Annals of Natural Sciences
Vol. 6(1), March 2020: 1-6
Journal's URL: http://www.crsdindia.com/ans.html
Email: crsdindia@gmail.com

e-ISSN: 2455-667X

Annals of Natural Sciences

ORIGINAL ARTICLE

Comparative Study of Water Quality in Upstream and Downstream of River Asan

A.K. Deshpande
Dept. of Zoology, Ambah P.G. (Auto) College, Ambah, Morena (MP)
Email: ananddeshpande158@gmail.com

ABSTRACT

Water is always a source of life on earth evident by various historical moments and origin of life on earth. It is clearly depicted that there is no life without water. Today's industrialization era spoil this source of life i.e. water in many ways which cause diseases and other complications in human population. Mainly dense cities are suffering from this problem seriously. Keeping these points in view, the present study is based on basic idea of water pollution and availability of life surviving condition in River Asan at Murena district through some hydrobiological parameters with comparative study at upstream and downstream flow.

Key words: *Water Quality, Upstream, Downstream, River Asan*

Received: 11th Jan. 2020, Revised: 2nd Feb. 2020, Accepted: 10th Feb. 2020

How to cite this article:
Deshpande A.K. (2020): Comparative Study of Water Quality in Upstream and Downstream of River Asan. Annals of Natural Sciences, Vol. 6[1]: March, 2020: 1-6.

INTRODUCTION

Water for suitable life is prime important life, without water biotic activities are not possible on this planet. In nature water occurs on the land, below its surface in atmosphere and in the biomass. Almost all sources of fresh water including Rivers and ponds are polluted due to urbanization and industrialization in the present time. Green revolutions by using pesticides, domestic sewage and industrial effluent have contributed a lot of water and soil pollution.

The industrial effluents, sewage and other pollutants when discharge in to any stream or River, not only cause pollution but disturb the whole biological system of lentic and lotic habitat and also cause pathogenic infection due to contamination of aquatic habitat. Villagers of the coastal region of Rivers and streams generally bathe their cattle due to which the oxygen supply in the water is reduced and algae increases because faecal matter (dung) and excreta mix with water which diminishes the fish stock of water. Due to traditions of some tribal the waste of worship and dead bodies generally throw in Rivers which causes harm to polluted our life. Asan River is boon for M.P. because its water is used for agriculture and for drinking purpose.

In the present investigation the water quality of Asan River has been observed to be of substandard quality because various untreated industrial effluents from Urban coastal region merge inside the River. Further municipal sewage mingle in the River without any treatment and deteriorate Asan water. Therefore, it has become necessary to assess the water quality of Asan River and its impact of aquatic fauna and flora.

MATERIALS AND METHODS

Water sampling sites from River Asan at Murena, after each 3 months sample were collected at the each sampling stations at different times for the analysis of different

parameters. Samples were collected in the middle of streams and at mid-depth in the direction of flow. Samples storage a low temperature (4 degree centigrade)-
The study sites are-

a. Chanda Gaon
b. Jaroni Gaon
c. Karua Gaon
d. Girgoni Gaon

WATER SAMPLING COLLECTION:
Sampling was done significantly after each three months interval for 1 year. The water samples of River asan were collected. From all the sampling points October 2010 to July 2011 for the study of water quality. Samples from the River water were collected in five litres precleaned plastic bottles for physico-chemical analysis. One glass bottle (DO. bottle capacity 300 ml.) was filled with water at every sample point for the estimation of dissolved oxygen as referred by APHA (1992).

COLOUR:
The colour of water sample was detected by visual comparison method. Colour of water sample was determined by the Platinum-Cobalt method, which is normally used for preparation of colour standards, in which 1 colour unit is equivalent to the colour produced by 1.0 mg/1 of platinum. The colour of water sample was matched with standard colour tubes by looking vertically through the tubes towards white surface placed at such an angle that light is reflected upward through the column of liquid. In case of colour of the sample was exceeded 700 units, the sample is diluted with distilled water. The pH of sample was measured as the colour was highly related to pH.
Calculation-
Colour units = Estimated colour x dilution factor

ODOUR:
Odour of water sample was measured as "Threshold odour number", which is equal to dilution ratio of the sample at which the odour is just detectable. The sample was diluted with odour free water until least perceptible odour is detected by the tester. The approximate range of threshold odour number (TON) was determined by diluting 200 ml, 50 ml, 12 ml and 2.8 ml of sample in a 500 ml glass stopper ertenmeyer flask to 200 ml with odour free water. These flasks were then placed in a water bath at desired temperature. One blank only with odour free water was also kept. Further dilution of the sample was done on the basis of preliminary range of odour was dilution at which odour was just detected at particular temperature was determined. Blanks were also inserted in between the sample dilution. The flasks were allowed to smell in sequence from least concentration of the sample to high concentration of sample. The observations were recorded on the basis of odour that was detected in each flasks.

$$\text{TON} = \frac{A + B}{A}$$

Where A = ml. sample
B = ml. odour free dilution water
When total volume was prepared to 200 ml, the volume of A+B was found to be 200.

DISSOLVED OXYGEN:
The dissolved oxygen in River water sample was determined by modification Winkler's and Azide iodometric method (APHA). The manganous sulphate reacts with the alkali (KOH or NaOH) to form a white precipitate of manganous hydroxide which in the presence of oxygen gets oxidized to brown colour compounds. Collected the sample in

300 ml. capacity of BOD bottle then add 2 ml. $MnSO_4$ solution then add 2 ml. alkali iodideazide reagent. When add reagent put tip of pipet just below the surface stopper carefully to exclude the air bubbles and mix up sample by inverting the bottle 2-3 times. When precipitate settled down one third in bottle, add 2ml. conc. H_2SO_4 then restopper and mix well until all the precipitate get dissolved. Taken 200 ml. solution in a conical flask and titrated with standard 0.025N ($Na_2S_2O_3$) sodium thiosulfates used starch as an indicator and continue titrated till the first disappearance of the blue colour.
Calculation-

$$\text{D.O.}(\text{Mg}/1) = \frac{\text{Titrant used x N x 8000}}{\text{ml. of sample}}$$

BIOCHEMICAL OXYGEN DEMAND (BOD):
The principle of the method in values measurement of difference of oxygen concentration between the unincubated and incubated (5 days at 20^0C) sample. Aerated the 1 litre distilled water in a container by bubbling compressed air for 1-2 hrs. At attained DO saturation and maintained the temperature at 20 degree centigrade. The add 1 ml. each of phosphate buffer, magnesium sulphate, calcium-chloride and ferric chloride solutions then add 2 ml. seeds of microbial population. Neutralized the sample to pH around 7.0 using alkali or acid (NaOH or H_2SO_4). Two dilution samples were made in the range of 40%-70%. It is recommended to have lower dilution to give 40% and higher dilution to give 70% respectively. Taken the diluted water in BOD bottles by siphon and soppered immediately. Keep one bottle for the determination of the initial (zero day). DO and other two bottles incubated in BOD incubator at 20 degree centigrade for 5 days. Prepared two blanks by siphoning out only the dilution water into the determine initial (Zero day) and the other is incubated at 20 degree centigrade for 5 days. Determine DO in the sample and in the blank on initial (Zero day) after 5 day.

$$\text{B.O.D.}(\text{mg/l}) = D_1 - D_2 = \frac{(B_1 - B_2) \text{ x } 100}{\% \text{ sample}}$$

Where D_1 = D.O. of diluted sample on zero day
D_2 = D.O. of diluted sample on 5^{th} day
B_1 = D.O. of diluted sample on zero day
B_2 = D.O. of diluted sample on 5^{th} day

STATISTICAL CALCULATIONS:
The statistical calculations were done by the following formula described by Fischer and Yates (1993).
(i) Mean

$$\overline{X} = \frac{\sum X}{N}$$

Where,
$\sum X$ = Sum of Observations
N = Total number of observations
(ii) Standard Deviation (S.D.)

$$\text{S.D.} = \sqrt{\frac{\sum (X - \overline{X})^2}{N - 1}}$$

Where
X = Individual observations
$\overline{X}$ = Mean of observations
$\sum(X - \overline{X})^2$ = Sum of the square of the deviation from the mean
N = Number of observations
$\sum$ = Summation

RESULTS AND DISCUSSION

The results indicate significant effect of pollution in River water as summarized in tables given below-

The colour of the water samples of Asan River has been observed slightly muddy of green tinge in different collecting time period as given below.

No odour of water samples has been observed from all the collecting site of Asan River.

Table 1: Average Colour

Month	Colour			
	Site A	Site B	Site C	Site D
Oct-10	Green tinge	Green tinge	Green tinge	Slightly muddy
Jan-11	Green tinge	Green tinge	Green tinge	Slightly muddy
April-11	Green tinge	Green tinge	Green tinge	Slightly muddy
July-11	Slightly muddy	Slightly muddy	Slightly muddy	Slightly muddy

Table 2: Average Odour

Month	Odour			
	Site A	Site B	Site C	Site D
Oct-10	Odour less	Odour less	Odour less	Unpleasant odour
Jan-11	Odour less	Odour less	Odour less	Unpleasant odour
April-11	Odour less	Odour less	Odour less	Unpleasant odour
July-11	Odour less	Odour less	Odour less	Unpleasant odour

Table 3: Average Dissolved Oxygen (Mg/L)

Month	Dissolved Oxygen	
	Upstream (A)	Downstream (D)
Oct-10	7.2	5.9
Jan-11	8.1	5.6
April-11	7.9	3.4
July-11	7.0	6.8

Statistical Analysis:

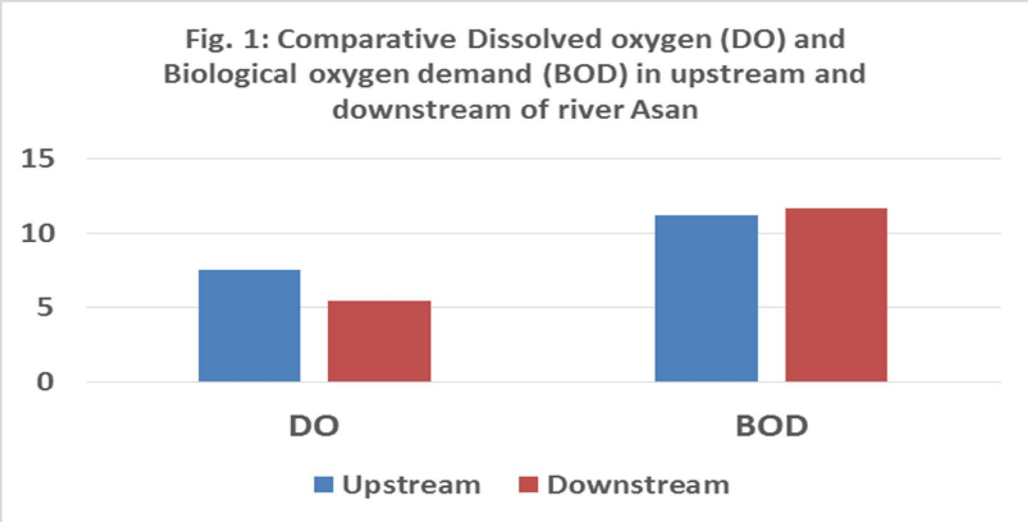
Variable	Number of cases	Mean	Standard deviation
Dissolved oxygen (mg/l)			
Upstream **Downstream**	4 4	7.55 5.42	0.53 1.44
	Mean difference S.D. difference	2.13	 0.91

Table 4: Average B.O.D.

Month	B.O.D. (mg/l)	
	Upstream (A)	Downstream (D)
Oct-10	9.0	12.0
Jan-11	10.2	14.0
April-11	12.0	9.5
July-11	13.6	11.3

Statistical Analysis:

Variable	Number of cases	Mean	Standard deviation
B.O.D. (mg/l)			
Upstream **Downstream**	4 4	11.2 11.7	2.02 1.86
	Mean difference S.D. difference	0.5	 0.16



The green tinge colour of Asan water samples taken during Oct. (2010) at up stream site (A) and slightly muddy colour of water samples taken during Oct 2010 at down stream site (D) may probably due to the fact that Asan River brings mud during course.

The Asan water samples are odourless during Oct. 2010 to July 2011 at up stream site A and down stream site D respectively. This is because of decline in waste level in Asan and heavy discharge of sewage domestic effluents and is accordance to Sinha (1988), Manian, *et al*., (1989) who observe the effects of pollutants to be responsible for such an effect in River Ganga and Yamuna respectively.

In the present investigation observation clearly indicate that the values of dissolved oxygen decrease significantly from site A to site D but in the month of July 2011 it increased which indicate that there is no effect of rainfall due to increase of raised water due to rainfall.

Depletion in dissolved oxygen is an index increased organic pollution at down stream site D as compared to up stream site A, it is due to addition of different types effluents of Murena area in the River at down stream site D. Further decrease in the dissolved oxygen may also be due to turbidity, which interfere the penetration of light for the liberation of oxygen in the process of photosynthetic mechanism and respiration of biota, Verma *et al*. (1992). However the depletion of oxygen content could attributed to decrease the light rays which affect the photosynthetic activity over balancing the photosynthetic production of oxygen. The low values of D.O. at down stream site D in summer months are mainly due to the decreased volume of water, while disposal of waste water and sewage remain virtually the same. The sewage continuously discharged in Asan River but their decomposition remains partial due to which lower D.O. values obtain.

The water quality with regard to D.O., indicates that down stream site (D) are highly polluted as compared to upstream site (A). It is thus obvious (vide super) that D.O. of Asan water in Murena area is affected by domestic, sewage and small scale industries effluents and is in affirmation to Shankar, *et al*., (1983), Saxena and Chauhan (1993), Tiwari *et al*., (1989), Jayjeet *et al*. (2007) who recorded decreased value of D.O. in River, Reh, Yammuna, and Ganga after being mixed up with untreated sewage, domestic and industrial effluents respectively. Divakar and Saxena (1997), David M. Gray (2008) also reported that low D.O. in the River Sabarmati and Ganga and power plant side could be due to presence of high organic load.

B.O.D is the oxygen demand of any system, required for stabilization under biological condition. So it is clear that an index of organic content of the system can utilize by microbes in the process of stabilization. Observations of the present work show that the value of B.O.D significantly increases in the month of July 2011, may be correlated with more water in River Asan, because of rains. Further a significant increase in B.O.D. value has been observed from Oct. 2010 to April 2011 at down stream site D as compared to up stream site A. The probable reason for this increase B.O.D. at down stream site D may be due to influx of washing, printing cloths from washing ghat and the enhancement in B.O.D. could be due to the entry of effluents of domestic sewage of the city. B.O.D. values of the Asan River are towards higher side in the winter compared to monsoon probably due to aquatic flora during winter. Such observations indicate the adverse effect of untreated sewage water on the water quality of River, which has further been revealed by high B.O.D. values of almost sewage, domestic as well as effluents of some small scale industries. According second opinion the increased value of B.O.D. is probably due to polluted water that mixed up at down stream site D.

The values of D.O. decrease and B.O.D. increase, the decreasing of D.O. is an index of increased organic pollution which is mainly due to the addition of wastes at down stream site D. These organic matters undergo degradation by microbial activities in the presence of D.O., which may be due to the exogenous addition of organic matter in the water. B.O.D. is an indicator of total amount of Biodegradable organic matter in the River. The B.O.D. increased probably due to presence of high organic matter in the water.

B.O.D. values indicate the presence of high organic matter load in Asan River. In the same way high values of B.O.D. indicate the presence of large concentration of organic matter. B.O.D. values are significantly increased in summer month April 2011 to July 2011. Sewage, domestic as well as small scale industrial waste and other kinds of effluents are also responsible for increase B.O.D. values in Asan River. The present observations indicate that the pollution is going to increase in Asan River. In the present findings the Author is of the opinion that the B.O.D. and C.O.D. values in Asan River going to exceed due to addition of sewage, small scale industries waste as well as due to rich amount of microbes which discharging their toxic effluents.

B.O.D. datas indicate the presence of high organic matter load in River Asan. The findings of present observation are supported by Kushwaha *et al*. (2006) and Singh *et al*. (2009) who studied in Chhatisgarh and Bihar states. The present observations clearly indicate that down stream site D heavily polluted as compared to up stream site A. the studies have revealed that the disposal sewage, domestic and small scale industries effluents would be harmful for aquatic fauna and flora as well as human beings if it is directly used for irrigation for other purposes.

REFERENCES

1. APHA, AWWA, WPCF, (1991): Standard method for the examination of water and waste water. 18th Ed., Washington.
2. David M. Gray (2008): The role of dissolved oxygen and ORP measurements in power plant chemistry. Power plant chemistry, 10(6).
3. Divakar R.P. and Saxena P.N. (1997): Fluctuating trend in microbial population on index of water quality. Proc. Nat. Symp. Frontiers. In Apll. Environ. Microbial, 11-13, dec. 1995, SES, CUSAT, Cochin.
4. Jayjeet Kumar, Bed Prakash Roy and Sinha R.P. (2007): Role of Physico-chemical properties of water in wet land diversity of Kuseshwarsthan, Darbhanga. Int. J. Mendel., 24(3-4): 105-106.
5. Kushwaha B.P., Kushwaha S.K., Rai O.P., Kushwaha Rama and Dwivedi Rahul (2006): Physico-chemical study of keloRiver water in Raigarh town, Chhatisgarh. Nat., J., Life Science, 3(Supp.): 569-572.
6. Manian S.R., Rathina Samy and Manivasakam N. (1989): Effect of municipal sewage on the bacteriological quality of River water. A case study environment risk assessment, 227-237.
7. Saxena K.K. and, Chauhan R.R.S. (1993): Physico-chemical aspects of pollution in River Yamuna at Agra. Poll. Res., 12(2): 101-104.
8. Shanker U. and Prasad G. (1983): Mycoflora of Ganga water Rishikesh (India). Kanpur Univ. Res. J. (Sci.), 4: 65-68.
9. Singh S.P., Verma M. and Pundhir H.S. (2009): Physic-chemical properties of nitrogen, phosphorus and potassium in sewage litigated and tubewell irrigated fields of Aligarh District. International Journal of Mendel, 26(1-4): 65-66.
10. Sinha A.K. (1988): A comprehensive study of Ganga and its dependents. Final technical report submitted to ministry of environment, Govt. of India. 1-356.
11. Tiwari N.P., Singh B.N., Singh R.K. and Prakash P. (1989): Environment and Ecology, 7(1): 88-91.