

# Review Analysis of Water Quality and Suitability to Human & Animals of River Subarnarekha, Jharkhand India

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## I. INTRODUCTION

India is a land of rivers. For Indians, rivers are much important than just a source of water bodies. We Indians consider our rivers as sacred. According to our mythology there is some mythological stories behind every river, we consider the river water as pious and pray it. Rivers not only adds to nature's beauty it has always motivated many poets to write poems on it. Indian rivers produced many poets, philosopher and has always inspire Indian literature. Rivers generally originates from hill or mountains and river water is the water of snow and rain water, our country is proud of many rivers. It provides water which people use for cultivation of crops, for generation of electricity, rivers are like god for Indians. Rivers helps in trading, producing electricity, it gives water, makes the soil fertile. Most of the rivers pour its water in Bay of Bengal. Rivers are very important as it not only serve as a habitat for human beings also it is the biggest route for transportation.

The trading of fishes is impossible without rivers. But it is very sad to say that rivers pollution has reached a critical stage now a days, almost every rivers are polluted to large extent which has affected the life of aquatic as well as human beings. Due to rapid urbanization different industries were built near the rivers bank. The industrial discharges have affected the water bodies as well as aquatic life this has degraded the water quality. Sediments are a part of ecology and is an important components of aquatic life, it helps in maintaining the tropic status of any water bodies, the presence of trace metals acts as pollution for the water bodies. The water which is polluted always shows the presence of trace elements. Among them the most dangerous elements are lead, Cadmium, Mercury and metalloids like arsenic and antimony, very small quantity of lead is very poisonous for human body. However Fe, Cu, Zn are elements which are needed by our body for normal biochemical and physiological functioning of the body. So Water treatment is very important it's very important to have a well-equipped laboratory so that the monitoring and sampling of water is carried out, as its leads to health hazards due to faecal matter and also due to chemical deposition like arsenic, lead which are poisonous for human consumption so water should be analysed to check the concentration of contaminants in it.

It has also been found that most of the industries has a tendency to throw its waste in river basin, this results in change in the pH, taste, colour, and odour. This changes effects the development and growth of aquatic organisms as well as aquatic plants. Dams also affect the flow, sediments depositions and temperature of the river system. This reduces the flow and also decreases the water level in tributaries which is directly affecting the riverside vegetation. Not only industries but the use of fertilizers in agriculture has also affected the river bodies in large scale we know that life without rivers is impossible. Rivers maintain ecological balance. India is known for its rivers: Ganges, Yamuna, Brahmaputra, Narmada, Godavari, Krishna, Kaveri are the famous rivers of India. We should step forward to protect our river bodies which nature has gifted us.

Subarnarekha River has attracted many researcher to work on it, and has been studied since the time of British administrators.

Mishra A, Tripathi BD (2008) was the first to have a comparative studied on east and west Singhbhum districts of chotanagpur plateau region and correlated with these type of problems. Presence of prehistoric tools within different units of quaternary sediments.

Mishra A, Tripathi BD (2008) also found that the Palaeolithic sites of this region are clustered in five areas, namely Chantal, Sine, Ghatsila and Chiapas. After Ghosh many researchers like, Chakrabarti and Chattopadhyay (1987), Bhattacharya and Singh (1987), Bhattacharya and Singh (1997, 1998) and Bhengra (2007), Polley and Ray (2010) have made some contributions to understand stone age archaeology of Subarnarekha valley region. Sediments act both as carriers and sources of contaminants in aquatic environment. (Walling et al 2003; Shuhaimi 2008) Metals may become concentrated up the foodchain (Era et al. 2003) leading to its high concentration in liver and muscles tissues of fishes (Era et al. 2003) There are a great number of studies on trace elements concentration of sediments and soil (Nairn and Skylark 1999, Tuzen 2003, Dalman et al. 2006).

Since Subarnarekha River flows through many industrialized areas so the flow of metals contaminants add to the sediments of the river. Residues which contains heavy metals may get accumulated in microorganism, like aquatic flora and fauna. As a result these metals enter the food chain of human also. Combustion of fossil fuels, use of fertilizers

and pesticides informing and forestry and the effects of transportation combustion and storm water runoff from roads also may contribute to heavy metal contamination (Fryberg et al.1986).Pollutant are released to surface water can accumulate to harmful levels in sediments by forming stable complex with inorganic and organic compounds (Nienke and Lee 1982).

There is a great concern for the use of river water by the people residing near the river bank and flora and fauna part of ecosystem .The Subarnarekha river flows through those areas which are famous for its ore mining (Mosaboni and Rakha mines) steel production plant (Jamshedpur),cement production (Ranchi and Jamshedpur) due to mining of copper and uranium and production of steel related activities become a major contributor of certain metals to the river water due to the addition of these metal contaminants the quality of the river water get altered which directly or indirectly effects the aquatic organism.

The river basin is found to be rich in mineral where the ore of copper, iron, uranium, chromium, gold, vanadium, dolomite, barites, china clay, talc, apatite etc. were found.

As per Balwant Kumar and pratap kumar upadhyay they also studied the area and found that the Subarnarekha River flows through west medinipore district and balasore district to Orissa. In west part of Medinipore Subarnarekha flows through upland region of western portion of the district which comprises of lateritic stones. The eastern part is coastal coast and is full of alluvial soil and is situated in north-western hills, the climate of this part is hot and humid. Most of the industrial part is lacking in these area. Scientists say that the colour of river is golden and it is due to lateritic rocks in the area because of large mining this leads in slow killing of the river. "The abandoned mines and quarries of the construction materials are a source of mineral waste water and suspended solids," says Dr. Priyadarshi.

As per recent study (2016) by Giri et al. that looked at the concentration and distribution of selected metals in the bed sediments of the river, both eugenic and human activities are found to be the contributing factors of metal profusion in Subarnarekha river. It has also found from Uranium Corporation of India near Jadugoara the effluents consisting of radioactive products enter in Subarnarekha River through tailing pond

## II. MATERIALS AND METHODS

Contamination in water creates spontaneity in process of a system that results in different type of diseases so proper treatment of water is necessary which are as follows

### 1. Microbiological Examination of Water

Water plays a vital role in the life of living being like heavy metals, microbes also contaminants water the microbial quality of drinking water should examined on regular basis as microbes present in water leads to different types of diseases.

The main objective of this study is to check the microbiological quality of water collected from nearby village locality as most of the villagers still directly consume the river water without filtering it, water samples collected are analysed

for most probable number and checked for the presence of various water borne pathogens. Simultaneously people are made aware about health, hygiene and sanitation for proper storage of drinking water.

Water samples are collected from nearby locality and are collected in sterile bottle, samples should be collected every 6-12 months for proper examination, collected samples of water are stored in chilled insulation to prevent the growth of bacteria then it is examined by biochemical test.

### 2. Physico and Chemical Quality of Water

A brief study on physic chemical properties of water in nearby locality has presented water sample were collected from different Ghats for analysis, water temperature is measured by ordinary temperature ,pH of water is tested by pH indicator ,coagulation ,flotation, sedimentation, oxidation, filtration, sorption process.

## III. STUDY AREAS

The river Subarnarekha River which originated from Piska Nagri village near Ranchi the total length of Subarnarekha River is 395km out of which 269km in Jharkhand, 65 km in West Bengal and 62 km in Orissa state. This river covers three main states and supports a lot in the irrigation, industrial and municipal water necessities of the states the Subarnarekha rivers covers at area of 19300 km<sup>2</sup>.The catchment area of Subarnarekha river in Jharkhand is 13,19368.4, in Orissa 3,114 16.1 and in west Bengal it is 2,98915.5 so we can say that the major part of the river is flowing in Jharkhand ,our research is in right direction, Its tributaries are Rare, Kharkai, Kharkai, and Sank rivers. The river flows over Precambrian terrain in the East Singhbhum carton. The rocks are schist and quartzite. Majority of its part is Indian shield where ancient Precambrian igneous and metamorphic rocks are exposed in the southeast part of Ghatsila some younger geological formation, namely, tertiary gravels, Pleistocene alluvium are exposed which represent a wide range of age, about 3.8 billion year older metamorphic rocks are seen in some parts of Mayurbhanj district.



The Subarnarekha River towards its sub lower reaches and flows through west medinipore district in west Bengal and balasore district in Orissa. The river also flows through east

Singhbhum district in Jharkhand finally its reaches Bay of Bengal .the river bed is mainly comprises of granites, gnesis dolomites and volcanic rocks. Subarnarekhais the smallest among the 14 major rivers basins of India it covers an area of 19,296 area and it is a mineral rich area, this river acts as a lifeline for the villagers, tribal like it provides livelihood and occupation to earn for their life. The Subarnarekha river is known as streak of gold as it is found that the sand of this river contains powered gold .the main cities and town of this area is Ranchi, Jamshedpur, Ghatsila, west Mednipur and Balasore of

Odisha. This river originated from Piska Nagri (21<sup>0</sup>18<sup>0</sup> 02’’N, 85011’04’’E) in Ranchi it covered an area of 400km and runs through Muri, Jamshepur, Ghatsila and bharagora

**Sample collection:**

The samples will be collected from about 10 location the sample will be collected by using scoope and sealed in polythene bag and then it will be dried at room temperature then will be transferred to porcelain dish and dried in oven and tested about its effect.

Sl no	Testing Point	Ghat Name	Place Where the Ghat is Situated	Reason for Selecting the Area	Trace Metals Detected	Remarks	Population of human being	Population of Animals
1	TP-1	Moubhandar pump ghat	Mubhandar	Water of this Ghat is used for drinking, Bathing, and for supply of water in township Moubhandar	Fe,Cu,Zn,Cr,Pb, Hg,Cd and sulphides	Due to presence of heavy metals like cu peoples get affected they suffered from gastrointestinal disorder. Hg Effects the kidney, As effects the skin and cause cancer	1150	43
2	TP-2	Amaynagar	Baraghat	Water is used for drinking ,bathing	Fe,Cu,Zn,Cr,Al,Ni,Co,	The metals deposition cannot be separated even after boiling .it may affect the lungs.	1079	56
3	TP-3	Panchpandav ghat	Dahigora	Water is used for bathing , washing drinking and a;lso top supply in township	Co,Ba,Mn,Ni,Fe,Pb,	Skin dull ,stomach burning sensatin	1279	74
4	TP-3	Banalopa pump ghat		Water is used for drinking, bathing and washing clothes etc.	Cr,Cu,Mn,Fe,Co	The metals deposition may affect the lungs, Stomach	1179	70
5	TP-4	Digri ghat(galudih barrage)	Galudih	Water is used for drinking, washing, bathing also for storing for hydroelectric generation as well for storage .	Cr,Cu,Zn,Fe,Al,Au,Co,	The metals deposition may affect the lungs, Stomach, Skin	1346	88
6	TP-5	Dherang ghat	Dhalbhumgarh	Water used for drinking ,washing clothes ,	Cr,Fe,Cu,Mn,	The metals deposition may affect the lungs,stomach,Skin	1267	76
7	TP-6	Domuhani Ghat	sonari	Water used for washing ,drinking ,and cooking food, water supply by jusco	Fe,Cu,Mn,Cr	The metals deposition may affect the lungs, Stomach, Skin	678	56
8	TP-7	Shyamsundarpur Ghat	Baharagora	Water used for drinking ,washing clothes ,cooking food ,irrigation	Cr,Cu,Fe,Ni, Cd,	The metals deposition may affect the lungs, Stomach, Skin	769	65
9	TP-8	Gandhi Ghat	Mango	Water is used for irrigation purpose	Cr,Fe,Cu,Ni,Zn,	The metals deposition may affect the lungs, Stomach, Skin	780	54
10	TP-9	Mahapal	Mahapal (Ghatsila)	Drinking, bathing, washing clothes	Co,Cu,Cr,Ni,Fe,Au,	The metals deposition may affect the lungs, Stomach, Skin	540	42
11	TP-10	Pontai	Pontai	Irrigation, drinking and washing cothes.	Ni,Fe,Cu,Cr,Au,Cd.	The metals deposition may affect the lungs, Stomach, Skin	985	69
12	TP-11	Burudih	Burudih	Irrigation, hydroelectric generation	Ni,Fe,Mn,Co,Cr	The metals deposition may affect the lungs, Stomach, Skin	972	75

This heavy metals which is a cause of industrial discharge effects human being, as well as animals and aquatic animals

we know that some metals are needed for our body but when this metals are present in excess amount it damages the body

in many ways like copper has effected human being as its consumption results that people suffered from gastrointestinal disorder, a large number of heavy metals can induce cancer, inorganic Cd they specially known as carcinogen and cause cancer in human Cd damages kidney, Hg damages liver Pb leads to anaemia, Pb also affects the central nervous system It also affects reproductive ,neurological and cardiovascular problems of body ,pregnant women consuming this water shows risks of child birth Henson and Chedrese report shows that cd exposure during pregnancy results in premature birth and reduced birth weight .little amount of copper is good for health but high concentration of copper may lead to vomiting, nausea, abdominal pain, diarrhoea, copper also cause failure of central nervous system. Pb is very harmful for children since it disturb the central nervous system so it results in poor brain. Accumulation of Hg leads to thyroid in many people. Heavy metals can disturb body's metabolic functions through various ways. They get accumulated in different parts of our body organs like liver, kidney, brain and disturb the entire normal functioning of the body, crops which irrigated with this water and this water when consume by human or animals

There is a link between lead exposures and cancer, workers with high concentration of lead results in cancer those workers working in smelter suffer from lung cancer. The relation between lead and cancer is a serious concern. Nickel is a compound which is found in environment in low concentrations. Human use Nickel in various ways, Human come in contact with this nickel by drinking water, air and eating foods as plant also accumulate large amount of nickel in its soil, high concentration of Nickel causes cancer, asthma, lung damage, skin rashes, prostate cancer, bronchitis, and heart disorder nickel exposure causes irritation and allergy in lungs and respiratory failure.

Copper is a naturally occurring metal that is found in soil this metal is present in all plants and animals, The major sources of copper in environment is mining, copper production industries, smelting ,and refining of copper, copper deficiency causes anemia, osteophoresis in children, and defects in connective tissues, however high concentration of copper damage kidney and liver, it leads to destruction of red blood cells, Wilson is a name of disease causes due to deposition of copper in liver. High doses of copper is also responsible for cancer producing, elevated level of copper also results in delayed growth, decrease in body weights.

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