



Dissolve Oxygen in Sagar and Devikund Sagar Village Pond Bikaner

Anand Kumar Khatri

Department of Zoology, Govt. Dungar College, Bikaner, Rajasthan, India-334001

Email: dranandkhatri@gmail.com

Abstract Among different gases oxygen plays an important role for survival, not only for aerial but also for aquatic animals. In both water (fresh as well as sea), oxygen found in dissolved form and consumed by several living organisms. At 1 atm. pressure dissolve oxygen found as 7.0 mg/l at 35°C but other factors also influence its quantity in the same, like air movement, chemicals, vegetation, organisms, etc. In fresh water ecosystem of sagar and devikund sagar village pond dissolve oxygen noted as 5.0975-7.1375mg/l in summer and 9.032-9.322 mg/l in winter. In all fresh water all organisms utilize dissolved oxygen for their survival. Oxygen in different fresh water get intake by all organisms to accomplish its different biological activities. By respiration, oxygen get consumed by organs and produce several ATP (energy) at cellular level, while in turn oxygen comes out from living being in the form of carbon dioxide. The produced energy utilized by different organs to perform different function like locomotion, reproduction, growth, excretion. The oxygen amount in different fresh water body of same area may differ due to several factors. The low oxygen level (amount) may become lethal to different living being like fishes etc. The harsh climatic condition of this region (dry and hot) also plays a very important role for determination the chemical composition of fresh water. A less amount of oxygen is available for aquatic animals of village pond of desert area Bikaner, in compare to another region. An inverse relation noted between dissolved oxygen and temperature, as DO in water decreases with the increase of temperature level.

Keywords Dissolved Oxygen, Devikund Sagar, Fresh Water Ecosystem etc

Introduction

A desert environment offers extreme environmental conditions. Freshwater ecosystems within desert area, although fewer and mostly ephemeral in nature, are also characteristic in themselves and are stressed due to harsh and hostile conditions. High salinity, alkalinity, hardness and wide diurnal and seasonal thermal fluctuations are among chief abiotic conditions these are marred with. Accordingly, biota of these waters is highly adapted and specific which is often radically different from that of humid and sub-humid regions.

For survival of most aquatic plants and animals oxygen is needed; fish for instance cannot survive for long in water with dissolved oxygen less than 5mg/l. Oxygen dissolves in surface water due to the aerating action of winds. Oxygen is also introduced into the water as a byproduct of aquatic plant photosynthesis. The low level of dissolved oxygen in water is a sign of contamination and is an important factor in determining water quality, pollution control and treatment process. Too much oxygen in water can lead to the potentially lethal gas bubble disease, in which gas comes out of solution inside the fish, and around its eyes.



Study Area

The State of Rajasthan, having an area of 3,42,274 km², constitutes the largest State of the Indian republic. It extends between 23°3'N and 30°12'N latitudes, and 69°30'E and 78°17'E longitudes. Bikaner, where the study has been carried out, occupies a central position in the former region (28°N and 73°17'E, MSL 228 m). The annual minimum and maximum temperatures at Bikaner are recorded to be 1°C and 48°C respectively.



1. Sagar Pond (Plate 1)

This Sagar Village Pond is situated about 8 km east of Bikaner city. The maximum depth of the pond is 5.5 and the surface water spread is about 2000 m². It has stone and brick walls on the eastern and southern banks. The north-west part of the pond is open and the surrounding plains act as catchments for the pond. The maximum depth is available in the north-east of the pond while the banks in the south-west are shallow littorals. The south-east end is relatively secluded and less disturbed.



Sagar Village Pond

2. Devikund Sagar Pond (Plate 1)

This pond is situated 7 km east of Bikaner city. On three sides brick-wall surrounds the pond while southern part acts as a catchment for the tank. The pond is utilized by village people for the purpose of washing and bathing. A number of tankers or bullock and camel carts are filled and transported from here. The clay of pond bottom is used



for brick making on the bank sides. The colour of pond water is sandy and no macrophytes are present. some birds including dab chicks and black-winged stilts are seen. Near the pond royal crematorium with several ornamental cenotaphs or 'chhatris' built in the memory of the Bika dynasty rulers is situated which is very important from tourist point of view.



Devikund Sagar Village Pond

Methodology

Water samples were collected from a depth of 0.5m. Since the water was shallow, no samples could be collected from greater depths. The sampling was carried out during morning hours between 06.00-11.30 Hrs. The samples were collected with the help of a plastic bucket of 15 litre capacity, and were transferred to well rinsed polyethylene bottles for the analysis of physical and chemical parameters. Transparency, temperature and DO were measured on the spot. For the analysis of chemical variables, the methods as prescribed by Strickland & Parson (1972), Golterman et. al. (1978), and APHA-AWWA-WPCF (1981) were followed. Dissolved oxygen was determined by volumetric methods. In the winkler method, firstly water sample of both ponds were collected in BOD bottles and then 1ml freshly prepared winkler A added in both BOD bottles. After this 1 ml winkler B is added in both bottles. By adding winkler A and winkler B, biological oxygen of both bottles got fixed and a precipitate is formed. Now stopper placed on mouth of both BOD bottles. Now 2ml concentrated sulfuric acid added in both BOD bottles, to dissolve the precipitate (shake the bottles). Now by using volumetric flask 50 ml sample of these BOD bottles taken in beaker and 2-3 drops of freshly prepared starch solution was added in it. A bluish colour appear and this was titrated from sodium thiosulphate (hypo solution) till disappearance of bluish colour. The reading was noted and put in a formula for calculation of BOD.

Results and Discussion

Water of sagar and devikund sagar village pond was well oxygenated (DO 6.986 – 7.594 mg/l). The dissolved oxygen level below 3 mg/l was of course rare and was encountered only in some summer months. The annual average of dissolved oxygen among two waters ranged from 6.986 mg/l (Sagar Pond) to 7.594 mg/l (Devikund sagar pond). Relatively low oxygen level in Sagar ponds may be correlated to their greater salinity and lesser depth. Cole (1968), one of the pioneers in desert limnology, noted turbidity as one of the features of many arid zone waters. Sharma (2003), while reviewing the physical-chemical limnology of diverge bodies of water in the Indian desert, observed the greatest amplitude of annual variation in oxygen level in case of shallow ponds whereas the deep reservoirs were least affected. Wide amplitude of annual variation in dissolved oxygen is attributed to shallow nature



and greater influence of temperature and salinity also observed by Olsen & Sommerfeld (1977), Mittal (1996), Singh (2000) and Kiradoo (2001).

References

- [1]. APHA-AWWA -WPCF., 1981. *Standard methods for the examination of water and waste water*. 15th Ed. APHA, Washinton DC.
- [2]. Cole, G.A. 1968. Desert limnology. In: *Desert Biology*. Vol. I. G.W. Brown, Jr. (ed), Academic Press Inc., New York. pp. 423-486.
- [3]. Golterman, H.L. Clymo, R.S. and Ohnstand, M.A.M. 1978. *Methods for physical and chemical analysis of fresh waters*. 2nd Ed. IBP Handbook No. 8, Blackwell Scientific Publications, London. 213 pp.
- [4]. Kiradoo, Baldev Dass 2001. *Colonization dynamics of periphyton on natural and artificial substrates in a desert pond*. Ph.D. Thesis, M.D.S. University, Ajmer. pp. 107
- [5]. Mittal, Kamesh. 1996. *Ecology of periphyton community of a lentic and a lotic ecosystem in the Indian desert*. Ph.D. Thesis, M.D.S. Univ., Ajmer. pp. 108.
- [6]. Olsen, R.D. & Sommerfeld, M.R. 1977. The physical-chemical limnology of a desert reservoir. *Hydrobiologia*, 53 (2): 117-129.
- [7]. Sharma, Virendra. 2003. *Physical-Chemical Limnology of Desert Waters Around Bikaner: A Review*, M.Phil. Dissertation, M.D.S. University, Ajmer
- [8]. Singh, Y. 2000. *A malacological study on a freshwater pond in the Indian desert*. Ph.D. Thesis, M.D.S. University, Ajmer. pp. 123.
- [9]. Strickland, J.D.H. & Parsons, T.R. 1972. *A practical Handbook of sea water Analysis*. Fish. Res. Bd. Canada, Ottawa, pp. 310.

