



## PHYSICO-CHEMICAL AND BIOLOGICAL CHARACTERISTICS OF RIVER RAMGANGA AT BAREILLY

\*Singh, P. and Gaur, A.

Department of Zoology, I.F.T.M. University, Moradabad-244001

### ARTICLE INFO

#### Article History:

Received 20<sup>th</sup> December, 2017  
Received in revised form  
16<sup>th</sup> January, 2018  
Accepted 23<sup>rd</sup> February, 2018  
Published online 30<sup>th</sup> March, 2018

#### Key Words:

Ramganga River,  
Winter Season, Water Pollution,  
Samples, Untreated Domestic Waste.

### ABSTRACT

The water quality of rivers and water bodies are not as per the norms and the main reason for this, is poor sewage, domestic waste and industrial effluents in the city. Physico-Chemical and Biological characteristics of the water of river Ramganga were studied and tested by collecting five different samples from five different sites in winter season and to observe the change in the quality of water in winter season by discharged through untreated sewage, domestic waste and industrial wastes etc. which increases the water pollution in river.

**Copyright © 2018, Singh and Gaur.** This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Citation: Singh, P. and Gaur, A. 2018.** "Physico-Chemical and Biological Characteristics of River Ramganga at Bareilly", *International Journal of Development Research*, 8, (03), 19198-19201.

### INTRODUCTION

Water pollution is caused by two ways, first is by natural, due to the decaying of organic matters, soil erosion, leaching of rocks etc. and secondly is by human beings, due to the high level emission of industrial wastes, domestic sewage, synthetic chemical, fertilizers, insecticides, etc. When large quantity of sewage or the other putrefiable matter is discharged into river water, it become turbid, sunlight fails to reach the lower depths and green plants which remove CO<sub>2</sub> from the water by the process of photosynthesis and release O<sub>2</sub> to it, die off. Scavenging organisms increase in number and remain active till a proper supply of food is available, these are responsible for causing serious water borne disease. Ramganga river starts its journey at an elevation of 3,110m. in the lower Himalayas of Garhwal, near Lobha village. The river passes through Uttarakhand and Uttar Pradesh only. Cities of Moradabad, Badaun, Hardoi, Bareilly, Shahjahanpur are placed on the banks of Ramganga river. The catchment area of Ramganga basin is 32,493 sq.km. (approx.).

### MATERIALS AND METHOD

In winter season (November-December), water samples were collected in order to study the physico-chemical and biological characteristics of river Ramganga from 5 different sampling site (Ajampur Balarau, Ghura Raghavpur, Sarai Talfi, Uncha Gaon and Kundara) at Bareilly. Methods are used for the study of physico-chemical parameters are Total Biomass, temperature by thermometer, pH by pH meter, turbidity by turbidity meter, electrical conductivity by EC meter, BOD by 5 days of BOD test, alkalinity by titrimetric method, dissolved oxygen by Winkler's method, calcium by EDTA titrimetric method, nitrate by UV spectrophotometer, TDS by Gravimetric method after filtration, total solids by Gravimetric method, COD by dichromate titration method and transparency as given in standard methods for the examination of water and waste water (APHA *et.al.*, 1985).

### RESULTS AND DISCUSSION

Tables and columns are showing the result of some physico-chemical and biological analysis at 5 sites of river Ramganga. Temperature affects the biological activities of the bacteria, solubility of gases and viscosity of polluted water.

\*Corresponding author: Singh, P.

Department of Zoology, I.F.T.M. University, Moradabad-244001.

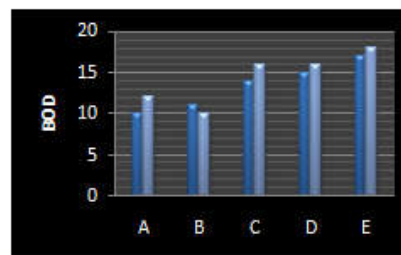
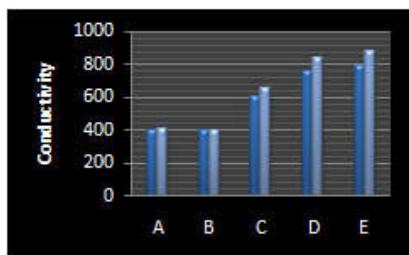
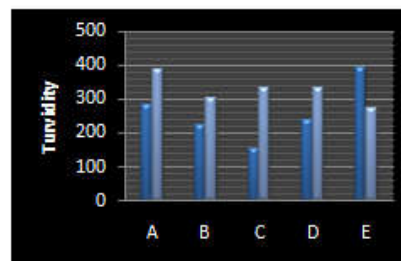
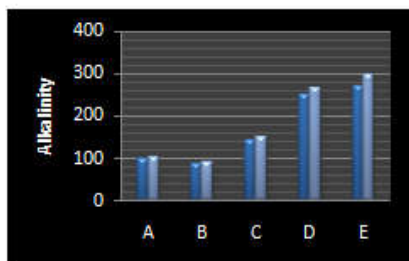
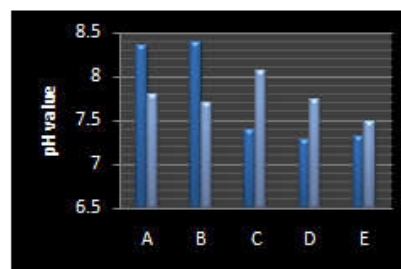
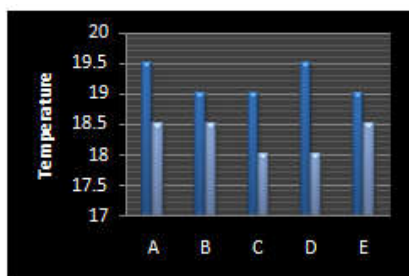
**Table 1. Site-wise values of different physico-chemical parameters in month of November**

	Site A	Site B	Site C	Site D	Site E
Temperature ( <sup>0</sup> C)	19.5	19	19	19.5	19
Transparency (cm)	15.5	20	9.5	10.5	17
pH	8.36	8.38	7.39	7.28	7.32
Total solids (mg/l)	312	270	483	695	560
TDS (mg/l)	234	210	390	430	370
Dissolved Oxygen (mg/l)	6.1	6.5	5.9	6	6.8
BOD (mg/l)	10	11	14	15	17
COD (mg/l)	29.3	30	46.6	68.5	73.7
E. C. (μmoh/cm)	400	400	600	752	790
Turbidity (NTU)	280	220	150	236	390
Alkalinity (mg/l)	96.5	85	140	250	270
Calcium (mg/l)	49	23	61	72	64
Nitrate (mg/l)	0.83	0.87	1.07	1.41	1.3
Total Biomass (mg/l)	18	24	17	15	16

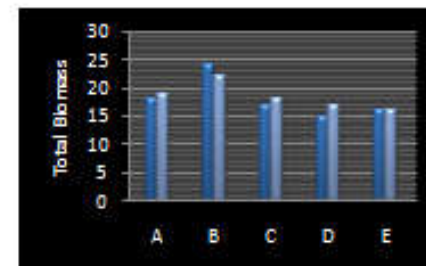
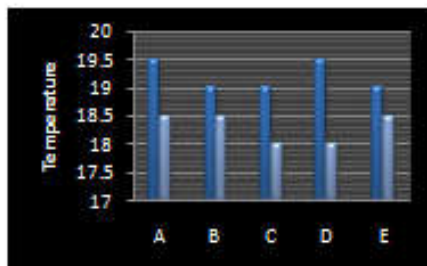
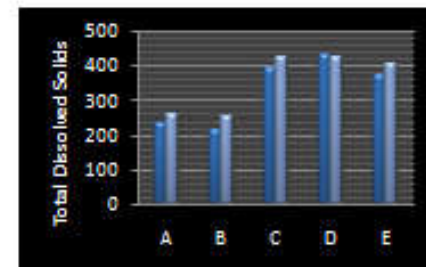
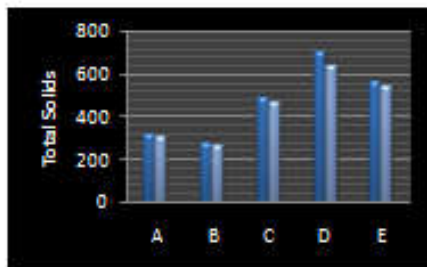
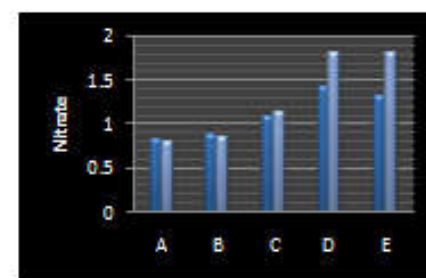
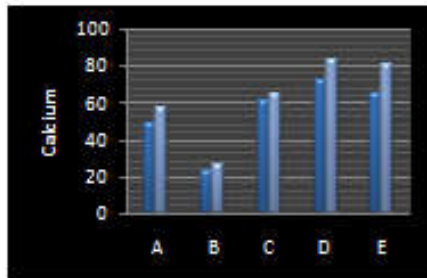
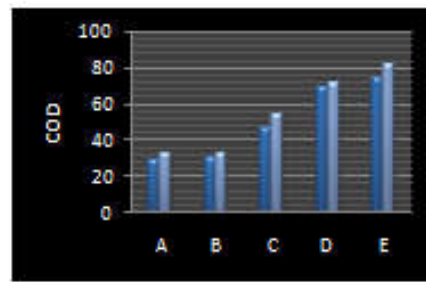
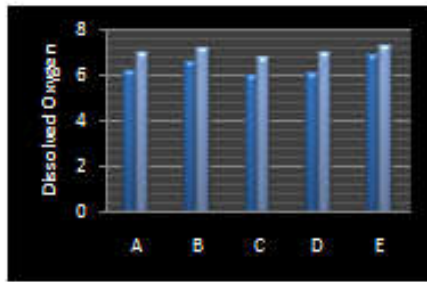
**Table 2. Site-wise values of different physico-chemical parameters in month of December**

	Site A	Site B	Site C	Site D	Site E
Temperature ( <sup>0</sup> C)	18.5	18.5	18	18	18.5
Transparency (cm)	17	21	10.5	11	16
pH	7.8	7.69	8.06	7.73	7.49
Total solids (mg/l)	301	266	460	632	539
TDS (mg/l)	260	254	422	422	405
Dissolved Oxygen (mg/l)	6.9	7.1	6.7	6.9	7.2
BOD (mg/l)	12	10	16	16	18
COD (mg/l)	31.9	32.5	54.2	72	81.1
E. C. (μmoh/cm)	405	396	658	841	883
Turbidity (NTU)	387	300	330	330	270
Alkalinity (mg/l)	102.7	91.2	148.4	264	296
Calcium (mg/l)	57	25.7	64	83	81
Nitrate (mg/l)	0.79	0.84	1.12	1.8	1.79
Total Biomass (mg/l)	19	22	18	17	16

All column shows the site-wise (site A- Ajampur Balarau, site B-Ghura Raghavpur, site C-Sarai Talfi, site D-Uncha Gaon and site E-Kundara) physico-chemical and biological values of both month( dark blue column indicate to November month and light blue column indicate to December month) of winter season



Continue .....



In present study, the temperature ranged from 18.0 °C to 19.5 °C during Nov.-Dec., 17.

**pH** value of water indicates the logarithm of reciprocal of hydrogen ion concentration present in water. pH value in months Nov.-Dec., 17 ranged from 7.28 to 8.38.

**Alkalinity** is a measure of the amount of acid (hydrogen ion) water can absorb (buffer) before achieving a designated it. Its value during Nov.-Dec.,17 ranged from 85.00mg/l to 296.00mg/l.

**Turbidity's** degree increases with the increase of pollution strength. Turbidity recorded in present study from 150NTU to 390NTU in month Nov.-Dec.,17.

**Electrical Conductivity** is a measure of the capability of water in a stream to pass an electric current. EC in month Nov.-Dec.,17 ranged from 400  $\mu$ moh/cm to 883  $\mu$ moh/cm.

**Biological Oxygen Demand** The amount of O<sub>2</sub> by the aerobic bacteria to cause the aerobic biological decomposition of putrescible matter of polluted water for complete oxidation. BOD ranged from 10mg/l to 18mg/l in month Nov.-Dec.,17.

**Dissolved Oxygen** content in water is dependent upon the amount and character to unstable organic matter in it.

In present study, DO ranged from 5.9mg/l to 7.2mg/l in the month Nov.-Dec.,17 of winter season.

**Chemical Oxygen Demand** test is carried out to know chemically oxidisable matter in polluted water sample. In present study, COD during Nov.-Dec.,17 ranged from 29.3mg/l to 81.1mg/l.

**Calcium** is one of the major inorganic cations or positive ions in water. Calcium ranged from 23mg/l to 83mg/l during winter season, Nov.-Dec.,17.

**Nitrate's** presence in water indicates that organic matter is fully oxidised. Nitrate recorded in the present study from 0.79mg/l to 1.80mg/l in month Nov.-Dec.,17.

**Total Solids's** level that are too high or too low can reduce the efficiency of wastewater treatment. In the present study, TS ranged from 266mg/l to 695mg/l in month Nov.-Dec.,17.

**Total Dissolved Solids** test provides a qualitative measure of the amount of dissolved ions. TDS ranged from 210mg/l to 422mg/l in Nov.-Dec.,17 of winter season.

**Transparency** of water relates to the depth that light will penetrate water. Transparency recorded from 11cm to 21cm in Nov.-Dec.,17 of winter season.

**Total Biomass** is the total mass of living material and dead organic matter. TB ranged from 15mg/l to 24mg/l during winter season, Nov.-Dec.,17.

The results revealed that for safe discharge or reuse of water, all harmful contaminants have to be removed from both domestic and industrial wastewater.

## REFERENCES

- Animesh Agarwal and Manish Saxena 2011. Assessment of pollution by physico-chemical water parameters using regression analysis; A case study of Gagan river at Moradabad, India. *Advan. in Applied Sci. Res.*, 2(2): 185-189.
- Apha, Awwa and WPCF 1985. Standard methods for the examination of water and waste waters, 16th ed. New York, USA, 874.
- Ashish Kumar and Yogendra Bahadur 2009. Physico-chemical studies on the pollution potential of river Kosi at Rampur (India). *World Journal of Agricultural Sciences*, 5(1):01-04.
- Sinha, D.K., Shilpi Saxena and Ritesh Saxena 2006. Seasonal variation in the aquatic environment of Ranganga river at Moradabad: A quantitative study. *Indian Journal Environmental Protection*, vol.26(6):488-496.
- Khan, Y. A., Gani, K. M. and Chakrapani, G. J. 2017. Spatial and temporal variations of physicochemical and heavy metal pollution in Ramganga river- tributary of river Ganges, India. *Environ. Earth Sci.* 76;231:1-13.
- Mohammad Alam and Pathak, J. K. 2010. Rapid assessment of water quality index of Ramganga river western Uttar Pradesh (India) using a computer programme. *Nature and Science* 8(11):1-8.
- Khan, M. Y. A., Daityari, S. and Chakrapani, G. J. 2016. Factors responsible for temporal and spatial variations in water and sediment discharge in Ramganga River, Ganga Basin, India. *Environmental Earth Sciences*, 75:283.
- Bhutiani, R., Khanna, D. R., Shubham and Faheem Ahamad 2016. Physico-chemical analysis of sewage water treatment plant at Jagjeetpur, Haridwar, Uttarakhand. *Env. Conv. J.*, vol.17(3):133-142.
- Ramesh Chandra, Kanchan Kashyap and Adarsh Pandey 2010. Pollution status of river Ramganga : Physico-chemical characteristics at Bareilly. *J. Exp. Sci.*, vol.1, issue.5,:20-21.
- Ravi Kumar Gangwar, Jaspal Singh, A. P. Singh and D. P. Singh, 2013. Assessment of water quality index: A case study of river Ramganga at Bareilly, U.P., India. *Int. J. Sci. & Eng. Res.*, vol.4, issue.9,:2325-2329.
- Ravi Kumar Gangwar, Puneet Khare, Jaspal Singh and A. P. Singh 2012. Assessment of physico-chemical properties of water: river Ramganga at Bareilly, U.P. *J. Chem. and Pharm. Res.*, vol.4(9):4231-4234.
- Sinha, D. K. and Kumar, N. 2006. Monitoring of Trace metals in Gagan river water at Moradabad. *IJEP*, vol.26(6):516-520.
- Sayeed, A., Chandra, S. and Singh, J. 2017. Characterization and influence of rainy season on ground water quality of Moradabad city. *Int. J. of Adv. Res.*,5(7):335-338.
- Tripathi, S. S. and Isaac, R. K. 2016. Rainfall pattern and groundwater fluctuation in Ramganga River basin at Bareilly district, U.P., India. *Int. J. Adv. Eng. Man. and Sci.*, vol.2, issue.6, pp:576-587.
- WHO 1984. guidelines for drinking water quality recommendation, Geneva.

\*\*\*\*\*