Uttar Pradesh J. Zool. 1 : 16-18, 1981

DIURNAL VARIATION IN SOME ASPECTS OF LIMNOLOGY OF THE RIVER MANDAKINI FROM THE GARHWAL HIMALAYA

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Dissolved O_2, free Co_2, and total alkalinity exhibit a negative relationship with the durinal temperature variation. But pH and oxygen saturation values increase during day and decrease at night. The study also provides an answer as to why the maximum number of fish are caught during night.

INTRODUCTION

Diurnal variation study of the freshwaters of India has been made by a few workers, namely, Ganpati (1955), George (1961), Verma (1964 & 1967), Michael (1966), Saha *et al.* (1971), Sumitra (1971), and more recently by Misra *et al.* (1975 & 1976), Bohra (1976), and Bohra *et al.* (1979). However, there is no record in the literature of the diurnal variation study in respect of the snow fed rivers. Hence it was considered desirable to study diurnal variation of some physico-chemical parameters of the Mandakini, a snow-fed river that originates from the South-eastern glacial peaks of the Kedarnath at an elevation of 4000 m.

MATERIAL AND METHODS

The diurnal variation study of the river Mandakini was made at Agastyamuni (700 m) on 23-24 January, 1981. Besides water temperature and pH, other parameters like free CO_2, dissolved oxygen, oxygen saturation, carbonates, bicarbonates, and total alkalinity were determined by standard methods (Welch, 1948, Anonymous, 1975) (Table 1).

RESULTS AND DISCUSSION

The observations recorded for 24 hrs are shown in Table 1. In Mandakini the water temperature follows a definite pattern of diurnal increase (during day) and decrease (during night), as also reported in the studies of Michael (1966), Verma (1967), Sumitra (1971), and Bohra *et al.* (1979). There is also a negative relationship between diurnal temperature variation and dissolved

Table 1. Diurnal variation in physico-chemical conditions of the River Mandakini at Agastyamuni.

Date	Time	Water Temp. (°C)	pH	Free CO_2 (ppm)	Dissolved O_2 (ppm)	Oxygen saturation(%)	Carbonates (ppm)	Bicarbonates (ppm)	Total alkalinity (ppm)
23.1.81	8 A.M.	4.5	7.5	16.9	14.1	117.0	—	30.0	30 0
,,	11 A.M.	6 6	7.5	15.7	13.7	120.0	—	26.0	26 0
,,	2 P.M.	15.5	7.5	6.3	12.0	130.0	—	16.0	16.0
,,	6 P.M.	14.4	7.5	13.4	13.5	142.0	—	22.0	22.0
,,	10 P.M.	12.3	7.5	12.0	12.6	127.0	—	21.5	21.5
24.1.81	2 A.M.	8.6	7.4	12 0	12.8	119.0	—	20.6	20 6
,,	4 A.M.	6.7	7.4	8.7	13.1	114.0	—	18.0	18.0
,,	6 A.M.	4.8	7.4	11.9	14.0	117.0	—	20 0	20.0
,,	8 A.M.	5.0	7.4	16.0	13.9	116.0	—	22 0	22.0

oxygen as shown by Verma (1967) and Misra *et al.* (1976). However, Itzava (1957) found a positive relationship. A slight increase in pH value during day and decrease at night lends support to the observations of George (1961), and Verma (1967). However, Sumitra (1971), and Tandon & Singh (1972) observed the same pH value during day and night. Free CO_2 and alkalinity, the latter being due to bicarbonates (Misra *et al.*, 1975 & 1976; Bohra, 1976; Bohra *et al.*, 1979), also exhibit a negative relationship with diurnal water temperature variation. The oxygen saturation value more or less increases during day and decreases at night as also observed by Verma (1964).

Besides pointing out to the day-night differences in the values of some physico-chemical conditions and their effects on fish life, the present study also provides an answer as to why the maximum number of fishes are caught by fishermen during night. One reason might be that during night, dissolved oxygen content and oxygen saturation value are comparatively decreased causing disturbance to the fish life. Perhaps to cope with this fluctuation the fish move swiftly and get trapped in nets. However, the impact of physico-chemical parameters on the activity of specific fish and other biota like plankton, is not studied.

ACKNOWLEDGEMENT

The authors are grateful to the Department of Science and Technology, New Delhi for financial assistance.

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