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## **Pollution of water in North Koel River basin in Latehar and Palamu districts in the state of Jharkhand**

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**Abstract:-** Water is an essential nutrient and plays a key role in the human body. We can survive up to several weeks without food, but only a few days without water. Every system in the body, from cells and tissues, to vital organs requires water to function. Water is uniquely vulnerable to pollution. Known as a "universal solvent" water is able to dissolve more substances than any other liquid on earth. It's also why water is so easily polluted. Toxic substances from farms, towns and factories readily dissolve into and mix with it, causing water pollution. Groundwater gets polluted when contaminants from pesticides and fertilizers to wastes leached from landfills and septic systems make their way into an aquifer, rendering it unsafe for human use. Covering about 70% of the earth, surface water is what fills our oceans, lakes, river etc. Every time it rains, fertilizers, pesticides and animal waste from farms and livestock operations wash the nutrients and pathogens such bacteria and viruses into our water sources. The causes of water pollution include a wide range of chemicals and pathogens as well as physical parameters. Contaminants may include organic and inorganic substances. Water pollution is measured by analysing water samples. The present paper deals in the pollution of water of North Koel river basin in districts of Latehar and Palamu. Samples from various sites were collected and analysed and we could sum up on the preventive measures required in future.

**Key words:** Groundwater, pollution, contaminants, pathogens

### **INTRODUCTION**

Water is an essential nutrient and plays a key role in the human body. We can survive up to several weeks without food, but only a few days without water. Every system in the body, from cells and tissues, to vital organs requires water to function. Water is uniquely vulnerable to pollution. Known as a "universal solvent," water is able to dissolve more substances than any other liquid on earth. It's also why water is so easily polluted. Toxic substances

from farms, towns and factories readily dissolve into and mix with it, causing water pollution.

Water is the main source of livelihood of human being. The water sources are decreasing and life is becoming dependent on the running water available located in the adjacent area of small hamlets. These water resources are also being polluted for various reasons due to which the quality of human life is deteriorating. This is also causing a number of water borne disease in rural areas. The longevity of life is also decreasing due to this problem.

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## Geographical Area

Geographically the study area is located on western side of the state of Jharkhand covering parts of Latehar and Palamu districts. The area can be approached by road and railways both with a considerable walk to the river side. The study area in the North Koel river basin starts from Kechki to Rehla which passes through Chianki, Sua, Kauria, Medininagar, Kajri, Rajhara and Pandwa areas of both the districts. The nearest railway station is Kechki in Chianki, Daltonganj and Garhwa Road. Roads are close to the river banks.

## Location

The area falls within the latitudes 23°45' N to 37°30' N and longitudes 83°50' E to 84°23' E covering Latehar and Barwadih blocks of Latehar district and sadar block of Daltonganj and Rehla area of Palamu district. The area is covered in Toposheet No.F45A2, F45A1, G45S4 and G44X16 of Survey of India of India in the scale of 1:50000.



## Geology of the Area

The study area forms a part of Chotanagpur Gneiss granulites complex, which is characterized by vast expanse of granitic rocks and hence the area carries the name Chotanagpur Gneiss Granulites complex (CGGC).

The area represents a group of meta-sedimentary rocks such as mica-schists, crystalline dolomitic limestones, quartzites and calc-granulites. The granitic rocks and gneisses, which constitute the bulk of the complex, are syn-post tectonic. A swarm of metamorphosed basic intrusion represented by meta-dolerites, meta-gabbros and massive amphibolites are encountered in the meta-sediments. The granites of the area are younger than the meta-sedimentary and basic intrusive and often show intrusive relationship with the country rocks. The pegmatite and quartz veins occur as numerous small bodies throughout the area. It is pertinent.

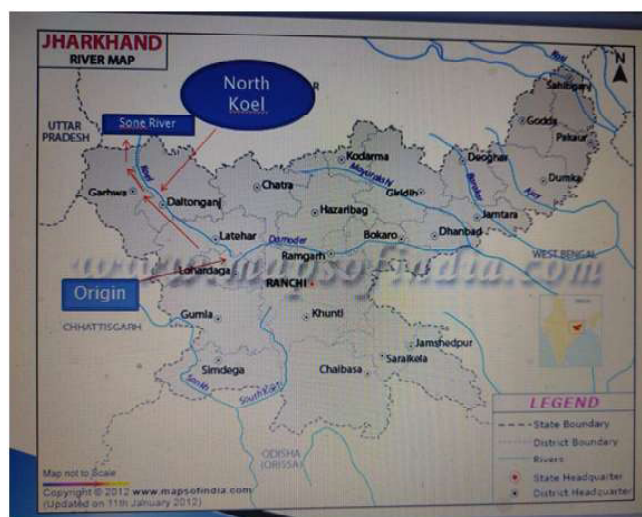
## North Koel river basin

The North Koel River originates in the Ranchi plateau (Lohardaga) and flows in Latehar and Palamu districts in Jharkhand state. The length is about 260 km. It is a big source of irrigation and water supply to a large number of populations in both the districts.

## Tributaries of North Koel River basin

North Koel and its tributaries is the lifeline of Latehar and Palamu district but due to polluted water the quality of life is decreasing and causes several diseases. The Important tributaries of North Koel river basin are:-

- Burha Ghagh
- Auranga
- Amanat
- Maila
- Sapahi



**Rainfall data of the area**

The rainfall data (in mm) of 2018 and 2019 of Palamua are:

Month	Year (2018)	Year (2019)
January	000.0	003.6
February	00.6	009.9
March	000.0	008.5
April	005.7	008.9
May	009.6	001.2
June	078.9	077.0
July	206.3	263.3
August	236.3	311.5
September	144.9	-
October	009.2	-
November	003.0	-
December	012.6	-

**Courtesy-** Indian Meteorological Department, Meteorological centre, Birsa Munda Airport, Ranchi, Govt. of India.

**The Main Causes of Pollution:**

**1. Domestic waste-** Sewage discharges, use of water by animals on river banks are the root cause of pollution. Washing of clothes by local people on river banks, solid waste disposal due to wind current from cities is also causing pollution. It consists mostly of grey water, black water, soaps and detergents. The waste water from residences, food wastes, laundry wastes and other waste products are classed as domestic or sanitary sewage.

**2. Industrial cause-** Discharge of toxic chemical waste from industries without any treatment or partially treated is being discharged into the river.

**3. Agriculture cause-** Fertilizers and pesticides are used in cultivation of crop. Rainwater dissolves certain percentage of the fertilizer and pesticides and goes to the river as subsurface and surface flow.

**4. Leaching of minerals from the rock exposed on the surface by rain water and running water and they finally reach the stream and pollute the river water.**

**Extent of pollution**

**The water samples from the various locations were collected during post- monsoon season.**  
**The water analysis data of one year for post- monsoon period of various locations are as below-**

Sl No	Parameter	Units	Results								
			WS1	WS2	WS3	WS4	WS5	WS6	WS7	WS8	WS9
1	PH value	pH	7.77	8.65	8.3	8.04	7.82	8.25	8.44	8.28	8.21
2	conductivity	µs/cm	195.0	332.0	219.0	275.0	298.0	288.0	342.0	280.0	312.0
3	Total dissolved solid	mg/l	124.0	206.0	132.0	160.0	180.0	178.0	216.0	168.0	192.0
4	Iron( as fe)	mg/l	ND (DL 0.1)	ND (DL 0.1)	ND (DL 0.1)	ND (DL 0.1)	ND (DL 0.1)	ND (DL 0.1)	ND (DL 0.1)	ND (DL 0.1)	ND (DL 0.1)
5	Magnesium	mg/l	4.37	0.48	6.8	8.74	11.7	10.20	21.38	10.20	11.7
6	Potassium	mg/l	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0
7	Sodium	mg/l	17.0	27.0	18.0	25.0	26.0	25.0	30.0	25.0	28.0
8	Phosphate	mg/l	0.04	ND (DL 0.003)	0.01	0.03	0.01	0.01	0.04	0.01	0.05
9	Calcium	mg/l	24.0	54.4	23.2	28.8	27.2	27.2	19.2	25.6	31.2

**Location of Water Sample (WS):-**

- WS1 - North Koel near Kechki
- WS2 - Auranga River near Kechki
- WS3 - North Koel + Auranga River (confluence of both rivers)
- WS4 - Pampukal Belwatikar (Koel River enters Daltonganj)
- WS5 - Bisfutta Daltonganj (River Koel exists Daltonganj)
- WS6 - North Koel at Singra
- WS7 - River Amanat at Singra
- WS8 - North Koel River + Amanat River (Confluence of both rivers)
- WS9 - North Koel River at Rajahra

**Courtesy -** sample analysis have been done from Yugantar Bharti Analytical & Environmental Engineering Laboratory, Namkum Ranchi.

**DISCUSSION**

The water analysis of various locations clearly indicates that the extent of pollution before the entry of the river in a human habitat is less but when it crosses the populated zone then due to causes mentioned above the extent of pollution increases. The increase is due to various causes and on the basis of analysis, it is discussed as below:-

The water sample analysis data clearly reflects the decrease and increase of various elements after confluence of the tributaries of the river into the main river. If one point is enriched in one element while the tributary is less concentrated with other elements than after confluence it either increases or decreases.

**The following points clarify the above facts:-**

The water sample WS6 is having 27.2 mg/l Calcium (Ca) in North Koel at Singra. While at same place the water sample WS7 is having 19.2 mg/l Ca in river Amanat. Immediately, after confluence the average comes to 25.6 mg/l. same is the case with magnesium (Mg) too. The water sample WS6 at North Koel near Singra contains 10.20 mg/l Mg. While as the water sample WS7 in Amanat near Singra contains 21.38 mg/l. After confluence it lowers down to 10.20 mg/l.

There is little variation in pH value but there is a marked change in Conductivity and TDS.

The Iron (Fe) has got no variation but potassium is slightly varied at different points. The sodium (Na) contains range from 17-28 mg/l at various locations which also fluctuates due to confluence of tributaries and Main River. The entire system of control can be achieved through awareness to the villagers.

**CONCLUSION**

The above discussion clarify the fact that due to disposal of solid waste, discharge of excess dissolve pesticides from agriculture field, washing of cloth by the villagers and towns. Increase the pollution of river water and broad changes in the Ph- value of the water. Running water on the bank of cities is considered as the lifeline of human being. The analysis data of the water collected from various resources clearly reflects the extent of pollution. However, on confluence it decreases certain remedial

measures are being suggested to check the pollution at the initial stage.

**REMEDIAL MEASURES**

It is suggested that the solid waste disposal should be stopped immediately by creating the collection points in the cities and reducing the volume of solid waste through treatment. The use of small quantity of fertilizer and pesticides will also reduce the agriculture cause of water pollution. Further River banks should not be allowed for washing clothes because it increases the acidic content in water. With this at initial stage the pollution can be controlled.

The process of this study will continue for two years in pre and post- monsoon season and finally after the end of stipulated period of research. The studies likely to come with a definite result and final remedial measures on the basis of old experiment will be suggested to control the pollution.

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