

## Dissolve Oxygen in Harsolao and Kodemdesar Village Pond Bikaner

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### ABSTRACT

For both aquatic and aerial animals, among different gases oxygen plays an important role for survival. Aquatic ecosystems consist of physico-chemical and biotic components. Physico-chemical parameters are directly affecting to diversity of flora and fauna of water bodies. 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 degree C but other factors also influences its quantity in the same, like air movement, chemicals, vegetation, organisms, etc. In fresh water ecosystem of harsolao and kodemdesar village pond dissolve oxygen noted as 3.873-5.198 mg/l in summer and 7.35-8.565 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 play an 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 other region. A inverse relation noted between dissolved oxygen and temperature, as DO in water decreases with the increase of temperature level.

Keywords- Oxygen, Harsolao, Kodemdesar, Desert, Lethal.

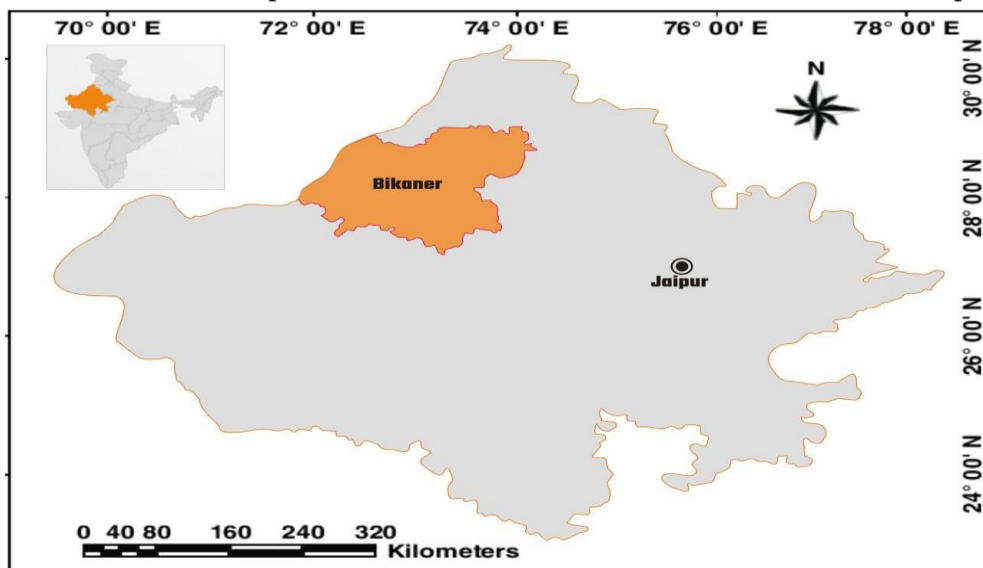
### I. INTRODUCTION

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.

## II. Study Area

The State of Rajasthan, having an area of 3,42,274 km<sup>2</sup>, 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. Harsolao Pond (Plate 1)

It is situated 5 km west to Bikaner city. This pond is partly natural and partly artificial. It has muddy bottom. Two sides are embanked by brick-walls and on one side are the steps. One bank of pond is natural catchments not guarded by any wall. This pond is in premises of lord Shiva temple and these premises are used as picnic spot by people.



Harsolao Village Pond

## 2. Kodemdesar Pond (Plate 2)

It is a village pond situated on the side of a popular temple, 25 km south-west of Bikaner. Its two sides have embankment and two serve as catchment. On one side of the pond a palace is present. It is also a picnic spot. For drinking purposes sheep, goat, camel etc. use the water of pond. Macrophytes like *Vallisneria* and *Hydrilla* are found in littoral region.



**Kodemdesar Village Pond**

## III. 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 thio sulphate (hypo solution) till disappearance of bluish colour. The reading was noted and put in a formula for calculation of BOD.

#### IV. Result and Discussion

Water of harsolao and kodemdesar village pond was well oxygenated (DO 5.508 – 7.136 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 5.508 mg/l (harsolao pond) to 7.136 mg/l (kodemdesar pond). Relatively low oxygen level in harsolao 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. Welch(1952) reported the reduction of oxygen contents due to the entry of drainage water in fresh water ecosystem.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).

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