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A Mini-Review with a Case Report on Ichamati River in India

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ABSTRACT:

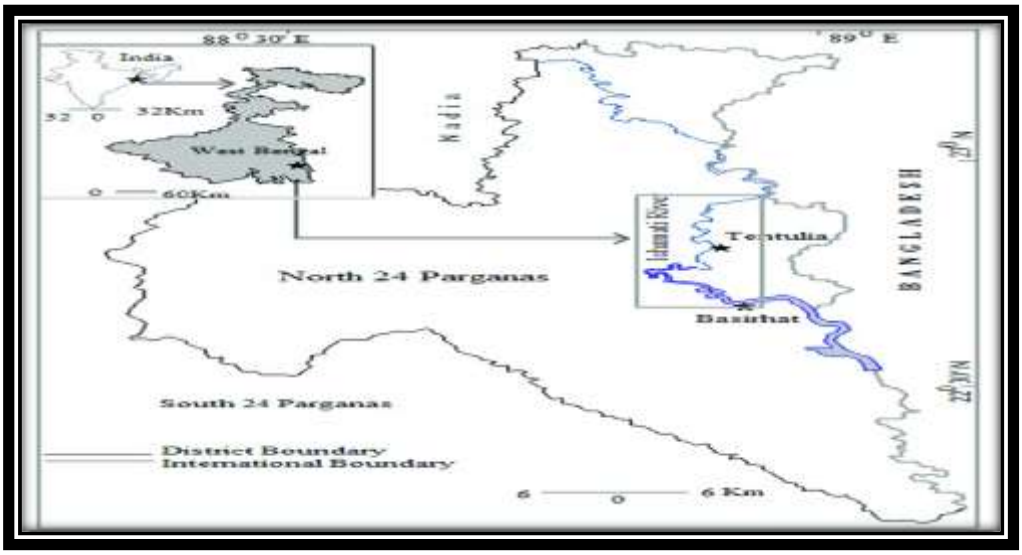
Ichamati River flowing along the borders of India and Bangladesh has cultural heritage, ecological importance and historical connection. Originating in the Majdia village and flowing across the West Bengal and Banglades. But it faces serious problems, including air and water pollution from rapidly growing cities, industries and agriculture . This report presents the results of a study of water and air quality on the Ichamati River, focusing on the North 24 Parganas district of West Bengal. Within the scope of the study, field visits were made to various points along the river and measurements were made with air quality measuring devices to determine the parameters of the particles. The results showed significant differences in air quality near brick factories, with higher levels of pollution, compared to rural areas and villages. Additionally, the water quality assessment revealed concerns about pollution, especially since the water comes from the drain to the river. In addition, the study examined the social and economic conditions of people working near the river and brick kiln, revealing the health effects of long-term exposure to pollution. Future research directions include the isolation and characterization of coliform bacteria in the Ichamati River and the study of microbial load that are Cd and Cr resistance from coastal brick kilns. Overall, the findings highlight the urgent need for sustainable environmental management measures to reduce pollution and protect the health of people who depend on the Ichamati River. Such efforts require interdisciplinary collaboration and a concerted commitment to preserve this vital natural resource for future generations.

Keywords: Ichamati river, water pollution, air pollution, fecal contamination, brick kilns, environmental management.

Introduction-

A lifeline through the natural beauty of India and Bangladesh, the Ichamati River intertwines legends, cultural heritage and ecology of great significance. Originating in the Nadia district it is a transboundary river that crosses the West Bengal State in India and flows into the Bangladesh , eventually entering the Bay of Bengal. The approximately 200-kilometer journey is a material and spiritual journey for the people he invites to the shores of the country. The Ichamati River is not just a geographical feature; It is a symbol of historical and cultural integration. It has been an important channel for trade and transportation for centuries, promoting regional and cultural development. Banks have witnessed the fall and rise of empires, and the daily lives of countless people dependent on their channels. However, in addition to its historical importance, Ichamati also has great cultural significance. The waters are filled with myths and legends that have inspired poets, musicians and artists for generations. The meandering river offers beautiful views of the traditional customs, festivals and rituals that flourish along its banks. From the colorful festival of Durga Puja to the festival of Muharram, Ichamati bears witness to the rich literature of different religions that characterize the region. However, the Ichamati River is not without its challenges. Like many water bodies around the world, it grapples with pollution, encroachment, and the looming specter of climate change. Rapid urbanization and industrialization have taken their toll on its once-pristine waters, threatening the delicate balance of ecosystems that depend on its flow. Efforts to conserve and rejuvenate the Ichamati have thus become imperative, requiring a concerted commitment from governments, communities, and environmental advocates alike. Despite these challenges, the Ichamati River remains a symbol of resilience and renewal. The waters continue to provide food, culture and dignity to those who live nearby. As we face the challenges of today's world, Ichamati reminds us of our connection to nature and the importance of protecting the precious resources that sustain life on this planet.

River Ichamati.



Location of the study area-the selected reach of the Ichamati River [Mondal et al., 2020]

Air quality near rivers –

According to recent research papers, climate change along India's rivers presents a complex story influenced by various anthropogenic and natural factors. Industrial emissions are a major cause of river pollution in India. Major emissions of pollutants such as pollutants, sulfur dioxide, nitrogen oxides and volatile organic compounds (VOCs) come from industrial activities in the region. These emissions from manufacturing, energy production and other industrial activities contribute to air quality and harm the health of nearby communities. The rapid development of cities leads to an increase in traffic, construction activities and energy consumption, all of which contribute to increased greenhouse gas emissions. Vehicle emissions, construction dust and energy sources contribute to urban air pollution in cities close to the river. Agricultural activities also affect the climate of Indian rivers. Fertilizers and pesticides contribute to air pollution and affect human health and the environment. Natural events such as dust storms and forest fires continue to affect air quality in the region. Similarly, forest fires increase the amount of air pollution by releasing smoke and dirt into the air. As a part of our study we have selected one river (Ichamati river present in West Bengal) to understand the air quality near the bank of river and along with the bank of this river many brick manufacturing industry are situated so this location is selected for air qulity understanding .

Bellow some tables and graph are given that show the information about the air quality.

Table – Field visit report of air quality

Site number	Latitude and longitude	Location details	Reading in air quality meter
1.a.	Lat 22.724824° Long 88.806294°	(Very near to brick industry).	AQI - 306 (258 ug/m3)
1.b.	Lat 22.725747° Long 88.80826	(In village area).	AQI - 164 (71 ug/m3)
1.c.	Lat 22.71156° Long 88.797103°	(Near bus stop) .	AQI - 208 (123 ug/m3)
2.a.	Lat 22.630317° Long 88.930703°	(Near brick industry) .	AQI - 209 (150 ug/m3)
2.b.	Lat 22.630317 Long 88.930703°	(Normal village area)	AQI - 172 (95 ug/m3)
3.a.	Lat 22.63516° Long 88.919532°	(Near brick industry)	AQI -286 (198 ug/m3)
3.b.	Lat 22.63516 Long 88.919532 9	(Beside road) .	AQI - 172 (97 ug/m3)

All this information were collected by air quality monitor during the time of field visit .

Some picture related to air pollution near then fields –

Some question were also asked to workers to understand the economical status of the worker –

Questions .
Site No.- 1
Name worker or number of worker - Person 1 / person 2 / person 3
Time of working?
4.00 am to 11.30 am .
How much time he or she is spent in home?
7.30 hr (apx) - in work. 12 hr in home .
Description of the work by the worker?
Firing work in process of brick making .
Without workplace the worker are exposed to air pollution or not?
NO information .
In home the worker use which type of material for cooking?
Coal
How many meals did the worker take in everyday?
3
Did the workers smoke?
Yes
Did anyone of worker family member smoke?
Yes

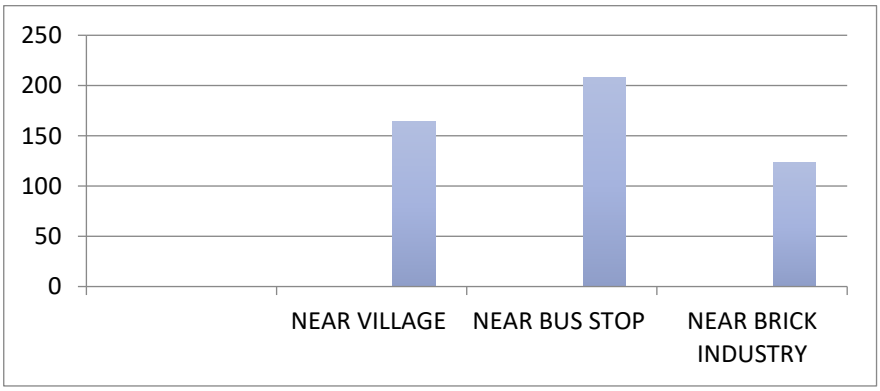
Site No.-	**2**
Name worker or number of worker - Person 1 / person 2 / person 3	
Time of working?	
4.00 am to 11.30 am .	**Next Shift - 12.00 am to 5.00 pm .**
How much time he or she is spent in home?	
7 hr (apx) - in work (morning shift), 5 hr (apx) (day shift) , 12 hr in home .	
Description of the work by the worker?	
Firing work in process of brick making - morning shift	
Raw brick making in day shift .	
Without workplace the worker are exposed to air pollution or not?	
NO information .	
In home the worker use which type of material for cooking?	
Gas in some case among 4 person 1 person is using gas other use coal .	
How many meals did the worker take in everyday?	
3	
Also 2 meals in a day in some case	
Did the workers smoke?	
Yes	
Did anyone of worker family member smoke?	
Yes	
In this site individual information not abvailable.	

Site No.-	**3**
Name worker or number of worker - Person 1 / person 2 / person 3	
Time of working?	
4.00 am to 11.30 am .	**Next Shift - 12.00 am to 5.00 pm .**
How much time he or she is spent in home?	
7 hr (apx) - in work (morning shift), 5 hr (apx) (day shift) , 12 hr in home .	
Description of the work by the worker?	
Firing work in process of brick making - morning shift	
Raw brick making in day shift .	
Without workplace the worker are exposed to air pollution or not?	
NO information .	
In home the worker use which type of material for cooking?	
Gas in some case among 4 person 1 person is using gas other use coal .	
Due to ' Pradhan Mantri Ujjwala Yojana some people are shifting to gas	
from coal .	
How many meals did the worker take in everyday?	
3	
Also 2 meals in a day in some case	
Did the workers smoke?	
Yes	
Did anyone of worker family member smoke?	
Yes	
No in some case .	
In this site individual information not abvailable .	

Compare Study Of Air Quality Of Different Places Of Same Site

SITE - 1

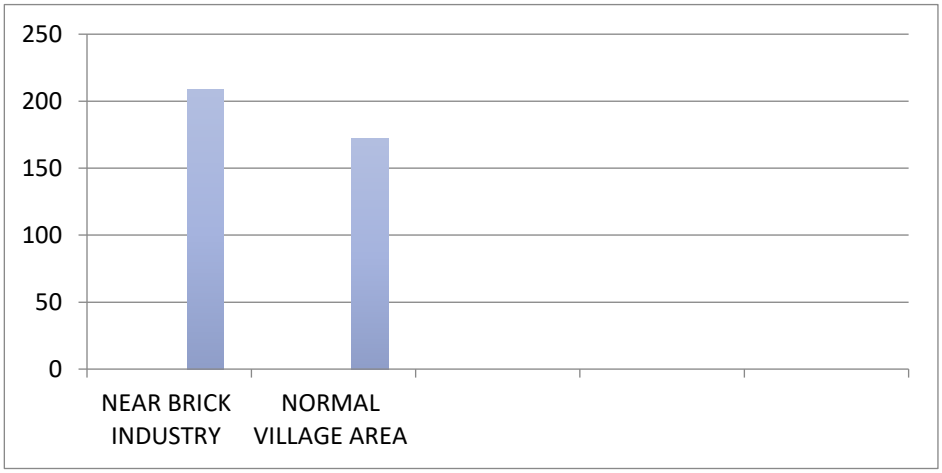
LOCATION	AQI
NEAR VILLAGE	164
NEAR BUS STOP	208
NEAR BRICK INDUSTRY	123



SITE - 2

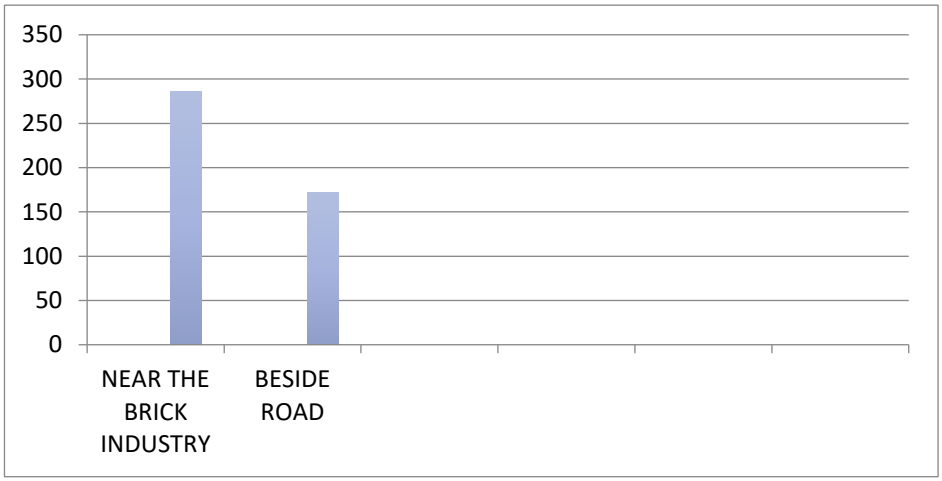
LOCATION	AQI

NEAR BRICK INDUSTRY	209
NORMAL VILLAGE AREA	172



SITE - 3

LOCATION	AQI
NEAR THE BRICK INDUSTRY	286
BESIDE ROAD	172



Water Quality Of The River –

Assessing the water quality of rivers like Ichamati involves analyzing various physical, chemical and biological factors. Here is an overview of things to consider:

Physical Properties: This includes observations such as colour, odor and turbidity (clarity). This may indicate problems such as pollution or desertification.

Chemical composition: measurement of chemicals such as pH, dissolved oxygen (DO), bioavailable oxygen (BOD), nutrients (nitrogen and phosphorus), heavy metals, and organic pollutants. High pollution levels may indicate industrial and agricultural runoff, sewage, or other sources of contamination.

Biological parameters: Monitoring the presence and health of aquatic organisms such as fish, macroinvertebrates and algae. Biological changes or the presence of certain types of symptoms may indicate biological problems.

Quality microbiology: investigation of the presence of pathogens such as bacteria, viruses and protozoa. High levels of these organisms may indicate contamination from human or animal waste.

Plant Analysis: Evaluation of the quality of plant contaminants such as heavy metals, pesticides and organic substances. Wastes can be reservoirs of pollutants and impact water supplies.

Flow and temperature: Monitoring water flow and temperature can provide information about the hydrology of a river and its potential impact on aquatic life.

Pollution is a major concern in water quality assessment, especially in rivers such as the Ichamati, which can receive input from both urban and rural sources. Pollution occurs when water sources are contaminated with contaminants from humans or animals. This contamination can cause pathogens such as bacteria, viruses and parasites to spread into water, which can harm public health. Sources of pollutants in rivers may include:

1. Sewage and sewage: Discharges from municipal sewage treatment plants, combined effluents and sewers can cause waste to enter water bodies.

2. Agricultural Runoff: Animal waste from farms, especially concentrated animal feeding operations (CAFOs), can be washed into rivers during rain events or irrigation, contributing to fecal contamination.

3. Stormwater Runoff: Urban areas with inadequate stormwater management infrastructure can experience runoff from streets, lawns, and pet waste, carrying fecal matter into rivers.

4. Wildlife: Birds, mammals, and other species can contribute significantly to river pollution, especially in rural or undeveloped areas.

Screening for river pollution often involves testing for indicator organisms such as *Escherichia coli* (*E. coli*) or fecal coliform bacteria. These organisms are used as a proxy for fecal contamination because they are abundant in the intestines of warm-blooded animals and are easy and inexpensive to detect. High bacterial levels in river water may indicate the presence of infectious diseases such as gastroenteritis, cholera, hepatitis and other waterborne diseases. Therefore, monitoring and reducing river pollution is important for protecting public health and maintaining the integrity of aquatic ecosystems. Control measures may include improving wastewater treatment, implementing better agricultural management practices, monitoring urban runoff, and promoting public education and campaigns on waste management and water conservation practices.

In the time of our study we found direct discharge drainage of water in river Ichamati which is the major source of fecal contamination .

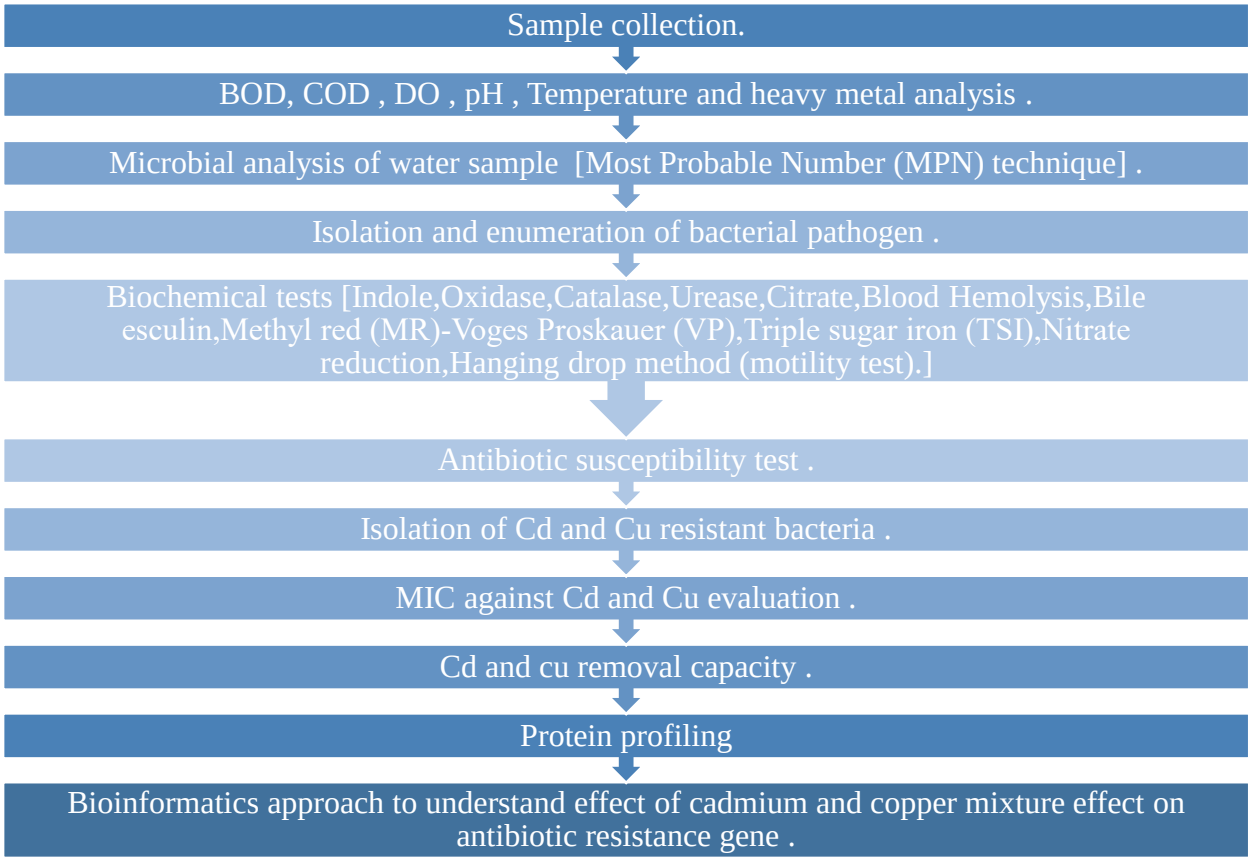
Picture of direct dischage of drainage water in river .

And also water is a basic need in daily life and therefore verious technique has been developed to remove toxic metal from water sources . Cd and Cr are two major heavy metal found in brick kilns (Muhammad Islam et al., 2012). In bank of Ichamati river there are more than 200 (approxmetly) brick kilns in North 24 parganas, West Bengal. So the water of river Ichamati maybe is a source of Cd and Cr resistance microorganisms.

Fututе Aspect and conclusion –

The survey report tell us to undestand the condition of water and air in river Ichamati .Till date the isolation and characterization of coliform bacteria were not performed as such as other rivers like Gangas in case of Ichamati river but the river is heavly polluted with untreated waste water. So it is now necessary to do a evaluation of coliform bacteria in river Ichamati river . Also there is lot of brick industry in bank of Ichamati so Cd and Cr resistant microorganisms isolation and understands the effect of Cd and Cr mixture on multidrug resistance gene can be good approch to understand the situation of river right now .

The overview of methodology that can perfrom to conduct the research are given in a flow chart –



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