

LIMNOLOGY OF FOUR STATIONS OF GANGA OF ALLAHABAD (U.P.) PRELIMINARY OBSERVATIONS

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ABSTRACT

A survey of the four stations of river Ganga viz; Kareti, Sringvarepur, Rasoolabad, Kara in Allahabad district of Uttar Pradesh was carried out in september' 85 to assess phytoplankton composition and physico-chemical characteristics. In Kareti, Sringvarepur, Rasoolabad, Kara total number of phytoplankton recorded were $43 \times 10^3/1$, $66 \times 10^3/1$, $74 \times 10^3/1$, and $90 \times 10^3/1$ on the bank respectively. Cyanophy ceae showed poor response in all the four stations. Though these stations are situated almost in a similar climate and geology, they differ considerably in their physico-chemical and biological characteristics. Results reveal moderate alkaline with pH ranging between 8.2 and 8.7. High concentration of various nutrients is special feature of these stations.

INTRODUCTION

Rivers are more stable as compared to terrestrial because of their peculiar physical, chemical and biological characteristics. Freshwater ecosystems have great significance as sources of fish and recreation. Plankton forms the basic link chain for all aquatic animals. The phytoplanktons are the primary producers and constitute the first level in the aquatic food chain.

Plankton abundance, distribution and production in aquatic environment have received considerable attention in India but little data is available particularly on the rivers of U.P. The deterioration of inland waters has been increasing since the last few decades at an alarming rate. (Wetzel 1975, Solterman 1975, Hillbricht Ilkowsks 1978) due to

water pollution, the main factor being the discharge of the water. Agriculture with its extensive use of fertilizers and pesticides emerges as the main factor in further deterioration of Indian waters increasing nutrient status.

All the four stations of the river Ganga viz; Kara, Kareti, Sringvarepur and Resoolabad in Allahabad district are situated at a distance of 8-40 Km, from the city. These stations are limnologically not very different with respect to their hydrobiological regimes, locations and morphology. Though relatively disturbed by human beings because of bathing ghats these are by no means oligotrophic. An ecological survey of these four stations was, therefore, carried out for physico-chemical characteristics and phylopolankton studies in September 1985. The present study has been under taken to provide basic information pertaining to

these stations and to evaluate the degree and kind of future pollution.

Table 1:

Location of different stations of Allahabad district

Station	Distance(Km.)
Kara	40
Kareti	38
Sringverpur	35
Rasoolabad	8

MATERIALS AND METHODS

Water samples from surface were taken from all the four stations, samples were analyzed for physico-chemical characteristics following Anonymous (1985) and Markereth (1963). Winkler method was used to estimate dissolved oxygen, where as carbon dioxide was determined by with sodium carbonate

method. For qualitative and quantitative estimations of phytoplankton, samples were concentrated by sedimentation and preserved with 5% formalin. The identification was done under compound microscope with the help of drop count method of 1 ml. capacity.

Table-2

Number of individuals belonging to different dominant groups of phytoplankton in four stations of Ganga at Allahabad (U.P.) September, 1985-

Stations	Total phytoplankton	Bacillariophyceae	Chlorophyceae	Cyanophyceae
Kara	90	48	32	10
Kareti	43	30	7	6
Sringverpur	60	12	14	4
Rasoolabad	74	46	17	11

Table-3

Percentage contribution in different dominant groups of phytoplankton in four stations of Ganga at Allahabad (U.P.) in September 1985

Stations	Bacillariophyceae	Chlorophyceae	Cyanophyceae
Kara	53.33	35.55	11.11
Kareti	69.76	16.27	6.52
Sringverpur	70.0	23.33	6.66
Rasoolabad	62.16	22.97	14.86

Table-4

Physical and chemical variables of four stations of river Ganga at Allahabad (U.P.) during September 1985-

Stations/ Parameter	pH	Conducti-vity (mho)	DO	CO ²	Alkalinity HCO ₃ CO ₃	Nitrate	Phosphate	chloride
Kara	8.6	923	4.6	-	175.0 29.3	5.8	2.0	14.9
Kareti	8.5	1540	5.9	-	175.0 18.9	1.8	5.6	17.8
Sringverpur	8.7	700	4.1	4.9	97.0 17.8	3.3	1.5	17.5
Rasoolabad	8.2	830	3.9	3.9	165.0 23.6	11	2.6	16.8

RESULTS AND DISCUSSION

A total of 23 genera of three dominant algal groups, Bacillariophyceae, Chlorophyceae, cyanophyceae were recorded in these stations. Bacillariophyceae number was high in Kara Rasoolabad while Chlorophyceae was also maximum on the same ghat. The number of phytoplankton estimated varied as $43 \times 10^3/1$, $60 \times 10^3/1$, $74 \times 10^3/1$, $90 \times 10^3/1$ in kareti, Sringvarepur Rasoolabad and Kara (Table 2)

Common genera in Bacillariophyceae were: Navicula, Synedra, Pinnularia, Denticula, Melosira Kareti and Sringvarapur ghat showed high percentage contribution of bacillariophyceae members where as Chlorophyceae genera contributed more in Kara and srinagvarepur (Table 3) Common genera of chorophyceae in all the stations were cladophora and Oedogorium. Numerical strength Bacillariophyceae was highest in Sringverpur. Very few members of Cyanophyceae was found in these stations. (Table 2, 3,)

Some pollution indicator species Oscillatoria Microcystis occur commonly in Sringvarepur and Rasoolabad. These species have also been reported as pollution indicators in various rivers by Hutchinson (1967) Prescott (1968) and Nygaard (1949). However, Microcystis were present in Kareti which is not organically rich river station; as shown by present results.

The evaluation of hydrobiological and physico-chemical parameters (Table 4) suggested that although these stations were located geologically and clinically in the same zone; the physic-chemical

characteristics and phytoplankton composition of each were quite variable. pH of all these water showed alkaline nature while conductivity value indicating were quantities of inorganic salts in the Kareti (Table 4). These values in general are high which may be due to more human interferences around these stations and very few allocatanous materials to go into the water bodies. (Zutshi and Vass 1973; Bilgrami and Dutta Munghi 1979). The chloride content of any water body gives an idea of the organic matter and nitrate present in it. Chloride has moderate corelationship relationship with nitrates.

An unstable form of nitrogen was recorded in very high quantity. This pointed to both maximum distribution and good utilization of nitrates by plankton similar results were shown by Pahwa and Mehrotra (1966).

The concentration of dissolved inorganic phosphate phosphorus varied from stations to station. The total phosphorus values were higher as compared to available phosphorus clearly responsible for rich phytoplankton population (Sylvester and Anderson 1964) The stations thus can be described as highly alkaline where the alkalinity as CaCO₃ in more than 100 ppm. (Philipose, 1960). pH and dissolved oxygem values for these stations except Rasoolabad were more and this can be attributed to more CO₂ utilization during photosynthesis by phytoplankton.

However, decomposition of organic material and respiration may be responsible for low oxygen value in Rasoolabad and Sringvarepur, In other ghat, it appears that photosynthetic activity of these algae,

use free CO_2 and release large quantity of oxygen. This is substantiated by the values of oxygen and CO_2 in the entire ghat except Srivastava and Rasoolabad; for photosynthesis; bicarbonate are used as carbon source when CO_2 is depleted to a large extent and Carbonates liberated as by product. The present data shows a more or less inverse relationship between temperature and CO_2 . A similar relationship has also been noted for Ganga at Bhagalpur (Patna to Faraka) by Bilgrami & Dutta Munshi (1985).

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