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Comparative Water Quality Analysis in Beso River in District Jaunpur, Azamgarh and Ghazipur Uttar Pradesh

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ABSTRACT

The Beso River originates from village Shahapur in District Jaunpur and enters in District Azamgarh after Jaigaha and finally merges into river Ganga in District Ghazipur Uttar Pradesh. It flows south-eastward for almost 95 km only through three districts of eastern Uttar Pradesh. The sample has been collected from three sites indicated by S. S1 from Lakhmapur Jaunpur, S2 from Lalganj Azamgarh, and S3 from Jakhania Ghazipur. The sample has been collected five times i.e. in May, August, November, January, and March on the second Sunday of the month in the year 2020-2021. During tabulation of data five reading from each sample have taken and bio statistically analyzed by students T-test for all parameters for all times and only significant data have been considered. The mean value for the pH as 7.4 Ammoniac Nitrogen as 66.0 ppm, Temperature as 28.66^{0}C, B.O.D 235.33 C.O.D 271, Free CO_2 260 ppm TDS as 543.33ppm, Cu 2.47 ppm, Iron Total as 2.09 ppm Zinc 6.46 ppm, Cr 3.58ppm, Phenolic Compounds as 5.36 ppm and Conductivity as 373.73 µ S/cm. have been measured by implication of different techniques. During the investigation, only Cu and total Iron values are measured lower to normal while other parameters reported high to normal values. Overall all physiochemical data indicate the water quality tends to be increased polluted as river move to Sangam from Ganga. Yet the water quality of Beso is many times better than River Sai and Gomati.

Keywords: ppm, significant data, site of sampling (S1, S2, S3), µ S/cm,

INTRODUCTION:

Water is very essential for all forms of life. Large amounts of human waste, agricultural and industrial pollutants are discharged in this river as it flows towards the Ghazipur of Uttar Pradesh. The river passes via various ponds lakes cultivating land villages slums and towns. So household effluents like shampoo detergents chemicals sewer agricultural fertilizers pesticides are being added, as a major source of municipal and domestic waste and sewage water causing pollution in this river (Tripathi, V.M., Tewari, D.D., Tiwari, H.D 2008). However, in recent times, the conditions of water quality are very badly affected. The reasons for this due to increase in population growth, rapid industrialization, and agriculture methods resulting in deterioration of water quality (Begum, A., and Harikrishna,(2008). Heavy metal accumulation in vegetables and crops through irrigation with contaminated water sources has become a serious problem responsible for causing devastating effects on consumer health (Kumar V., Thakur R.K., & Kumar P. 2019b). The waste generated from hospitals and medical health institutions is a major source of environmental and public health problems requiring safe handling and secured disposal. The primary cause of environmental

degradation in India is attributed to the rapid growth of population in combination with economic development and overuse of natural resources (Rajiv Chopra 2016). Microbe contamination of groundwater due to sewage outfalls and high concentration of nutrients in marine and coastal water due to agricultural runoff are among the most serious threats (Swati Tyagi, Neelam Garg, and Rajan Paudel,2014).

Water pollution has many negative consequences such as destruction of marine habitat, development of various fatal human diseases such as cholera, malaria, tuberculosis, etc. Therefore, water pollution is indeed a major and serious global topic of concern. Water Pollution matters because it harms the environment on which we depend. Destroying the environment ultimately reduces the quality of our own lives. Research survey concluded that a large number of drains are responsible for pollution in river Beso that enter directly into the river carrying untreated industrial and domestic waste. In the present article, we have attempted to study the successive increase in water pollution as it passes for merging to Ganga River.

MATERIAL AND METHODS:

During the collection of the water sample, we have collected them from **Lakhmapur Jaigaha** just 10 kilometers apart from its origin from **Berukh tal** in village Shahapur near town Khetasarai from **Lalganj town from Azamgarh** and **Jakhania from District Ghazipur**.the water

The sample was further analyzed in physiochemical Laboratory Bhavya and Bhairavi associate sigra, Varanasi about BOD, COD, pH, ammonical nitrogen, Temperature, CO2, Total Dissolved Solid(TDS), phenolic compounds conductivity, and inorganic contents. The sample has been collected five times i.e May, August, November January, and March on the second Sunday of the month. During tabulation of data five reading from each sample have taken and biostatistically analyzed by students T-test for all parameters for all times and only significant data have been considered. Finally, mean values have been considered. Now the table for each month has been stored. The table shown in this paper has been prepared from the mean value of the physicochemical parameter.

For the measurement of pH, Hg electrode pH meter, Ammonical Nitrogen and Phenolic Compound by UV/VIS Spectroscopy. Temperature by Bulb Mercury Thermometer. B.O.D, C.O.D free Carbon dioxide, by the laboratory test method, TDS from TDS meter, and heavy metals from Flame Atomic Absorption Spectroscopy have been measured.

Map: *Showing flow of* ***Ganga*** *and its fusion with* ***Beso***

Pics: View of BESO in Lalganj Azamgarh and its origin in Jaunpur

Table: showing the mean and bio statistically analyzed data for various parameters. S1-sampling site Lakhmapur, S2-sampling site Lalganj S3- Jakhania mg/L=ppm.

Parameters	S1	S2	S3	Normal Value	Mean	Technique employed
pH	7.2	7.4	7.6	5.5-9.0	7.4	Hg electrode pH meter
Ammoniacal Nitrogen	62	66	70	50 mg/L	66.0	UV/VIS spectrophotometer
Temperature	29	28	29	5 o C	28.66	Bulb Mercury thermometer
B.O.D	230	236	240	150 mg/L	235.33	Laboratory Test
C.O.D	270	271	272	250 mg/L	271	Laboratory Test
Free CO2	212	280	290	200 ppm	260	Laboratory Test
TDS	500	520	610	400ppm	543.33	Digital TDS Meter
Cu	2.56	2.73	2.13	3.0 mg/L	2.47	Flame atomic absorption Spectroscopy
Iron Total	1.96	2.10	2.22	3.0 mg/L	2.09	Flame atomic absorption Spectroscopy
Zinc	6.32	6.42	6.66	5.0 mg/L	6.46	Flame atomic absorption Spectroscopy
Cr	3.86	3.82	3.06	2.0 mg/L	3.58	Flame atomic absorption Spectroscopy
Phenolic Compounds	4.56	5.66	5.86	5.0 mg/L	5.36	UV/VIS spectrophotometer
Conductivity	384.26	367.04	370.07	350.18 μ S/cm.	373.73	Conductivity meter

RESULT AND DISCUSSION:

During the collection of the water sample, we have collected it from **Lakhmapur Jaigaha** just 10 kilometers apart from its origin from **Berukh tal** in village Shahapur near town Khetasarai from **Lalgang town from Azamgarh** and near **Jakhania from District Ghazipur**. The water sample was further analyzed in physiochemical Laboratory Bhavya and Bhairavi associate sigra, Varanasi. The sample has been collected five times i.e May, August, November January, and March on the second Sunday of the month. During tabulation of data five reading from each sample have been taken and mean values have been considered. Now the table for each month has been stored. The table shown in this paper has been prepared from the mean value of the physicochemical parameter. The average pH value at site S1 7.2 at site S2 7.4 and S3 as 7.6 have been reported showing slightly alkaline water medium of River but under normal pH range. The whole total average pH value is 7.4 which is satisfactory. The Ammoniacal Nitrogen at site S1 62 ppm at S2 66 ppm and S3 as 70 ppm with a total average of 66.0 ppm. This value is higher than the normal range showing continuous addition of Nitrogenous Fertilizers in River water because the River Flows via farming fields. The enriched concentration of nitrogenous substances shall be injurious to the aquatic life of the river and cattle drinking the water during grazing on the river bank. The temperature at site S1 was 29 ^{0}C at S2 28 ^{o}C and site S3 was 29 ^{o}C. The entire average temperature of River water is measured as 28.66^{o}C which is based on the environmental Temperature. Furthermore, the Biological Oxygen Demand (BOD) has been measured at site S1 as 230 ppm at S2 236 ppm and as S3 as 240 ppm. The average BOD of 235.33 ppm is high than the normal value. The BOD value is increasing as the river moves toward its destination due to increasing Phyto planktonic Pollution. Simultaneously COD value also increased at site S1 as 270 ppm at S2 271 ppm and S3 as 272 ppm. The mean value estimated was 271 ppm above to normal value prescribed.

Free CO2 Value has been measured at site S1 212 ppm at S2 280 ppm and site S3 as 290 ppm. Average carbon dioxide has been measured as 260 ppm which is high to the normal prescribed value indicating the increasing Planktonic population as the river Proceeds forward. The TDS value at site S1500ppm at S2 520 ppm and S3 have been estimated as 610 ppm. The Mean TDS value was estimated as 543.33 ppm high to the normal value of 400 ppm. As the river moves towards the destination the TDS value is increasing resulting in a successive increase in pollution levels in river water quality. The Copper quantity is necessary for water purification at Site S1 2.56at S2 2.73 at S3 2.13ppm. The means Cu quantity in River has been estimated as 2.47ppm but lower than the normal value of 3.00ppm. The copper value is lower than the normal value indicating the pollution in river water along with impurity in a water sample. Iron total in a water sample at site S1as 1.96 at S2 2.22 at S3 as 2.22 ppm. The average value of 2.09 ppm is shower deficiency in total Iron quantity. Zinc quantity at site S1 estimated as 6.32 at S2 as 6.42 at S3 6.66 ppm High to normal value 5.00ppm. As the river proceeds to its destination, the zinc quantity in the water adds from the agricultural field because Zinc sulfate is used in Paddy crop to treat the Khaira disease, But an increase in Zinc in water to normal level increases its toxicity injurious to aquatic life of the river.

The Chromium concentration in Beso water has been measured as at S1 3.86 at S2 3.82 and S3 as 3.06 ppm high

to normal value as 2.0 ppm. An increase in Chromium enhances the toxicity of the water. Phenolic compounds may be toilet discharge DDT and other insecticides also. This is estimated at site S1 as 4.56 at S2 5.66 and S3 as 5.86ppm. The value has reported slightly higher 5.36 in an average water sample from a normal value of 5.00 ppm. The most important observation of the water sample has been carried out for conductivity of the water sample measured with a Conductometer. At site S1 as 384.26 at S2 as 367.04 at S3 as 370.07 μ S/cm. The average conductivity value of 373.73 μ S/cm is higher than the normal value of 350.18 μ S/cm, indicating that the ionic concentration in water is high than the normal value.

During the investigation, only Cu and total Iron values are measured lower to normal while other parameters reported high to normal values. Overall all physiochemical data indicate the water quality is unsatisfactory as the river moves to Sangam from river **Ganga**. Yet the water quality of **Beso** is many times better compared to River **Sai** and **Gomati**. Oxygen is the most well-established indicator of water quality. Dissolved oxygen is essential for the survival of all aquatic organisms. Moreover, oxygen affects a vast number of other water indicators, not only biochemical but aesthetic ones like odor, clarity, and taste. Economic analyses seem to indicate that higher levels of income tend to improve oxygen levels. Oxygen levels of some of the major rivers have nowadays returned to their previous high levels after decades of low levels. This has improved the possibility of life. Rivers in the richer countries have become steadily cleaner over the past decade. But when measured for nitrates, fewer than one in ten European rivers is any longer *natural:* most have nitrate levels four times the norms found in nature. As cities expand to support larger populations, roofs, highways, and parking lots increasingly replace permeable soils and vegetation. Rainwater in urban areas is channeled into sewers and drain systems instead of filtering, the ground, too, raises, the water. (Verma, S., and Khan, S.A.2007). In developing countries, the picture is very different.

Rivers in the poorest countries have shown a substantial drop in the level of dissolved oxygen. Nine-tenths of all sewage in developing countries run directly into rivers, lakes, and seas without treatment. Many types of pollution are discharged into rivers, and the purification processes remove them at various speeds. Some heavy metals, for example, are removed relatively quickly because suspended clay and organic particles have a slight electric charge and adsorb the metal atoms. When the clay or organic particles settle out of the water, they take the metal atoms with them. Suspended solids in a moving body of water will settle out at various points or be carried long distances, depending on their size and the rate of the flow. The higher the amount of suspended solids is, the cloudier or more turbid is the water.

Suspended matter can affect the amount of light entering the water and therefore restrict the amount of photosynthesis that can occur and therefore the growth of plants. Small particles settling out in large amounts on the bottom of a water body can prevent some organisms from living there as well as preventing green-plants-from-photosynthesizing (Gupta, A.K., and Pankaj, P.K.2006). How fast the water body moves affects the degree of mixing of water and how much dioxygen it will carry. Thus, fast-flowing highly agitated streams will not only be saturated with oxygen but also carry well-mixed nutrients, which will be.ultimately carried.to.a.river(Brown, R.M., Mccleiland, N.J.1972). The temperature of a water body is crucial to the amount of dissolved dioxygen it can contain. The warmer the water, the less dioxygen it contains.

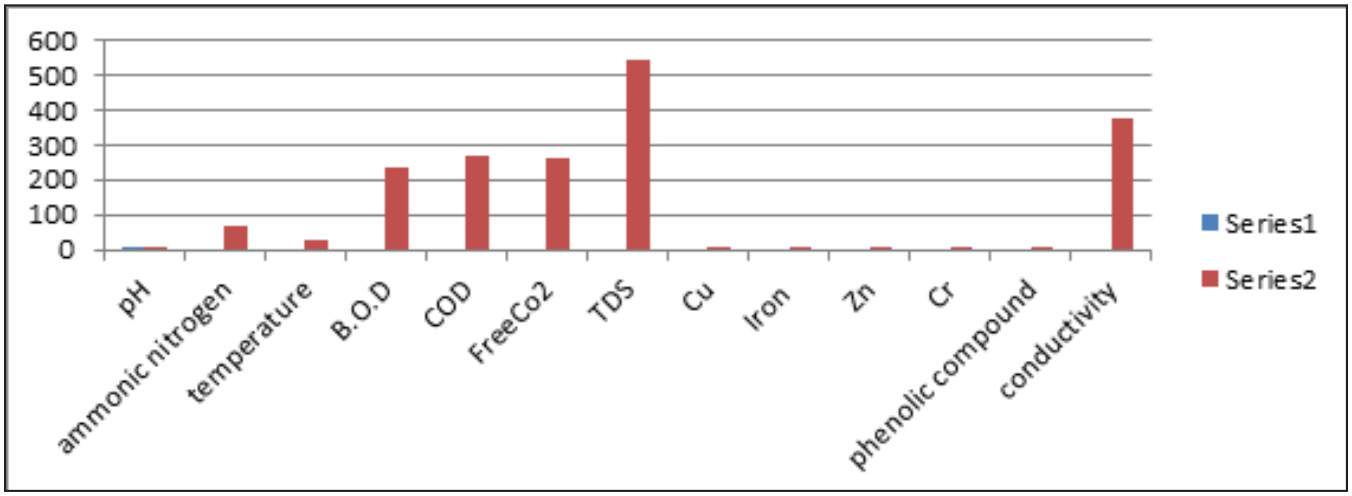

Fig: Chart showing various parameters in BESO water.

CONCLUSIONS:

With the help of different physiochemical techniques, the mean value for the **pH** was 7.4 **Ammoical Nitrogen** as 66.0 ppm, **Temperature** as 28.66^{0}C, **B.O.D** 235.33 **C.O.D** 271, **Free CO_2** 260 ppm **TDS** as 543.33ppm, **Cu** 2.47 ppm**, IronTotal** as 2.09 ppm **Zinc** 6.46 ppm **Cr** 3.58ppm **Phenolic Compounds** as5.36ppm and **Conductivity** as 373.73 µ S/cm. have been measured During estimation, only Cu and total Iron value is measured lower to normal while other parameters reported high to normal value as provided by **Ministry of Environment Government of India**. Overall, the physiochemical data indicate the water quality tends to be highly polluted as the river move to Sangam from **Ganga.** Yet the water quality of **Beso** is several times better than River **Sai** and **Gomati**.

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