Nadu.

INTRODUCTION

Water is one of the most important natural resources required essentially for the life and health of living organisms. Such water gets contaminated and abused as a convenient dumping ground for wastes and effluents of all kinds, including agricultural, industrial and domestic wastes. The unique peculiarity of aquatic ecosystem, whether it is lentic or lotic, is its inhabitation by planktonic organisms. Generally, planktons are considered as an index of fertility of the water column (Fraser 1962). Planktonic organisms have short life cycle with a high metabolic activity, which facilitates them to respond to any pollution stress quickly and significantly, compared to benthic or nektonic organisms (Perkins 1976). Hence, study of planktonic community is of crucial importance in under standing pelagic productivity and pollution impacts.

In Kerala, studies on plankton population were done by Pillai et al. (1973) in Vembanad lake, Nair & Abdul Aziz (1981) in Ashtamudi estuary, Shobha & Miranda (1981) in Kudinumkulum lame lake and George Thomas & Tresa Femandez (1989) in Kumaraskum back waters.

Productivity of lakes depends on the presence of plankton biomass. Enrichment of nutrients and dissolved matter in the water bodies affect diversity of plankton and also physico-chemical properties of water. Diversity in the distribution, abundance and variations in the biotic factors provide information of energy turnover in aquatic ecosystems. A host of workers have studied the influence of nutrients and physico-chemical factors on algal density (Funk & Gautin 1971).

In any aquatic body primary productivity gives an information relating to the amount of energy available to support bioactivity of the system (Vollenweider 1969). Estimation of primary productivity of the aquatic systems, those are adversely affected by anthropogenic activities, serves as an important tool in studying the effect of those activities on the system. Several studies are available relating to the primary productivity of different ponds, lakes and reservoirs in different parts of India (Verma & Mohanty 1994).

Primary production is an important biological phenomenon in the aquatic environment in which phytoplankton act as a primary producer, their physiological activities greatly controlled by physico-chemical characters of the water body (Sahu et al. 1995, Aravind Kumar 1997). Phytoplankton also serves as food for aquatic animals especially for fishes and also they play an important role in main-

taining ecological balance and quality of the water (Pandey et al. 1994). Sharma & Sharma (1992) noted that phytoplankton encountered in the water body as well as they may be used as indicators of the water quality.

The present study has been undertaken to study the primary productivity of the freshwater Sulur pond, from the point of view of future pollution abatement programmes. There are three types of productivity determinations, gross primary productivity, net primary productivity and community respiratory rate. Rate of photosynthesis by the natural population was frequently lower at the surface than at three metre depth, especially during the period of bright sunshine although phytoplankton population remains uniformly distributed (Bhosle et al. 2001).

MATERIALS AND METHODS

The Sulur pond is a freshwater pond situated in Sulur village, 25 km east of Coimbatore City. The total depth of the pond is 13.03 feet and an area of about 0.481 sq. km. The total water holding capacity of the pond is 32.21 million cu.ft. Nearly 705 acres of Sulur village gets irrigation facilities from the pond. For the present study sampling points were fixed in the pond to study the ecology of the pond water, and samples were collected for a period of six months from July 2005 to Dec. 2005.

The pond receives water from the catchment areas of Western Ghats through Noyyal river during rainy seasons. The water samples were collected from 12 Noon to 2 P.M. during the first week of every month. The samples were collected in sterilized polythene containers completely to exclude any air space, sealed tightly and transported to the laboratory within 24 hours. Primary productivity has been estimated by light and dark bottle method.

RESULTS AND DISCUSSION

The values of primary productivity are presented in Table 1. The values of gross primary productivity, respiratory rate and net primary productivity fluctuated between 1.72-2.1, 0.6-0.84 and 0.9-1.33 mgC/L/hr respectively. Maximum values were recorded in the month of September, and minimum in July.

The fluctuation of productivity values in Sulur pond water in different months is well marked. It has been reported that high and low productivity values of water bodies might be due to high and low nutrients status of the water (Radheyshyam et al. 1988).

Variation of productivity values, directly or indirectly, are influenced by environmental factors.

Table 1: Variations in the primary productivity in Sulur Pond (2005). Units: mgC/L/hr

Months	Gross primary productivity	Respiratory rate	Net primary productivity
July	1.72	0.82	0.90
August	2.00	0.75	1.25
September	1.70	0.62	1.08
October	1.90	0.84	1.06
November	2.10	0.60	1.5
December	2.00	0.67	1.33
Mean	1.90	0.72	1.19
SD ±	0.16	0.10	0.22

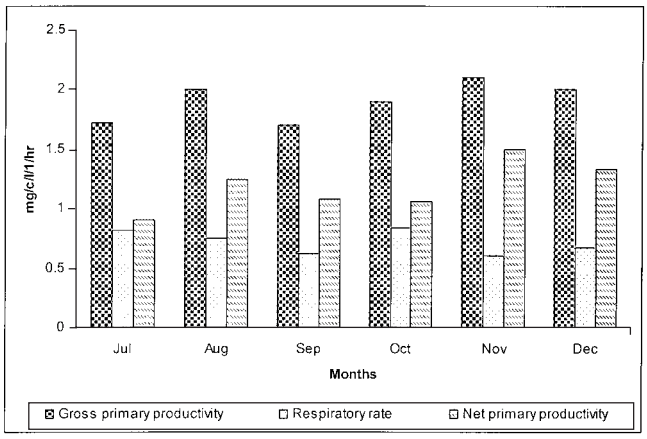

Fig. 1: Variations in the primary productivity in Sulur Pond (2005).

A significant direct relationship of temperature with productivity is established by several authors (Vijayaraghavan 1971, Arvola 1983, Eloranta & Salminer 1984, Verma & Mohanty 1995).

Basheer et al. (1996) while studying primary productivity in Kalidah pond, receiving sewage effluents from Aligharh city, did find a direct relationship between air temperature and productivity. The minimum and maximum occurrence of productivity values in different times has been reported by several researchers. Generally the rate of photosynthesis increases with the rising temperature up to maximum and then diminishes rapidly with further rise of temperature. The pH, phosphate and nitrogen are another important factors, controlling productivity of aquatic ecosystems (Cabecuds & Brogueira 1987). Thus, the present study gives a clear idea on the primary productivity of Sulur pond.

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