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A STUDY ON PHYSICOCHEMICAL CHARACTERSTICS OF (WATER) RIVER AMI

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ABSTRACT

Despite the existence of pertinent legislation, pollution of water resources is a sever and developing issues. An important body of water in Khalilabad Sant Kabir Nagar U.P., India is the river Ami, which recives treated and untreated effluents from sources in Gorakhpur city, Khalilabad and Basti. Evaluation of these effluents harmful effects on the Ami river water quality was the main goal of the current investigation. The change in water body physicochemical properties on seasonally basis, including temperature, pH, DO, BOD, COD, TSS, and TDS also based on the methodology used by the (APHA) American Public Health Association. All these criteria were significantly greater above the tolerance level advised by the central pollution control board of India.

KEYWORDS: Industrial effluents, physicochemical properties, APHA, Ami river water.

INTRODUCTION

All living things could be at risk from pollution of the aquatic ecosystem. It is acknowledged. Because pollution is a product of human activity, it is seen as a biggest act of self harm committed by humans.[1] Runoff from industries and agriculture is the main source of aquatic pollution. It has been highlighted how important the fishing industries is as a major source of food. For a sizable section of the world population fish are essential to their ability to live and stay healthy. heavy metals, ions and anthropogenic pollutants, including heavy metals, ions and microbiological toxins are continuously contaminating the aquatic ecology.[2] For all living things, water is must. The public health and ecology may be at risk, due to pervasive nature of water body pollution. This calls for examining not only the availability and usage of

water but also the qualitative elements associated with it.[3] Realizing the value of water to our quality of life is essential because the water crisis extends beyond just storage of available water. Lack of water quality in water shed is a major cause of conflict since it prevents or compromises to the ability to use the water for intended purposes.[4] Assessing how urban and industrial activity affect the water quality of river Ami in eastern U.P. The purpose of the work is to educate field engineers and researchers working n the related field on the knowledge and most recent advancement in the field of water quality and its management.[5] This will enable them to better plant and design water quality monitoring programs for issues and problem related to water quality. The people of Siddharthnagar, Sant Kabir Nagar, Basti and the Gorakhpur area in eastern utter Pradesh depend up on the Ami River; a meandering river that flows from Sohanara.[6] It flows 126 km area and empties in river Rapti in the Gorakhpur district U.P. People in this area are known to experience health issues related to the water.[7] As a result water sample were taken all along the Ami River to educate its quality. Today the production and discharge of harmful substances that might intract with the environment and disturb the ecosystem blanned for the majority environmental issues.[8] Since many of the harmful compounds are lipophilic and unaffected by water, they can easily pass through cell membranes and typically have large bioaccumulation factors. Most of the tribal ecological consequences and human catastrophes that have occurred in the last 40 years area result of industrial wastes that are degrading the ecosystem because they contain harmful hazardous compounds to health.[9], The discharges from these industries pases a biohazard to people and other living things in the environment, organic contaminanants have increased in a warrying and aalarming way. Paper mill effluents contains a wide range of toxic substances, including chlorophenols, fatty acid, and resin acid. These are the main acutely toxic and bioaccumulating compounds in bleached Kraft mill effluent and they may be to blame for the aquatic organism altered metabolism which may be even result in their demise.[10] The increased human effect on water bodies is having a negative impact. Indian rivers are frequentally heavly contaminated with anthropogenic elements and serves as temporary reservoirs for the drainage of water and industrial effluent. This is especially true for the river Ami in India, which recives bleached mill effluent from the different industrial resources.[11] The quality of water offers up to date knowledge on the quantity of different solutes at a specific location and time. due to the careless disposes os sewage, industrial wastes, and anthropogenic activities, genotoxic substances like heavy metals, microbial toxins, pesticides like fungicides and insecticides and their bioaccumulation caused several disease like bulging eyes, ruptured scales, internal damages.[12] Macro and

micro anemia reproductive dysfunction, DNA damages and so on end up in water bodies. These effluents are frequently loaded with nutrients and chemicals that deplete oxygen, reducing the amount of dissolve oxygen in the aquatic environment.[13] Weeks of continued hypoxia have a detrimental effect on fish populations including mass extirpation and population decreases. Fish and other Aquatic creatures, in particular, may experience stress due to a number of acute or anthropogenic conditions.[14] It refers to stress that is caused by people, such as tensions from fishing, netting, handling, shipping, transporting. Some type of stress are physical or natural, such as heat, cold, sound and light. Environmental and biological factors like as pathogens, malnutrition, crowding, immunization, pollution etc can all cause stress.[15] The brain become hypersensetize and the hypothalamus triggers the release of catecholamine's and cortisal. Both are stress hormone that are released in extraordinary circumstances. also known as stress hormones. Metabolic and hematological and other biochemical markers are altered as a result finally under stress aquatic animals exhibits behavioral changes before dying.[16]

MATERIALS AND METHODS: - THE AREA OF STUDY

Currently, There is a research area, GIDA Gorakhpur located in utter Pradesh India on national highway -28 between the latitude 26^0 46 ' N and longitude 83^0 22 ' E. It has a total area of 3483.8squre kilometer, and the Sant Kabir Nagar district, which is bordered by Gorakhpur in east, is where the studies were conducted, Khalilabad Sant Kabir Nagar upstream on the eastern up river Ami is its lifeline.[17] A distance of about 250 km separates the river Ami from the river Ghaghara before merging with the river Rapti. This river recives both bleached and industrial effluents discharge from Rayna Paper board industries Ltd Khalilabad Sant Kabir Nagar U.P., mill effluents of Rudhauli Sugar mill Satnariya Basti U.P., and also recives industrial effluents of GIDA Gorakhpur.[18] This body of water is used for irrigation, fish capture for fish seed and fingerlings production. Some bodies of water are used to dispose of sewage and industrial pollutants, which pollutes the water bodies.[19] The mill used thermo chemical and Kraft pulping processes, waste paper from soft and hard wood is what the mill carries, Calcium hydroxide and chlorine are used to bleach the waste paper, Together with the effluent from the remaining mill activities, this pretreated waste water is gathered in one drain before being discharged in to the river Ami.[20] The sugar mill also discharged different kinds of chemical effluents which are expose in river Ami. While the Gorakhpur industrial development authority (GIDA)also discharged such kinds of chemicals and expose directly or indirectly in river Ami.[21] It is clear that the GIDA is a industrial developmental zone of

Gorakhpur and various kinds of industries are situated there.[22] So a huge amount of industrial effluents are produce here and expose in river Ami. This poses a health risk for local people and also disturb the aquatic ecosystem of river Ami which recives such type of toxic substances or chemical effluents.[23]

PHYSICO-CHEMICAL ANALYSIS

Water sample were collected for the analysis. Following are the sites that were chosen for collecting water samples from various sampling station in glass Stoppard bottles at an undisturbed stage.

- Site-1 Effluent before treatment plant.
- Site-2Effluent after treatment plant.
- Site-3Entry point of effluent treatment plant.
- Site-4 200 m away from the entry point in up stream.
- Site-5 200 m away from the entry point in down stream.

At several location sampling were done from a depth of 25 to 50 cm. Loose sediments were carefully avoided at all coast.[24] The obtained sample were taken right away to the lab, Where the physicochemical characteristics of the water sample were determined.[25] The obtained sample underwent Temperature, Ph, TSS, TDS, DO, BOD, and COD etc. In the analytical techniques, the process outlined in the APHA[39], standard(method) methodologies for the examination of sewage, mill, and industrial wastes has been adopted. The reading obtained were compared to standard established by WHO, and Indian Government ^{s} control pollution control board.[26]

RESULT AND DISSCUTION

The result of physicochemical analysis of water sample on different sites at seasonal basis are presented and discussed on the basis of each 12 months in a year or seasonally. Temperature of water sample of each sites shows minor differences seasonally. The highest temperature was observed in rainy season (June, July august and September)at sampling station 3.Which were 31-31.5 C^0 and lowest temperature measured in winter season (November, December, January and February) at sampling station 2 which were 19 -19.6 C^0.[27] Among all the five sites lowest temperature record in winter season and highest temperature were measured in rainy season. Which shows in graph 1.1. The water temperature is one of the most significant physical characteristics of any aquatic ecosystem, because it affects the life of living organism. When the temperature increases then the microbial activity is also increase.[28]

Temperature increases is function as barrio to fish. migration and it produce serious effect on reproduction of fish species. Industrial cooling system, working in a manufacturing plant or power plant is one of the major sources of thermal pollution.[29] The waste water temperature is commonly high, because in waste water bodies the warm water from industrial activities is continuously added.

A important environmental factor of water is pH. Chemical changes, species composition and life processes is linked with fluctuation of pH. Sampling station 3 recorded as higher pH reading in every month, ranging from 7.9 to 8.6 Which shows in Graf 1.2.For inland and irrigation water, central pollution control board of India and WHO propose an ideal pH range of 5.5 -8.5 to 6.5 -8.5 respectively.[30] Aquatic organism are sensitive to pH variation, hence pH control or monitoring is necessary for biological therapy. As a result, pH playas major role in determining the effluent quality of waste water. water with a pH value of around 10 is considered exceptional and could be contaminated with basses like NaOH and $Ca(OH)_2$.[31]

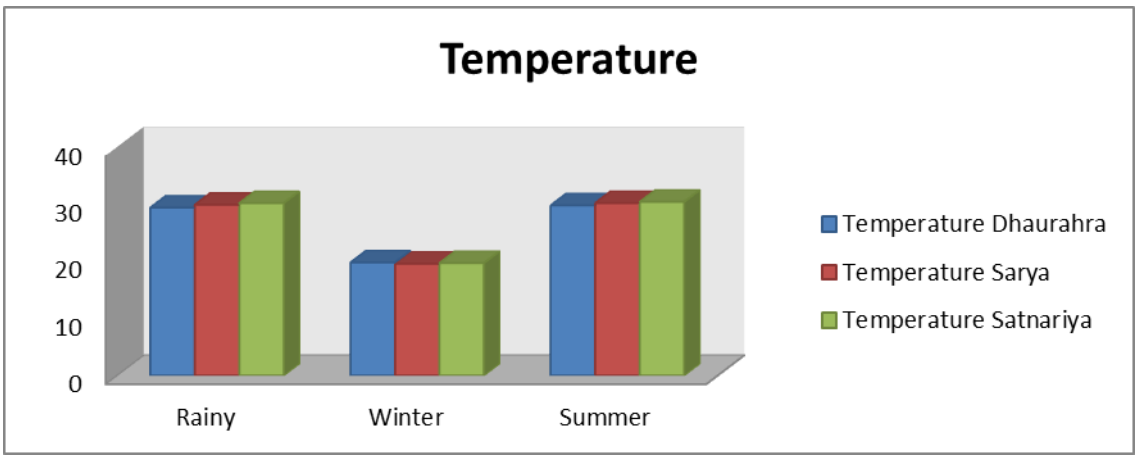
Total dissolve solid (TDS) are monitored at different sampling sites. Total dissolved solids level maximum ranged from 599.95 mg/l at site -1 and from 561 mg/l minimum ranged from at site-2 over the course of study. this variation shows in Graf 1.3.[32] The WHO and central pollution control board of India both recommended an acceptable limit of total dissolve solids of 20-1000mg/l and 500-1500mg/l respectively.[33] The organism is impacted by total dissolved solids. They are run-off byproducts and they become more prevalent with more precipitation and also harm full for dissolve oxygen level.

Total suspended solids, the different types of colloidal particals and organic complexes make up the suspended matter.[34] The highest level of total suspended solids was identified at site -2 and ranged from 1941 mg/l while the lowest level was recorded at site 1-1 varies from 508 mg/l, this variation in suspended solids are shows in Graf 1.4 Alteration in total suspended solids is cause damage and disease on aquatic individual life and disturb the aquatic ecosystem.[35]

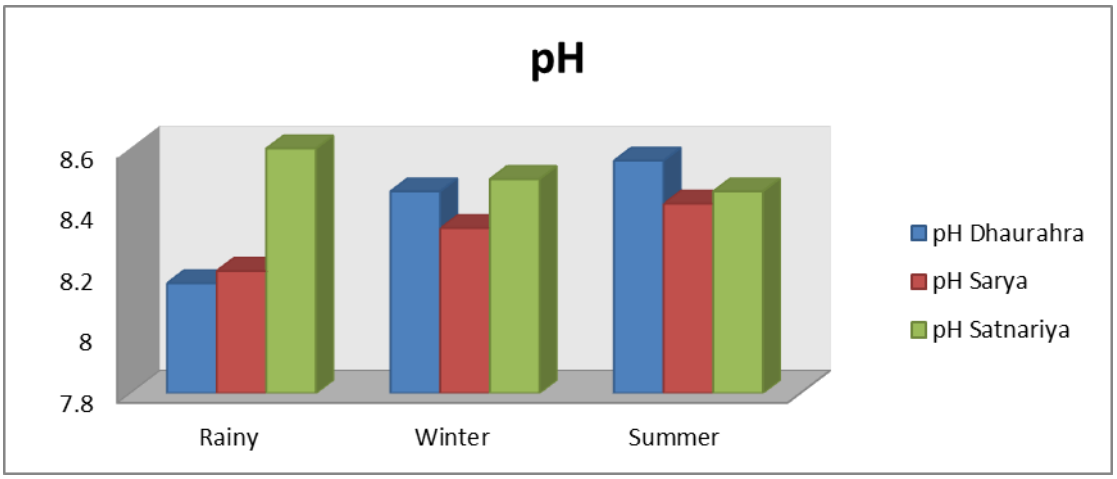
The dissolved oxygen measured at various sampling location seasonally. Maximum level of dissolved oxygen were measured at site -1 about 2.08 and minimum level observed at site -2 which is 2.04 in winter season.[36] The seasonal variation in dissolve oxygen is shows in Graf-1.5.

The chemical oxygen demand is the volume of oxygen needed to oxidize all organic material, both biodegradable and no biodegradable.[37] The highest allowed limit of COD recommended by the WHO and the central pollution control board of Inda is 250 mg/l, while maximum COD values were found to be much higher than standerd values at site -1 and ranged fro1263.07 mg/l and 729.57mg/l at site -2shows minimum COD level.[38] the seasonal variation in COD is shows through Graf 1.7.

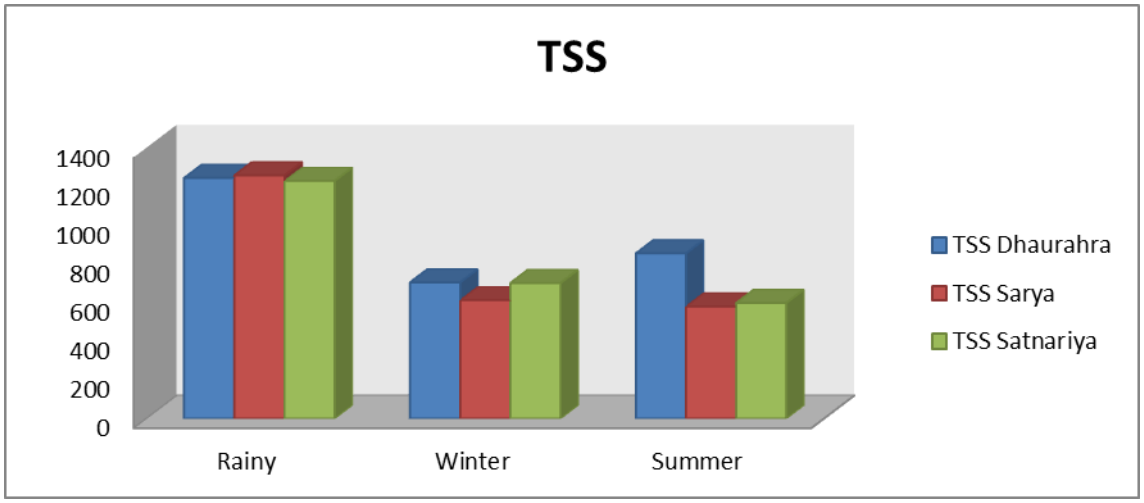
The biological oxygen demand, or BOD measures how oxygen is consumed by microbes to break down organic material, At all of the sampling sites, BOD levels recorded at site -1 which ranged from 1280 mg/l on winter while the lowest levels recorded at site -2 ranged from 569 mg/l.[30] These levels are higher than the maximum BOD levels permitted by the WHO(World Health Organization) and Central Pollution Control Board Of India. which are 30 and 35 mg/l respectively. The seasonal variation in BOD shows in graph 1.6.



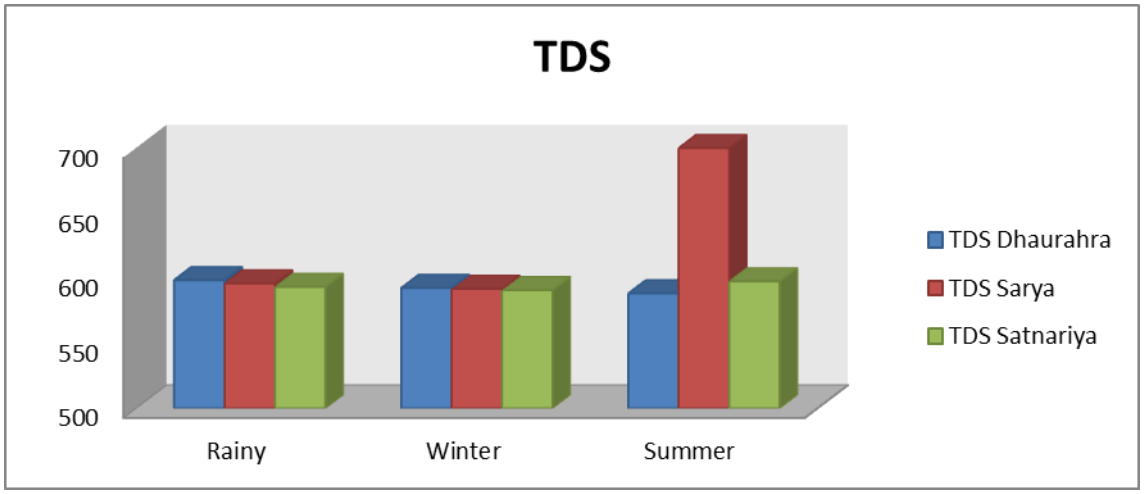
Graph1.1.



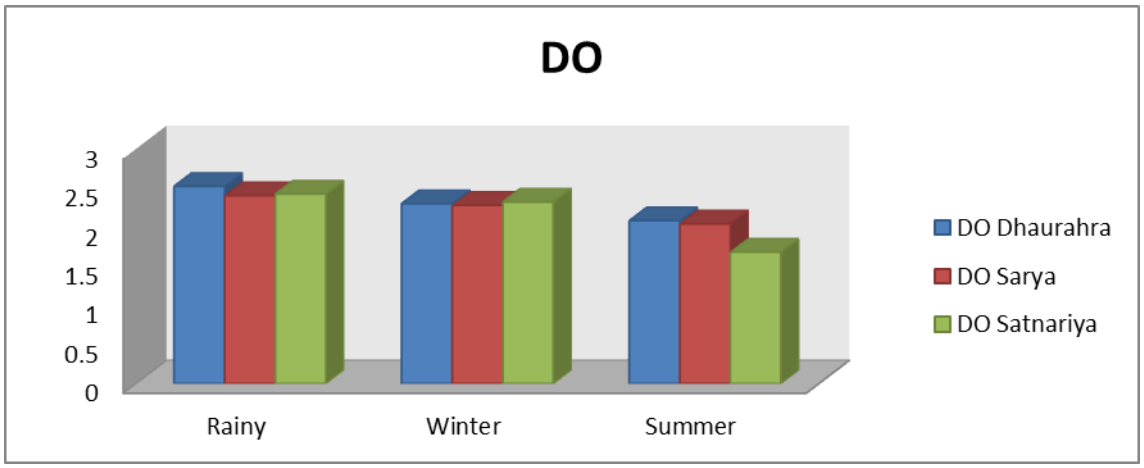
Graph1.2



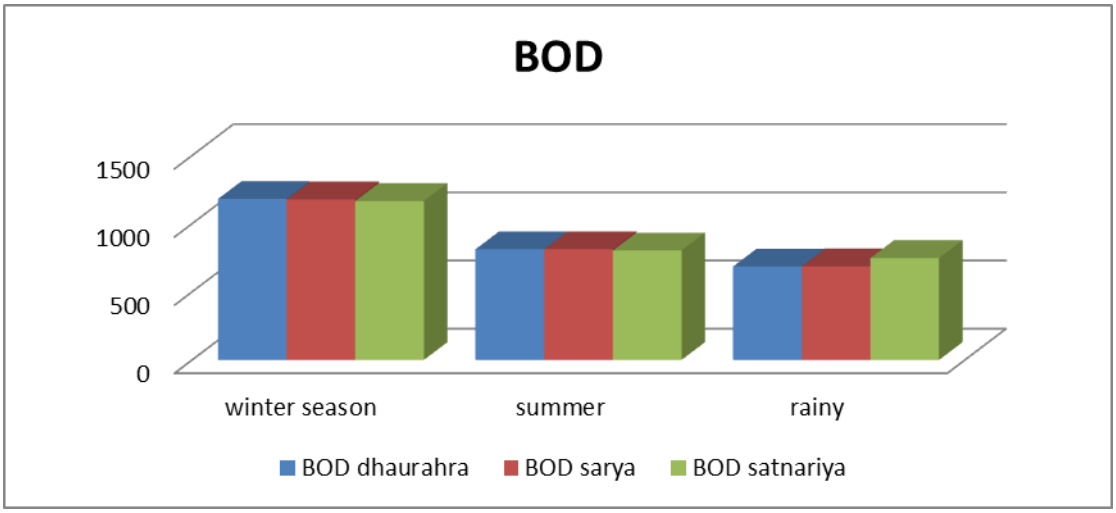
Graph 1.3



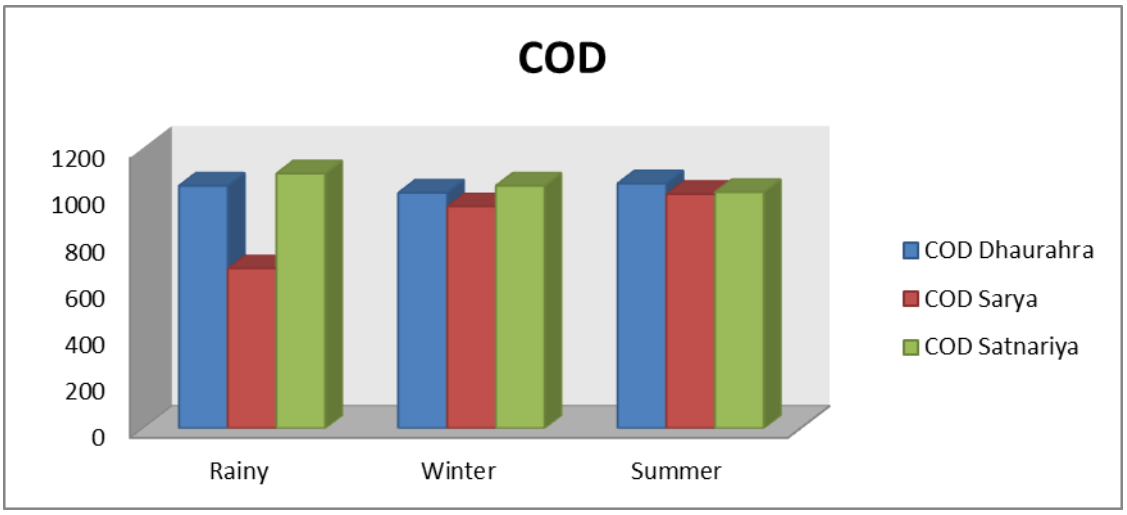
Graph1.4



Graph1.5



Graph1.6



Graph1.7

CONCLUSION

The River Ami is a significancnt tributary of the river Rapti in eastern U. P. India. It is evident from the study above that the river Ami, which flows through the city of Khalilabad, becomes polluted as a result of effluent discharged, and this pollution has a negative impact of the aquatic fauna as well as the communities people in the surrounding area.[31] Who economically depend up on this river for fishing and agricultural purposes. However, the gravity and significance of this issue have only done to address the damaging effects of effluents on the river Ami water quality and above ground fish.[23] In order to determine hazardous effects of effluents on the physicochemical characteristics of the river Ami, an assessment was undertaken, there fore, it is anticipated that the data from this study will

serves as a base line for developing a successful fishery conservation program me in this region.

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