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STUDY OF DISSOLVED OXYGEN OF SAI RIVER WATER AND ITS CO-RELATION WITH OTHER WATER PARAMETER

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ABSTRACT

The great solvent power of water has been making the creation of absolutely pure water a theoretical rather than a practical goal. Even the highest quality distilled water is having dissolved gases and to a slight degree solid. The problem therefore has been one of determining what quality of water has been required to meet given purpose and then finding practical means of achieving that quality. In the present investigation an attempt has been made to find D.O. of river water at different four sampling sites.

1. INTRODUCTION

Clean water has become one of the most precious and inaccessible resources for the common man (Stumm and Biliski 1972). The surface water gests polluted due to discharge of the industrial effluents, agricultural runoff, discharge of partially treated domestic sewage, washing of animals and faecal discharge. The result is an over nutrition of water and ultimately eutrophication.

India ranks amongst the first ten of heavily industrialized countries of the world. River pollution is necessary evil of essentially all the development activities. Thus has resulted in a heavy back log of gaseous, liquid and solid pollution in the rivers of the country. Several important studies have been under taken on the ecology and pollution of Indian rivers (Agarwal 1983). Ajumal 1985, Bhargava 1985, Chakravarty 1986, Chaturvedi 1985, Ajmaland Khan 1985, Kudesia et al. 1986, Paul 1986.Raina 1985, De 1985, Basu et al. 1970, Tripathi et al. 1991, MathurArvind 1991, Singh &Asthana 1994, Mishra & Singh 1995, Ikmal&Asthana 1998.

Due to enormous population growth, mushrooming industrialzation, agri. and agro revolutions, multifarious needs and deeds of inhabitants and varying nature of habitats, the pollution level of Sai river is changing rapidly and becoming worse from bad.

2. MATERIAL AND METHODS

The water of river as sample is taken in the last week of each month at monthly interval from January 1996 to December 1997. Polyethylene bottles of two liter are used for the collection of water

sample. Each sample from different sampling sites (P_1, P_2, P_3 and P_4)are brought to laboratory in ice box for the analysis of D.O.

3. Materials:

I . B.O.D. Bottles (100-300ml.)

II. Reagents.

(A) Sodium thiosulphate

6.205 gm of sodium thiosulphate was dissolved in 250 ml. boiled distilled water and then added a pallet of NaOH as stabilizer.

(B) Mangenoussulphate solution

100 gm. of Mangenoussulphate solution was dissolved in 200 ml. of boiled distilled water and then it was filtered.

(C) Alkaline potasium iodide

100 gm. of KOH, 250 gm. of potasiumiodide ware dissolved in boiled distilled water.

(D) Starch indicator

1 gm of starch was dissolved in 100 ml. of boiled distilled water and then added few drops of formaldehyde solution .

4. Method :-

(A) 50 ml. of river water sample was taken in stoppered BOD Bottle and added 1ml. mangenoussulphate (B) and 1ml. alkaline potassium iodide (C) solution precipitate appeared, 2 ml. of sulphuric acid was added and shakedthoroughly to dissolve the precipitate 20 ml. of sample was taken *from whole* content in a conical flask and added a few drops of starch indicator (D) titrated against Sodium thiosulphate solution (A). Blue green color changed in to colourless (end point).

5. Calculation:-

If whole content is used for titration D.O. (mg/l)= $\frac{V_1 x\ N\ x\ 8\ x\ 1000}{V_2 - V_3}$

If a fraction of the contents is used for titration

$$D.O.\ (mg/l) = \frac{V_1 x\ N\ x\ 8\ x\ 1000}{V_4\ (V_2 - V_3)}$$

Where

DO = Dissolved Oxygen

V_1 = Volume of titrant (ml.)

N= Normality of titrant (0.025)

V_2 = Volume of Sampling bottle after placing the stopper (ml.)

V_3 = Volume of Mangenoussulphate + Potasiumiodide solution 1 added (ml.)

V_4 = Volume of fraction of the contents used for titration (ml.).

6. RESULTS AND DISCUSISON

The monthly variation of dissolved oxygen of sai water is shown in fig. 1 and fig. 2. Generally P_3 and P_4 have lower values in comparison to P_1 and P_2 sampling sites. The highest content of D.O. was 6.8 ppm in January 1996 while the lowest was 4.1 ppm at P_4 sampling site in May and June 1996.

An analysis of variance revealed significant ($p<0.01$) variations among the sampling sites.

D.O. has negative correlationship with all the parameters, like temp., B.O.D. , C.O.D., ALKALINITY, CI^- , PO_4^{-3}, Na, Fe, Cu, Zn, Pb, Cd and Mn. D.O. of river water in 1996 showed negative and significant correlationshipWith B.O.D. (r= -.855 at site P., r= -.897 at P_2**r=**-.856 at P_3r= -.829 at P_4), C .O.D. (r= -.733 at P_1 r= -.717 at P_2, r- -.554 at P_3), PO_4^{-3} (r= -.5 86 at **P_1**r=-.657 at P_2 ,r= -.666 at P_3, r= -.548 at P_4), sodium (r= -.574 at P, r= -.566 at P_2, r= -.491 at P_3), B.O.D. (r= -.860 at P_1, r= -.959 at P_2, r= -.935 at P_3, r= .962 at P_4), C.O.D. (r= -.716 at **P_1**r= -.569 at P_2, r= -.498 at P_3, r= -.372 at P_4), CI^- (r= -.664 at P_2, r= -.499 at P_3 r= -.629 at P_4), PO_4^{-3} (r= -.531 at P_1,r= -.797 at P_2,r= -.809 at P_4),Fe (r= -.595 at P_2,r= -.754 at P_3, r= -.7481 at P_4) Cu(r= -.756 at P_2,r= -.754 at P_3, r= -.566 at P_4), Zn(r= -.521 at P_2, r= -.566 at P_3, r= -.566 at P_4) Cd(r= -.478 at P_1,r= -.636 at P_2, r= -.523 at P_3,r= -.816 at P_4 in 1997).

Generally these metals are highly negatively correlated with D.O. at sampling sites P_2,P_3,P_4 in comparison to P_1. D.O. is very important to all living organisms and is considered as an important factor to asses the nature and quality of aquatic system and water. The concentration of D.O. in natural and waste water depends on the physical, chemical and biological activities, variation in D.O. concentration are mainly due to (a) O_2 consumption by aquatic plants and bacteria for chemical oxidation and respiration(b) photosynthetic O_2 evolution(c) O_2 exchange between hydrosphere and atmosphere. There is an inverse correlation between O_2 and temperature. Dissolved oxygen was found maximum in winter while minimum in summer.

This is because at low temperature oxygen dissolving capacity of water gets increased. Respiration by aquatic fauna and microbial oxidation decomposition of the organic matter is also responsible for decrease in D.O. level at experimental sites. Water of river was classified by Royal commission 1898 (Lester 1969) on the basis of D.O. in to four categories as (i) very clean (D.O.=7.0µg/l) (ii)clean or moderate (D.O. =6.0µg/l) (iii)Doubt full(D.O=5µg/l) and (iv)bad (D.O.=4.0//g/l)The water quality at site P_1 in winter season is found clean quality of water at site P_3 and P_4 at summer season in 1996 and 1997 was always found bad. The minimum D.O. concentration was noted when water temperature was very high. It might be due to increased microbial decomposition of organic matter which further causes decrease in D.O.Similar D.O. of Sai river water showed negative and significant ($p<0.01$) correlation with most of the taken parameters.

P_1=●, P_2=■,P_3=○,P_4=□

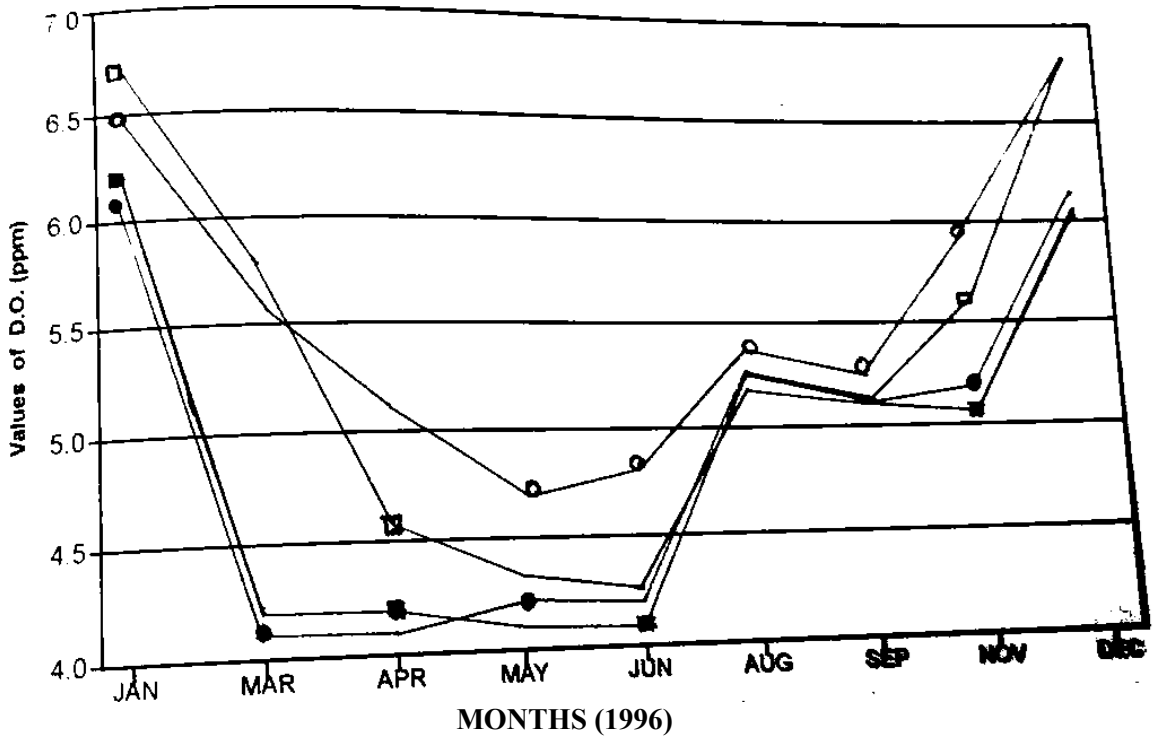

Fig. 1; Monthly variation in D.O. at different sampling sites of the **Sai** river at Pratapgarh city.

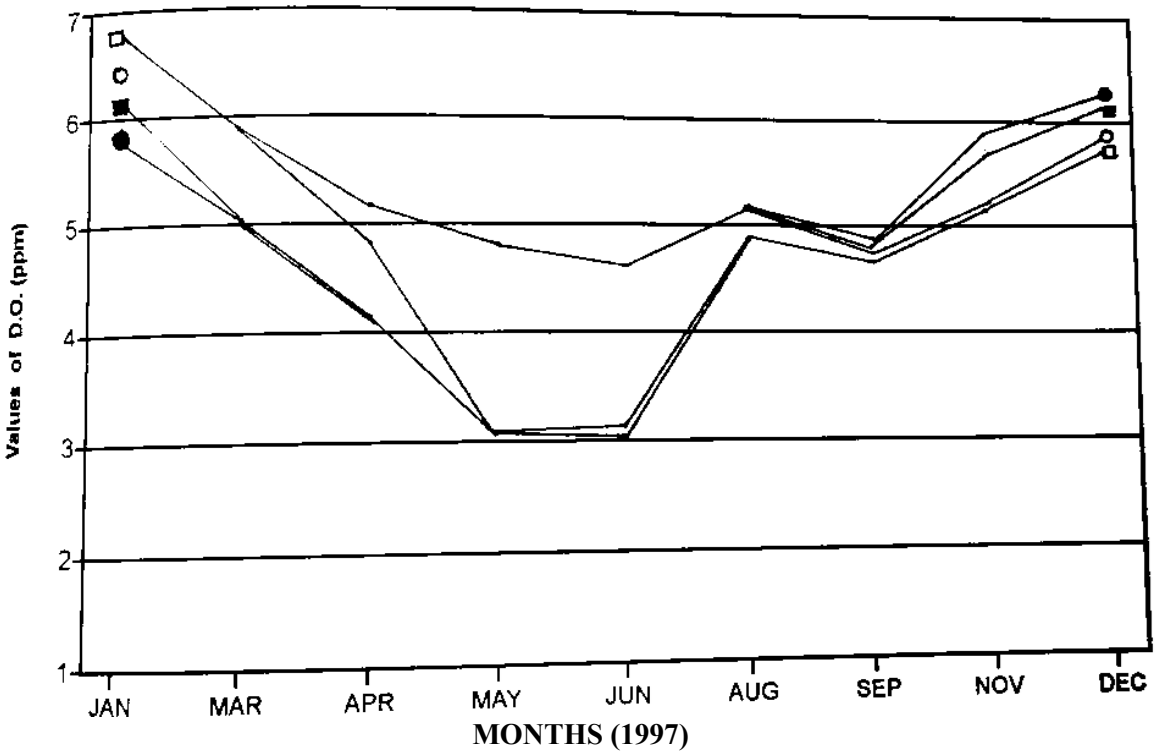

Fig. 2: Monthly variation in D.O. at different sampling sites of the Sairiver at Pratapgarh city.

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