COMPARATIVE ANALYSIS OF PHYSICO-CHEMICAL PARAMETERS OF WATER SAMPLE COLLECTED FROM MADAN SAGAR LAKE AND KIRAT SAGAR LAKE, MAHOBA (U.P.) INDIA

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ABSTRACT: *This area of Bundelkhand region comes under the semi arid climate with low precipitation (900 mm/yr) and higher evaporation rate (1800 mm/yr). Surface water is the main source of water for domestic, irrigation and other purposes for local inhabitants. After treatment, the surface water is supplying to various areas through pipelines for municipal uses. So the surface water is very much valuable resource for this region. Eutrophication, anthropogenic pressure, holy rituals and tourism have been the major factors which have contributed to the damage, deterioration and degradation with a consequent adverse impact on the lake water quality. For the present work three sampling sites were identified in the lakes. the water quality was analyzed for physico-chemical characteristics (Temperature, pH, Chloride, Sulphate, Calcium (Hardnesss), Nitrate, BOD, dissolved CO_2) in the rainy season.*

Key Words: *Bundelkhand region, Physico-chemical parameters and water samples.*

I. Introduction

India's surroundings is becoming fragile and environmental pollution is one of the unwanted facet results of industrialization, urbanization, populace growth and unconscious attitude closer to the environment (Singh, Virendra and Chandel, C.P. Singh (2006). Water, the most important natural resource on this planet, has the precise assets of dissolving and sporting in the suspension a huge type of chemicals and therefore water can without difficulty become infected.

Water is one of the most quintessential and is the maximum important aid for the existence guide system.about 97.2% water lies in oceans as salt water. even as 2.15% in frozen ice shape and the final zero.65% stay as fresh both on surface or floor water. available fresh water sources are very constrained. The demand for clean water has accelerated daily and could increase with the fast increase of populace, agriculture and industry. As a result the clean water reserve depletes every day too. The requirement of clean water in step with character is ready 2.7 lt. in keeping with day. Agriculture is also one of the principal purchasers of sparkling water resources (Zaidi, Jamshed, Ganesh Shree and pal Amit (2011).

Due to anthropogenic activities water body get highly polluted, which make social life in more trouble condition. numerous elements, like discharge of agriculture, home and business wastes land use practices, eological formation, rainfall styles and infiltration charge are suggested to affect the quality of ground and surface water in a place. WHO estimate that approximately eighty% of water pollutants in growing u . s . a . like India is accountable for domestic wastes. The fallacious management of water systems might also purpose severe problems in availability and fine of water. Availability of water on this place is rely upon a few ponds and lake. This vicinity (Bundelkhand vicinity) faces such problems sometimes. Availability of water on this location depends on rain water, but some district which can be located near river our bodies are well habituated. In Mahoba water requirement definitely relies upon upon surface water sources, ponds and lakes due to adverse environmental circumstance. because of anthropogenic activities water body get notably polluted, which make social life in more problem condition.

Our environment has witnessed a non-prevent and fast deterioration which purpose pollution in all its abiotic and biotic additives. Now-a-days water pollution is burning trouble anywhere in the worldwide. Like one of a kind growing nations water pollution in India additionally obtain in alarming situation because of lack of proper control rules. consequently the extremely good and quantity of utilizable pond water decreases which in the long run consequences in water disaster. So there can be want for non-stop assessment of water wonderful and pollutants stage on the way to sell better residing situation across the reservoirs and to maintain the reservoirs in advance than there intense worst condition of eutrophication (Anu, S.adequate Upadhyaya and Avinash Bajpai (2011). The physico-chemical parameters of water and the dependence of all life manner on those elements make it suitable to take as an environment(A.S. Manjare, Vhanalakar and V.D. Muley (2010).

The first-rate of surface water is largely stricken by herbal methods (weathering and soil erosion) as well as anthropogenic inputs (municipal and business waste water discharge). The anthropogenic discharge represents a consistent polluting source; whereas floor runoff is a seasonal phenomenon, in large part suffering from climatic situations. numerous studies were carried out so far to understand the physico-chemical houses of lake, pond and reservoirs (S.M.Jain, M.Sharma and R.Thakur (1996); Sreenivasa and Kotaiah (2000); Thorat and Masarrat, (2000); Datta and Sharma, (2001); Shastri and Pendse (2001), J. Kumar, D.P.Gond, and Amit friend (2010). although numerous reviews at the assessment of water nice based totally on physico-chemical and biological parameters had been posted by means of numerous people in India (Lettia and Dan, (2008); M.A. Sheikh, Yousuf Dar Idrees, Yaseen Sayar, Amit pal and Ashok k. Pandit (2013) but water great tracking in aquatic bodies of Bundelkhand place is overlooked (J. Kumar and Amit friend (2010); Zaidi, Jamshed, Ganesh Shree and pal Amit (2011);J. Kumar and pal, 2012).the present proposed look at has been undertaken for have a look at the water pleasant of the historical lake namely Kirat sagar in Mahoba district, Bundelkhand region of Uttar Pradesh.

II. Material and method

A. *Study area*

Mahoba is widely known district of Bundelkhand area of Uttar Pradesh with a geographical area of 2884 sq. km. The call Mahoba is derived from 'Mahotsav Nagar', the town of amazing festivals, which had been celebrated right here via Chandra Verman, the traditional founder of the Chandella Dynasty. most of the later Chandella rulers whose names are specially related to the local ancient monuments are King Vijai friend (1035 - 1045 advert) who constructed the lake Kalian Sagar. The lake Kirat Sagar was built with the aid of King Keerti-Verman (1060-1100 advert); and Madan Sagar was built by way of King MadanVerman (1128-1164 advert) respectively. The district Mahoba is situated within the South West nook of the area at 25º01'30"N - 25º39'forty" N range and 79º15'00"E –eighty º10'30" E longitudes. The southern region of the district is blanketed with hillocks. The average annual rainfall is 864 mm. The climate is typical subtropical punctuated through long and extreme summer season. approximately 87% of the annual rainfall is acquired from South-West monsoon. may is the most up to date month with temperature stoning up to 47.50C. With the development of monsoon by means of approximately mid June, temperature starts off evolved reducing. January is generally the coldest month with the temperature going up to eight.30C. The relative humidity is highest throughout south-west monsoon ranging between eighty% to 85% with its lowest around 30% for the duration of top summer time months of April and can. the water sample have been accumulated from 5 exclusive factors of kirat sagar lake.

Temperature

Temperature and photoperiod are important factors which control the behavior, physiology and distribution of organisms. the water sample in three different beakers has been taken and dips the thermometer in the first beaker for 2 minutes and notes the temperature in the record file. This process is repeated with second and third beaker and notes the temperature reading in the record.the average temperature calculated with this data.

pH

The toxicity of several common pollutants is markedly affected by pH changes. The pH range increasing acidity or alkalinity may make these poison more toxic. Switch on the pH meter and leave for 10 minutes to warm up. the electrode rinsed with distilled water and wipe off with tissue paper. the electrode dipped in standard buffer solution of pH- 7 for calibration, wait until the displayed reading establish at 7.00. Rinse the electrode with distilled water and wipe off.the electrode dipped in standard buffer solution of pH- 4 and wait to establish reading at 4±01 or adjust with calibration knob. Rinse the electrode and dip in the sample, wait until reading establish and note the reading.

Total Hardness (EDTA Titrimetric method)

Calcium and magnesium, the two most dominant cations play a major role in determining the hardness of the water. Hardness may be due to the presence of Ca++ and Mg++ salt from detergents and soaps used for laundering on the bank of the water body precipitated as calcium carbonate. The water sample(50ml) taken in a conical flask and 2 ml buffer solution and 2 drops EBT indicator solution added into it, wine red colour appears. Titrate with EDTA till the colour changes to blue. the volume of EDTA used noted. the total hardness Calculated by following formula-

Total Hardness (EDTA) mg/l= Titrant x 1000/ volume of sample

Chloride (Titrimetric method)

The water sample(100 ml) taken in a conical flask and adjust the pH in the range of 7-10. 1 ml K_2CrO_4 indicator added, titrate with $AgNO_3$ end point will be pinkish yellow.

Cl- (mg/l) = V x N x 35.45 x 1000/ volume of sample

Where,

V= ml $AgNO_3$(Titrant) used for sample

N= Normality of $AgNO_3$

Results and Discussion

A. Temperature-

Observation table-

S.No.	Sample description	Temperature	Average temperature
1.	Kirat sagar(A)	32^0C	
2.	Kirat sagar(B)	32^0C	32^0C
3.	Kirat sagar(C)	32^0C	

S.No.	Sample description	Temperature	Average temperature
1.	Madan sagar lake(A)	32^0C	
2.	Madan sagar lake(B)	32^0C	32^0C
3.	Madan sagar lake(C)	32^0C	

The average temperature of water sample was observed 32^0C.

pH-

Observation table-

S.No.	Sample description	pH value	Average pH value
1.	Kirat sagar(A)	6.56	
2.	Kirat sagar(B)	6.86	6.69
3.	Kirat sagar(C)	6.65	

S.No.	Sample description	pH value	Average pH value
1.	Madan sagar lake(A)	6.56	
2.	Madan sagar lake(B)	6.65	6.66
3.	Madan sagar lake (C)	6.83	

The average pH of water sample was observed 6.69 and 6.66. Generally,pH ranges between 7 to 8 has been considered good for fish culture. pH IS 10500-1991 Desirable :6.5 – 8.5, Permissible (Indian Standard for Drinking Water - Specification IS 10500 : 1991).

Total Hardness (EDTA Titrimetric method)

Observation table-

S.No.	Sample Description	Sample volume (ml)	EDTA used (ml)	Total hardness (mg/l) as $CaCO_3$
1.	Kirat sagar(A)	50ml	4ml	
2.	Kirat sagar(B)	50ml	4ml	80mg/l
3.	Kirat sagar(C)	50ml	4ml	

S.No.	Sample Description	Sample volume (ml)	EDTA used (ml)	Total hardness (mg/l) as $CaCO_3$
1.	Madan sagar lake(A)	50ml	5.5ml	
2.	Madan sagar lake(B)	50ml	5.5ml	110mg/l
3.	Madan sagar lake(C)	50ml	5.5ml	

Calculation-(keerat sagar lake)

Total Hardness (EDTA) mg/l= Titrant x 1000/ volume of sample

= 4 x 1000/50

= 80 mg/l

Total hardness for madan sagar lake = 5.5 x 1000/50 = 110 mg/l
Hardness IS 10500-1991 Desirable :300 mg/l , Permissible : 600 mg/l . (Indian Standard for Drinking Water - Specification IS 10500 : 1991)

Chloride-

Observation table-

S.No.	Sample Description	Normality of AgNO3	AgNO3(Titrant) used for sample (ml) V	Chloride (mg/l)
1.	Kirat sagar(A)	0.2	0.6ml	
2.	Kirat sagar(B)	0.2	0.6ml	42.564mg/l
3.	Kirat sagar(C)	0.2	0.6ml	

S.No.	Sample Description	Normality of AgNO3	Volume of the sample	AgNO3(Titrant) used for sample(ml) V	Chloride (mg/l)
1.	Madan sagar lake (A)	0.2	100ml	0.3ml	
2.	Madan sagar lake (B)	0.2	100ml	0.3ml	21.28mg/l
3.	Madan sagar lake (C)	0.2	100ml	0.3ml	

Calculation –
Cl- (mg/l) = V x N x 35.45 x 1000/ volume of sample
Where,
V= ml AgNO3(Titrant) used for sample
N= Normality of AgNO3
Cl (mg/l) =0.6 x 0.2 x 35.47 x 1000/100
=42.564mg/l

Chloride (mg/l) for Madan sagar lake = 0.3 x 0.2 x 35.47 x 1000/100 = 21.28mg/l
Chloride, Cl IS 10500-1991 Desirable : 250 mg/l , Permissible : 1000 mg/l(Indian Standard for Drinking Water - Specification IS 10500 : 1991)

BOD (BIO-CHEMICAL OXYGEN DEMAND)

Calculation for DO of the sample

Glass stoppered BOD Bottle of known volume (100-300ml) filled with sample avoiding any bubbling. No air should be trapped in bottle after the stopper is placed. 1 or 2 ml of each maganoussulphate and alkaline potassium iodide solution using separate pipettes. Place the stopper and shake the bottle thoroughly.
Add 2 ml of conc. H_2SO_4 and shake thoroughly to dissolve the precipitate. Transfer gently 203ml of it in conical flask. Put few drops (4) of starch indicator and titrate against sodium thiosulphate solution and note the end point when initial yellow colour turns to colourless.

calculation

$DO(mg/l) = V_1 \times N \times 8 \times 1000/V_2-V_3$

Where
V_1 = Volume of Titrant (mg/l)
N = Normality of Titrant (0.025)
V_2 = Volume of sampling bottle after placing the stopper
V_3 = Volume of maganosulphate and KI solution
Initial DO of the sample was measured as dicussed above. The sample along with duplicate was incubated in BOD incubated at 27^0C for three days. After three days final DO in the bottle was measured.

Calculation

$BOD(mg/l) = (D_0-D_3)$

Where , D_0= Initial DO in the sample(mg/l)
D_3 =Initial BOD left out in the sample after 3 days incubation (mg/l)

Observation table-

S. No.	Description of sample	Volume of Titrant (initial)	Volume of sample/dilution factor	Initial DO (mg/l)	Final DO (mg/l)	BOD (mg/l) (Initial-final)
1.	Kirat sagar lake	2ml	300ml	1.35mg/l	0.3	1.05ml
2.	Madan sagar lake	4ml	300ml	2.7mg/l	2.6	0.1ml

Calculation of initial DO(mg/l) for kirat sagar = 2 x 0.025 x 8 x 1000/300 -4 = 1.35 mg/l

Nitrate(Spectrophotometric method)

Treatment of sample: 1ml Hcl solution added to 50ml sample and mix properly.

2-3ml sample taken in the vessel of UV-spectrophotometer. Read the absorbance or transmittance against redistilled water set at zero absorbance or 100% transmittance. Use a wavelength of 220 nm to obtain nitrate reading and a wavelength of 275nm to determine interference due to dissolved organic matter.

Observation table

S.No.	Sample description	Volume of HCL solution	Nitrate (mg/l)
1.	Kirat sagar lake	1ml	22.16mg/l
2.	Madan sagar lake	1ml	6.84 mg/l

Sulphate (Spectrophotometric method)

Preparation of conditioning reagent: 50ml glycerol with a solution containing 30ml concentrated HCl, 300 ml distilled water , 100ml 95% ethyl or isopropyl alcohol and 75 g Nacl.

2.5ml conditioning reagent and 0.075 gm $Bacl_2$ added and mix properly in 50 ml of each sample.

Measure the turbidity developed after every 30sec, for 4 min. on spectrophotometer at 420nm.

Observation table

S.No.	Sample description	Volume of conditioning reagent	$Bacl_2$(gm)	Sulphate(mg/l)
1.	Kirat sagar lake	2.5ml	0.075gm	895.29mg/l
2.	Madan sagar lake	2.5ml	0.075gm	492.99mg/l

Dissolved CO_2 (Titration method)

Preparation of Titrant: 0.2272 gm sodium hydroxide dissolved in 250ml of distilled water.

4 drops of phenophthaline indicator added in each sample (50ml) and titrate with the titrant (0.22N,NaOH).

Observation table

S.No.	Sample description	Volume of sample	Volume of the Titrant	Dissolved CO2
1.	Kirat sagar lake	50ml	0.2ml	4mg/l
2.	Madan sagar lake	50ml	0.3ml	6mg/l

calculation

Dissolved CO2 mg/l = Titrant x 1000/ volume of sample

1. Kirat sagar lake = 0.2 x 1000/50 = 4mg/l
2. Madan sagar lake = 0.3 x 1000/50 = 6mg/l

Conclusion

From the observations it may be concluded that the value of above physico-chemical parameters in kirat sagar lake and Madan sagar lake is desirable . The lake is productive and will support diverse number of organism from planktons, benthos to fishes and macrophytes going by the abundance of chemical ions needed for inter-conversion of energy and production of organic materials present in the lake. The only threat to its productivity was the case of cultural eutrophication, which was observed in the lake. The results of the physico-chemical examination of this could be helpful in the management of the lake for its water quality and fisheries.

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