



Relationship Between Water Temperature and Dissolved Oxygen of Kolar River, Saoner, (M.S.), India

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Abstract:

A water body affects the environment in its vicinity, like charging of ground water tables, conditions of climate etc. Most of the people like washer man, and fisherman, living in the surrounding area depend on this source of water for their survival. Any damages to this water source by any agency will not only make life miserable but that will also disrupt the aquatic ecosystem. It is therefore necessary to study the quality of river water, on the basis of physico-chemical parameters so as to assess its potability. Most of our water bodies, rivers and streams have become polluted and unfit for human use. In 1970 about 3500 cu kms. of water were diverted for human use, while about 5800 cu kms. of clean water were found to be polluted with varying degree of pollution.

Key words:

River, Water, Temperature, DO, Pollutant.

Introduction:

Water supports life on earth and around which the entire fabric of life woven. It is well established fact that life, doubtless originated in water and therefore like air, water is one of the most important and precious natural resources and a regular and plentiful supply of clean water is essential for the survival and health of all living organisms. A huge quantity of fresh water is available on our planet; almost 1500 million cu kms (Penman 1970). However, 70% of available water is of no use as it contains significant quantity of salt. Total amount of available fresh water on our planet is only about 84.4 cu. kms of which 70% water is in frozen state in the form of snow caps, ice sheets, glaciers etc. Thus less than 1% of total water remains for human use and that too which is unusually distributed all around the earth. This constant amount of water passes through a system of hydro biological cycle.

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It is well established fact that life, doubtless originated in water and therefore like air, water is one of the most important and precious natural resources and a regular and plentiful supply of clean water is essential for the survival and health of all living organisms. Water is regarded as 'polluted' when it is changed in its quality or compositions, directly or indirectly as a result of human activities, so that it becomes less suitable for drinking, as well as domestic and other purposes, Dhamani, et. al. (2011). As a consequence of rapidly expanding industrialization and excessive population growth, most of our rivers, lakes, streams and other water bodies are being increasingly polluted. Hence, it is necessary to assess the relation of water temperature with dissolved oxygen by analyzing water.

The rivers are the lifelines of millions of Indians. However, the rivers Ganga and Yamuna served as a cradle of Indian civilization. Most of the population in India resides along the stretch of rivers, and the localities dump plenty of untreated sewage in the river water. Most of the Indian rivers and rivulets are facing the problems of water pollution by human activities. Factual information about the water quality status and the related effects are needed at regular intervals for an effective control of water quality. Government of India has passed the water Pollution Control and Prevention Act in 1974 to safe guards our water resources. In spite of this, increasing human population and their activities are seen deteriorating the water resources. In fact 80% of diseases occur due to use of contaminated water. This has been confirmed by All India Institute of Medical Sciences, New Delhi and Public Health Authorities, that various toxic chemical pollutants found in water, namely Nitrates, Chlorinated hydrocarbons, Biocides etc.

Odum, renowned ecologist and many other subsequent workers in the field have regarded various factors such as human population explosion, unplanned urbanization and deforestations, profit-oriented capitalization and technological advancement, responsible for the origin of pollution crisis of the earth, Agrawal (1996). Water pollution is caused by the fact that there are over 200 rivers or lakes in the world shared by two or more countries.

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Pollution is thus not a problem of any one country, but is a global problem. The present investigation has been undertaken to assess the relation between Water temperature and dissolved oxygen of river water at Saoner town, which determines the water quality essential for human use. The proposed work will deal with the study of Kolar river in the vicinity of Saoner town. Study area is located at 21.3858107° North latitude and 78.9201379° East longitude, in Nagpur district of Maharashtra state. Kolar river originates from Badchicholi village of Chindwara district located in Satpuda Ranges of Madhya Pradesh. The river runs nearly 120 kilometers to enter Saoner town. The river Kolar is the tributary of Kanhan river. The river joins with Kanhan river at Beena in Nagpur district.

Material and Method:

Water samples were collected weekly in clear glass bottles from surface (max. depth 20 cm) and vegetated zone of study site of the river. Water samples were collected. Measurement of temperature is an important parameter required to get an idea of self purification of rivers, reservoirs and control of treatment plant. Water temperature is also important parameter for fish life. It is the important factor for calculating the solubility of oxygen and the carbon dioxide, bicarbonate and carbonate equilibrium. The temperature of drinking water has an influence on its taste. A thermometer having a quick response, with 0.1°C division, checked against a precision thermometer.

All living organisms are dependent upon oxygen in one form or the other to maintain the metabolic processes are the subject of great interest for their need for free oxygen. Dissolved Oxygen (DO) is also important in precipitation and dissolution of inorganic substances in water. Analysis of DO is a key test in sanitary engineering practice. The estimation of dissolved oxygen is to be done by using the Portable Digital Water Analysis Kit.

Result and Discussion:

The present study was conducted at selected sampling station of Kolar River at Saoner town for a period of one year (from 2010 to 2011). Covering





three main seasons i.e. Rainy (July/August/September), Winter (Dec./Jan./Feb.) and Summer (Apr./May/June) in an year.

The most important source of heat for fresh water is generally the sun, although temperature can also be affected by the temperature of water inputs (such as precipitation, surface runoff, groundwater, and water from upstream tributaries), heat exchanges with the air, and heat lost or gained by evaporation or condensation. Human activities affecting water temperature can include the discharge of cooling water or heated industrial effluents, agriculture and forest harvesting (due to effects on shading), urban development that alters the characteristics and path of storm water runoff, and climate change.

The water temperature is one of the important parameter in river. In the present study of Kolar river, difference in the fluctuation of water temperature was maximum 25.6°C to 19.2°C. The season wise studies showed the increased temperature of the river during summer is due to the common effect of intensity of solar radiations, ambient temperature. Decreased values of temperature during winter days are due to low ambient temperature, Gyannath, et.al. (2000).

The amount of oxygen that dissolves in water can vary in daily and seasonal patterns, and decreases with higher temperature, salinity, and elevation. The maximum solubility of oxygen in water at 1 atm pressure (standard air pressure at sea level) ranges from about 15 mg/L at 0°C to 8 mg/L at 30°C—that is, ice-cold water can hold twice as much dissolved oxygen as warm water (Wetzel 2001). Dissolved oxygen comes from the atmosphere and from photosynthesis by aquatic plants, and is depleted through chemical oxidation and respiration by aquatic animals and microorganisms, especially during the decomposition of plant biomass and other organic material.

Dissolved oxygen is essential for a healthy aquatic ecosystem. Fish and aquatic animals need the oxygen dissolved in the water to survive. The need for oxygen depends on the species and life stage; some organisms are adapted to lower oxygen conditions, while others require higher

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concentrations. Dissolved oxygen can affect the solubility and availability of nutrients, which can be released from sediments under conditions of low dissolved oxygen (B.C. MELP *et al.* 1998).

It also influences the biota present inside the river water. Adebisi (1981) have reported the seasonal fluctuation of dissolved oxygen in water bodies. Similar pattern of DO observed in the present study, it decreases during the hot days of summer. DO show the inverse relationship with the temperature in river water.

From present study it is concluded that dissolved oxygen in Kolar river water varies from season to season. Maximum D.O. value was observed in the winter and minimum during summer season. It is also observed that increase in temperature of river water resulted in to decrease in the value of dissolved oxygen. It is evident from the table that the lower concentrations of DO in summer are due to many sources of pollutants that contaminate the river water. Higher concentration of organic matter and increased rate of decomposition due to more temperature of river water during summer may be responsible to depletion of DO levels (Wagh and Bobdey, 2012).

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Table. 1- Values of Water Temperature and Dissolved Oxygen of Kolar river for the period July 2010 to June 2011.

Months→ Parameters↓	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Temp.	24.6	24	25.6	23.3	20.8	18.6	19.2	20	23	25	23.3	23
D.O.	9.8	9.8	10.1	10.3	11	11.6	11.8	10	7.6	7.6	7.9	8.3

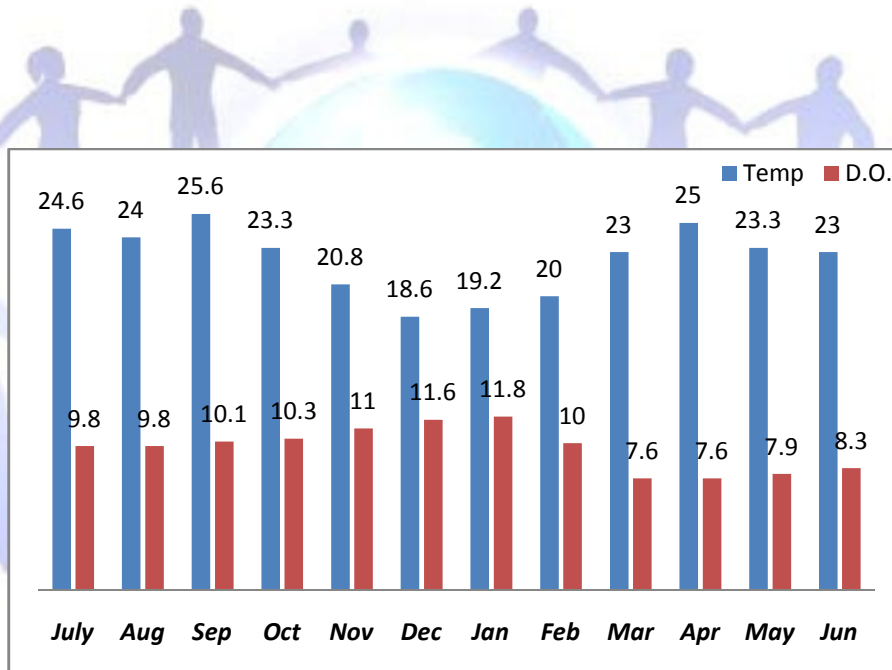


Figure. 1- Relationship between water temperature and dissolved oxygen

