

## **A Comprehensive Illustration of Water Pollution Being a Pitfall of Human Activities**

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### ***Abstract***

Water is one of the prime utilized environmental resources that is currently under threat for its quality and continued existence. Pollution has a significant influence on this matter of concern. The existence of impurities in water that change its chemical and biological composition is referred to as water pollution i.e. a major threat to symbiosis between human beings and the environment. Due to its multipurpose use, the sources of water contamination must be varied. Thus, in order to obtain a comprehensive understanding of the pertinent inclusive circumstances and responsible causes of water pollution, laboratory tests have been performed on water samples to identify any pollution. Additionally, three distinct sites on the bank of the Mahananda River in Siliguri City have been chosen and relevant information regarding the genesis of water pollution has been gathered. The current study investigates the many causes of water contamination with proper analytical descriptions in Siliguri City as well as people's perspectives on the sources from a social standpoint.

**Keywords:** Environment, Water contamination, Human being, Responsible causes.

### ***Introduction***

Humans, being the most progressive entities on earth, as individuals are the integration of certain social, biological and ecological determinants which as a whole are accountable for the synergistic relationship between man and environment. The environment, whether social or natural, is the ultimate provider of necessities required for one to survive. Over time, the prerequisites for human survival have shown its dynamic essence, which is subjected to be regularized by the needs of an individual. When it comes to meeting the demands, water is the most essential element of the natural world since it helps to fulfil all three categories of need: integrative, instrumental and primary. Whether providing food as a means of support or upholding

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the age-old traditional practices and rituals, the role of water is ubiquitous. Thus, water quality and availability should consequently be preserved in order to meet our own requirements. Unfortunately, usable natural water sources are becoming less numerous and water pollution is one of the major reasons behind it. Water pollution can be simply defined as the presence of harmful substances in the water that alter its chemical and physical properties and render it unfit for human consumption and other uses. The pollutants that are responsible for the contamination of water bodies are not from a single source as water is multipurpose in its use. Diverse sources indicate different activities as an outcome of the advancement of mankind. However, the pessimistic effect of all these actions collectively resulted in a distinct issue of contaminated water. Water pollution is one of the major global crises and ensuring the availability and sustainable management of clean and adequate water is one of the aspirations of sustainable development goal. Even though it has been an issue for more than a century as endeavours such as The River (Prevention of Pollution) Act of 1876, The Water (Prevention and Control of Pollution) Act of 1974, Zero Liquid Discharge Policy (ZLD) National Green Tribunal (NGT) and numerous more are littered throughout the history of efforts to prevent water pollution but the relevant progress in the concerned issue is still insufficient. 'Poor water quality remains a pervasive problem. Water pollution causes 1.8 million deaths each year and yields an additional critical burden of chronic diseases (Landrigan et al., 2018 cited in University of Birmingham, 2022, <https://www.birmingham.ac.uk/news/2022/addressing-crisis-of-global-water-pollution>). To mitigate such detrimental consequences water contamination should be gradually decreased with the vision of eliminating it in the far future. The sensitive issue of water pollution is still being dealt with in many countries worldwide, not only in India. 'Across Europe, 34 per cent of the 130,000 water bodies surveyed in 2020 failed to meet "good" chemical status. Notably, 100 per cent of rivers in England, Germany, Belgium and Sweden failed standards, and less than one-third of rivers met comparable ratings used in the USA' (Kristensen et al., 2018 cited in University of Birmingham, 2022, <https://www.birmingham.ac.uk/news/2022/addressing-crisis-of-global-water-pollution>). 'Moreover, deteriorating water quality is evident for Asian, African and South American rivers (UNEP, 2016). These reports demonstrate that we have not solved our water quality woes' (University of Birmingham, 2022, <https://www.birmingham.ac.uk/news/2022/addressing-crisis-of-global-water-pollution>).

Although human life has evolved over time to include healthier lifestyles, technological advancements, and other changes, it has been discovered that these changes are inversely correlated with the state of rivers and water as rivers are the prime source of natural water in residential and industrial area in both rural and urban

region. It is evident from the records of multiple studies that with time urban areas increasingly becoming the victim of water pollution in comparison to rural areas although both areas show certain similarities and dissimilarities with each other regarding its causes and consequences. Moreover, the river is a common source of natural water that is open for access to all and in its course, it acts as a connectivity that combines people through its uses creating a nexus between urban and rural life. Therefore, it is much more evident that rivers are the worst sufferers of water pollution in adjoining people's lives and fulfilling their needs.

***The Context of Water Pollution from an Anthropological Perspective:*** Pollution of water is one of the oldest environmental concerns that has an inclusive impact on the environment, ecology, biodiversity, well-being, weather and a lot more of the world's balanced continuation. Being one of the prime elements of the natural environment water is necessary for all living entities including plants, microorganisms and the most evolved and advanced animal on earth i.e. man. As per the Water Science School (2019), 60 per cent of the human adult body is composed of water (usgs.gov). According to Mitchell and others (1945), the brain and heart are composed of 73 per cent water, and the lungs are about 83 per cent water. The skin contains 64 per cent water, muscles and kidneys are 79 per cent, and even the bones are watery: 31 per cent (Mitchell et al., 1945 cited in usgs.gov. 2019). However, the contribution of water is not only confined to the construction of human body components in the case of man. Since humans must consume water to exist and maintain a proper healthy life it is a prerequisite for an individual at any given point in time. In addition, humans are the only animals with social structures extending across their environment, the social realm plays a major role in determining factors such as survival, existence and future development. The social environment of an individual is determined by the availability of resources that one needs to have adequate access to survive to fulfil all the necessities. This eliminates any doubt that the natural environment's resources are what gave rise to the social environment's basis. Additionally, an individual's use of dietary habits, attire, tools, and other items including their belief, practices, rituals, and knowledge in their daily lives is a result of both their social and natural surroundings which is known as the smallest unit of culture i.e. culture trait/element. These traits are inseparable from one another and jointly establish the culture as the inclusion of multiple components and this fact has been presented in detail by Bidney in his book, *Theoretical Anthropology* (1952:3-4). He holds the view that the culture of a people may be defined as the sum total of material and intellectual equipment, whereby they satisfy their biological and social needs and adapt themselves to their environment' (Upadhyay and Pandey 1993: 347). As culture is adaptive in nature, in order to keep it

continuous the proper supply of natural resources should be provided. Pollution of water is one of the major reasons behind the depletion of natural water resources and the shortage of utilizable water which creates a threat to humans as a community to continue their existence. Furthermore, water contamination acts as a stimulus in creating people's perception towards diverse social groups and can cause them to live an unhealthy existence. Given that anthropology is a holistic field of study, it addresses every aspect of human biology and culture and overall, what is understood as man in today's context encompasses all of its domain in its entirety. Thus, as a general hazard to human existence, water contamination is a topic of concern in anthropology.

**Statement of Research Problem:** The problem to be addressed through this study is despite exploring the divergent origins and preventative strategies using a variety of investigations and approaches from the perspective of the affected entity, the origins of one of the widespread environmental problems that threaten human livelihood—water pollution—remain obscure. Unless the sufferers' perceptions of the origins of water pollution are not considered meticulously, the problem might not be resolved.

**Review of Literature:** Several studies have been carried out relevant to the current issue and some of them are intensified here. Mallick (2013) conducted a detailed study regarding how industrialization is a more practical means of supporting the country's population than agriculture, polluting the natural water sources and rivers by creating a threat to traditional livelihoods and affecting the local natural resources. Gowda et al. (2016) examined water samples collected from 15 sites of the Cauvery River in Karnataka, India and recorded the analytical results of a certain number of water quality parameters of the collected samples in pre-monsoon and post-monsoon period in the time span of the study. This study includes the role of anthropogenic activities behind the degradation of water quality and provides a statistical analysis of the relevant data. Khatun (2017) provided an inclusive description concerning the causes, consequences and prevention method of pollution of water in Murshidabad district. The role of the Public Health Engineering Department Government of West Bengal (WBPHEd) has also been elaborated regarding the concerned issue in this study. Rangarajan et al. (2019) presented the water quality index of Mahananda River in Siliguri city and analyzed the water quality status of it. Ghosh and Kansal (2019) provided an elaborative account regarding the pattern of change over time in the relationship between human beings and water as a resource. They have presented a period-wise historical account of the water system in Delhi to understand the current scenario of water in Delhi and its relation with society. Singh et al. (2020) enlightened concerning different sources and types of a water pollutant and the present condition

of surface and groundwater due to water contamination. Akhtar et al. (2021) discussed several natural and anthropogenic factors, that are accountable for the degradation of water quality and classified them in accordance with their sources of generation. The utmost pollutants of water sources and their impact on humans, as well as the environment and its constituents, are keenly analyzed. Robert and Mbaka (2021) investigated the relativity between socio-economic factors and the water quality status of the Chania River in Kenya by applying statistical analysis and studying the most effective factor in contributing towards the understanding of water quality and its pollution. Gboudjou, Amani and Bouafou (2022) investigated the perceptions of riparian households regarding the causes and impacts of water pollution in the Koumassi Ebrié lagoon. The socio-economic and educational level of the studied population and the consequences faced by them due to pollution have been enlisted. Shinde et al. (2023) are acquainted with several sources and effects of water pollution on the environment as well as humans and their health. A certain amount of diseases caused by water contamination and some of the waste-water treatment processes have been mentioned by him in this study.

It is abundantly clear from the research cited above that the development of civilization has had a multitude of effects on water, a vital natural resource and humans are its victims and solely as much as its agent. The many legitimate reasons why water contamination occurs, demand a thorough and elaborative understanding to comprehend how water in today's context functions to meet human needs in which the domain of anthropology is omnipresent, being a wholistic study of human beings that attempts to concede the alliance in the existence of man and it's every single constituent. In relation to the aforementioned, this study is an exploration, to identify the stimulus that contributes to the creation of causes of water pollution in the city of Siliguri, a region that is progressively transitioning and taking the shape of an urban society bringing with it the customs of previous lifestyles as the foundation of what it is today. The territory is located in the foothills of the Eastern Himalayas with convenient access to four international borders, being one of the trading, transportation and tourism hubs of the country. This study attempts to explain the spectrum of human liability that gives rise to water contamination sources in the city of Siliguri, West Bengal, India.

***Research Gap and Research Scope:*** While a wealth of research exists regarding the causes of water pollution in both Siliguri City and globally, there is significantly less understanding of the stimulus behind the divergent sources of water pollution and how people, who are the worst sufferers of such occurrence perceive the causes of it in the city Siliguri. To actively prevent and eradicate any occurrence that continues to happen

even after great effort has been made to stop its detrimental impact, the reasons for and place of its creation ought must be adequately comprehended. This research attempts to offer a comprehensive analysis of how individuals who live in Siliguri view the causes of water contamination in their surrounding area and an endeavour to enlist the identified reasons for the aforementioned issue.

### ***Aims and Objectives of the Study***

The present study is an attempt to explore the genesis of water pollution in the Siliguri area, a transitioning city in West Bengal. The research intends to examine how nearby populations perceive the sources of water pollution in the regular course of life. Through a comprehensive analysis of the collected data, the study aims to offer significant insight into the issue of water pollution inclusively to identify the multiple sources of water contamination with extensive rationale of their occurrence and workable strategies to deal with it.

The objective of the present work is to examine the physio-chemical parameters of the water source i.e. Mahananda River in the selected area to detect whether the water is polluted or not and to collect relevant information regarding the divergent sources of water contamination and people's perception of them as a generator of pollution in water. This study's importance stems from its holistic approach towards examining the causes of water pollution and the recipient's conscious or unconscious part in the problem's formation, as well as gaining insight into a practical solution that will lessen its severity.

### ***Research Methods***

The present study is an attempt to understand the induction of human activities as a cause of water pollution in the Siliguri area and its contextual circumstances. Both primary and secondary sources were utilized to carry out the current investigation. The basic qualitative and quantitative data for the conduction of this study were gathered from the field utilizing standard anthropological procedures and methods such as interviews, observation and case studies. Additionally, essential secondary sources of information have been obtained from a variety of sources, including books, journals, the internet, census records, and survey results.

***Selection of Informants:*** For carrying out the study, two types of sampling methods were adopted, namely purposive and snowball sampling methods. 'Purposeful sampling resides on the proposition that information-rich samples are to be selected to have an in-depth view of the phenomena' (Shaheen et al., 2016 cited in Shaheen,

Pradhan and Ranajee, 2019). Through the Purposive sampling technique, the researcher selects informants based on a predetermined set of criteria, including the informant's competency within a certain demographic and the category of data that is required. One more non-probability sampling strategy that has been employed is the Snowball sampling method used when relevant informants regarding the concerned query of a particular population are difficult to recognize or access and participants in research enlist new informants for the conduction of the study. It is evident from the aforementioned statement that this sampling strategy is employed when direct access to the complete population is a challenge for the researcher.

To assess whether or not the area's natural water source is contaminated, a sample of water from the Mahananda River was collected and examined to ascertain the water's current level of physiochemical properties including pH, Turbidity, TDS, Colour, Iron, Res. Chlorine, Fluoride, Total Hardness, Total Alkalinity, Chloride, Nitrate, Copper. In addition as an effort to pursue the study's intended goal, three sites were chosen for sample collection in the study area. Site-I (S-I) was selected from the area nearer to 'Air-View- More' which is a prime location within the city. The second site (S-II) was selected from the Dadabhai colony area nearer to Prakash-Nagar and the third site (S-III) was selected from the area nearer to Jyoti Nagar was chosen as a nearby location of Jhankar-more. Information from the aforementioned sites was collected in order to get an understanding of the ways in which water is being polluted in those areas and case studies have been collected from the people who are associated with the polluted water in divergent ways.

***Positioning in the Field by Insider and Outsider Approach:*** The researcher is an insider in the current investigation. Because the researcher was born and raised in Siliguri, the researcher has extensive knowledge of the local communities, their customs, language, and way of life. However, in the context of the study, the researcher was unfamiliar with some of the locals and their way of life. The investigator had the advantage of easily interacting with the majority of Bengali people in the area, but communication with some non-Bengali communities proved challenging, particularly with individuals who did not speak Hindi or English. However, over time, the investigator got to know the previously unidentified individuals and found them to be approachable; eventually and subsequently, the researcher managed to gather further data about the subject of the work.

### ***Data Collection***

***Study Area:*** The study has been conducted in the city of Siliguri, which is located in the foothills of Eastern Himalaya combining two districts, mostly Darjeeling and a

small portion of Jalpaiguri in the state of West Bengal. The geographical area of the city is 41.9 sq. km. under the administration of Siliguri Municipal Corporation with a population of 513264 as per the 2011 census. The average rate of literacy in the city is 85.91 per cent. Hinduism, the predominant religion in the city, has 91.98 per cent of its adherents, while a diverse cultural appearance is created in the city by a large number of adherents of other religions, including Buddhism, Sikhism, Jainism, Islam, and Christianity. Admixture of diverse cultural groups indicates variation in thought processes resulting in the variation in consideration of a domain as a source of water pollution. Consequently, three separate locations along the Mahananda River i.e. one of the prime natural water sources in Siliguri were selected: Kuli Para, which is close to Airview-more as Site-I (S-I); Prakash Nagar, which is near Dadabhai Colony as Site-II (S-II); and Jyoti Nagar, which is close to Jhankar More as Site-III (S-III) to get a comprehensive perception regarding the sources of water pollution in the city. In addition, the water sample was collected and tested in the district laboratory at Fulbari to detect the level of its physiochemical parameters to identify the pollution in the water.

A few questions were asked to ascertain what people believe to be the sources of water pollution, including (i) Do they utilize river water directly? (ii) Why did the riverbank get so cluttered with trash? (iii) Where is the wastewater from domestic production disposed of? And all of their responses are enlisted.

A few intriguing findings can be observed from the informant's statement below:

Kanika Paul, a 28 years old housewife stated, "This is where both outsiders and locals dump the trash. Despite the fact that we have a rubbish collection arrangement. However, individuals continue to litter the riverbank" ("*ekhankar loke o moyla fele abar durer lok eseo moyla fele. Byabostha j nei moyla felar ta kintu na tobuo nodite keo keo fele moyla*"). Another informant named Madhusudan Debnath, a 31-year-old mason, residing in Jyoti Nagar stated, "Although it is requested that people not litter here, some people nevertheless come from other sites and leave trash here. Actually, there isn't a working garbage disposal. This area contains a cloth bag manufacturing, and all of the leftover waste cloth is dumped here." A further informant who is a 35-year-old housewife residing at Kulipara, shared "We need effective waste management. We cook meals three times a day if nothing else and the husks of the grain also produce considerable waste. If there is a dustbin of some sort, trash will not be thrown into the riverbed."



Figure 1: Cattle are tied at the extreme nearer to the Mahananda river



Figure 2: Local wastewater entering the river through a drain

### ***Results***

The existence of humans and the environment are both generally threatened by water pollution. Being a significant natural water source, the Mahananda River has long been a part of the local population and is used by them for a variety of purposes. In order to

ascertain the current state of the water's physiochemical properties and determine whether pollution is present in the river, a sample of the water is taken and tested in a laboratory and its respective result is enlisted below.

Table: Levels of Parameters from the sample of water collected nearer to Airview More.

Serial No.	Physiochemical Parameters	Acceptable limit	Cause of Rejection	Airview More Mahananda River
1.	Turbidity (NTU)	1	10	27.08
2.	pH	7.0-8.5	<6.5 or >9.2	8.76
3.	TDS (ppm)	500	2000	268
4.	Colour (Hz)	5	25	23.12
5.	Iron (mg/l)	0.1	1.0	0.24
6.	Res. Chlorine (mg/l)	0.2	>1.0	0
7.	Fluoride (mg/l)	1.0	1.5	0.38
8.	Total Hardness (mg/l)	300	600	144
9.	Total Alkalinity (mg/l)	200	600	224
10.	Chloride (mg/l)	200	600	133.87
11.	Nitrate (mg/l)	45	45	3.20
12.	Copper (mg/l)	0.05	0.5	0.38

Source: Field Study, 2020

The physiochemical parameters of the river water sample, as determined by testing, are shown in the above table to be higher than permitted limits in terms of turbidity, pH, colour, iron, total alkalinity, and copper. The water from the aforementioned source is therefore obviously contaminated and unfit for human consumption.

**Turbidity:** A fluid's relative clarity is measured by its turbidity, which is brought on by the presence of suspended particulates that are often unseen. Plant pieces, wood ashes and the presence of various chemicals are the responsible causes of high turbidity in water.

**pH:** The negative logarithm of hydrogen ion concentration in a solution is known as pH. It determines whether the water is acidic or base in nature. The overabundance of nutrients in the water, which leads to the eutrophication process and excessive plant

growth requiring more carbon dioxide for photosynthesis, which increases the pH of water, originates from industrial sources and municipal sewage.

**Colour:** Pure water is colourless. When water has the presence of colour, it indicates invisible divergent impurities from both domestic as well as industrial sources and thus the water is regarded as not fit for use.

**Iron:** Iron can, however, dissolve into water from soil and rock that contains iron. Iron can occasionally also come from water pipes or well casings made of steel or iron corroding.

**Total Alkalinity:** The capacity of water to neutralise acids or withstand changes that lead to acidity while preserving a steady pH is known as alkalinity. Industrial wastewater is the main human-made source of alkalinity in water.

**Copper:** Even though copper is a necessary trace element for optimum health, larger amounts of the element are hazardous to life. Incineration of stacked waste is an important source of copper in water.

**Discussions**

Water, as a multipurpose element of the environment is always at a higher risk of contamination by divergent sources. To eradicate such problems numerous investigations have been carried out to pinpoint its origins. Using anthropological tools and techniques, as well as making a concerted effort to treat the insightful results of such investigations as secondary data, the sources of water pollution specifically concerning the Mahananda River, that has been found in Siliguri are as follows:

Sources of water pollution: Categories	Specific Responsible Causes
Domestic Source	Untreated detergent mixed wastewater
	Pesticides from cleaning vegetables
	Pest Control
	Plastic Waste from Household
	Domestic Animal
Industrial Source	Food Industries/Fast Food Vending Shop
	Construction Waste
	Jewellery Shop
	Printing Press and Polymer industry
	Cement and Marble Shops

Socio-economic Factor	Education
	Income
	Transformed Lifestyle
Ritualistic Belief	Idol Immersion
	Cremation Ghat
Other	Dumping of Waste at River Side
	Public Lavatory
	Rapid Urbanization
	Growth of Population

**From Individual's Viewpoint:** Anthropology, as a field of investigation, has long taken the stance to emphasize and portray via the idea of reading between the lines and looking for facts that are apparently not visible. While conducting this study in search of an intense understanding of the current scenario it has been observed that subconsciously or reason for not realising accurately somehow the random negligence and overall activity of the entire metropolis has contributed towards the river and as a result of which it is polluted. While interacting with the locals in conversation one of them named, Mrs. Maya Roy who is a 42 years old housewife residing in the Prakash Nagar area nearer Gandhi Maidan said, “As a housewife, I used to do all the household work at home although my family members help me in this. We directly don’t use the river water for domestic purposes. We have personal well in our house which we use in case of cleaning utensils and laundry work and for taking bath as well. The waste water that comes from laundry work has a high amount of detergent, we don’t through it directly into the river but that passes through the drains into the river. Without this drain, we don’t have any other facility to pass out this wastewater into any other place, so unwillingly it goes to the river and pollutes it. Due to pollution, a bad smell is spreading in the locality and we have to survive with it. As detergent is not a food element there must be some side effect of it in the river as well as water probably the diseases related to stomach infections are a result of it but we cannot let the waste-water to be accumulated inside the houses and by pipe the waste-water of household work that is admixed with washing powder falling into the river” (“*kapor dhoa jol nodite to felte Jaina kintu drain diye noditei jay. Eta chara moyla jol felar onyo konobyabostha to nei. Kapor dhoa saban to r khaoar jinis na, kichu nak ichu osubidha to er thakei. Peter osubidha mone hoy er thekei hoy*”). Another interesting outlook stated by Ananda Mohan Biswas, a 54-year-old private tutor, “My hometown is nearer to Kaliachawk, I came to this city around 30 years ago when I was a college student. During my third year of studies, I began tutoring some students. After finishing my

studies, I made it my profession and have continued ever since. When I came to the city, at that time this area was not so crowded even now the place where we are residing is so empty that in the evening no rickshaw puller wants to come into this area. From Haiderpara-bazaar to Bidhan Market has a distance of about one and a half km and the rent of a rickshaw is Rs. 2/- only. In comparison with that time now today's Siliguri has changed a lot. The people are now residing at the bank of the river but earlier that area was fully empty and there was only large ground. Now people are using that area as a residential place and not taking care of the river as a result of continuous negligence resulting in the pollution of river water. Even not only the river, if we consider the municipality water tap which is provided for drinking water purposes, whenever no one is using it, at the road the water is seen to be continuously fallen from 85 the tap even most of the people, are found casual regarding this wasting of drinking water and are not so much bothered as well. Maybe this is because those who are residing in comparatively developed places of the city are not directly affected by this. Additionally, individuals residing near the river may have contributed to the increased pollution. To prevent this, they need to understand both the direct and indirect effects of pollution. Most of the people of that area are not so much sufficient to maintain proper hygiene and economic source is an important factor in that case. In the question of education, nowadays the children of that area are getting the facilities of academic education but most of them are the first generation in their family to have these facilities and in most cases whatever they learn from teachers and schools are not able to apply in their life. They grew up in such an environment where they use the river in their daily life but they are not concerned regarding its conservation and hygiene." He further stated, "Apart from the residents near the river area, the drains which are distributed throughout the city are connected with the river. Municipality has provided the facility of door-to-door waste collection on a regular basis, despite that people are throwing plastic packets, paper waste and waste from the cut vegetables and lots of things into the drains which ultimately block the drainage and in totality are getting mixed into the river. Maybe not everywhere in the city has dustbins but in some of the places it is there, but although having this, in those places also waste materials are found lying here and there. In totality, the pollution in the river, which is now an emerging issue, definitely is not the result of few days rather it is an outcome of a long time ignorance and random use of river water in an uncontrolled way." Another informant, who is a 17 years old student stated that "Many people are there in the city who are not having proper sanitation facilities and nowadays although the number has decreased due to several government schemes but there are the people who use the river bank as a site for open defecation. Many diseases are originated or carried through this. Some people are using public toilets although most of them are

maintained. But there are some which are having unhygienic conditions. These all are collectively resulting in the increment of water pollution.”

The above conversation reveals more profound causes regarding the pollution of water in Siliguri. Industrial factors have always been responsible for the spread of water pollution. In the case of Siliguri, small-scale industries are one of the prevalent commercial sources contributing to water pollution. The kind of business such as jewellery making, cement and marble shop, printing press and polymer industry are individual sources of multiple non-biodegradable and chemical waste. Printing press waste produces toxic heavy metals like cadmium, hexavalent chromium, lead, and mercury that can contaminate water sources and be harmful to human health. Waste water generated from jewellery shops contains two common chemical acids used for cleaning and polishing of jewellery namely, hydrochloric acid (HCL) and nitric acid (HNO<sub>3</sub>). The waste materials that are generated from the cement factories contain high amounts of Lead (Pb), and Mercury (Hg) which is polluting the water chemically. Although in the main town of Siliguri, no such cement factory has been noticed; but there are storehouses where cements are stocked. If stormwater gets connected with the storage place then it may indicate the presence of a high value of sulfate in soil and toxic metals like Zinc (Zn) and Chromium (Cr) in the dust and thus cause the high TDS value in the Groundwater. Even nowadays, the fitting of marble in the floors is very common in the Siliguri area, the procedure of which, creates dust-containing wastewater that is usually getting into the river through drains. Even dishwashing water from most of the roadside eateries goes down the drain and ultimately mixes into the river which contains an unmeasurable amount of detergent. However, Domestic sources have an equally important role in causing water pollution. The amount of water that is used for cleaning purposes in houses is gone out into the drainage system. Domestic sewage is the primary source of pathogens (disease-causing microorganisms) and decayable organic substances. People are freely releasing detergent-containing water into the water sources via drains and due to the lack of a system this polluted water is getting mixed into the rivers without proper treatment for removal of pollutants. Before cooking most people wash their vegetables and the runoff material of these vegetables creates a huge amount of harmful chemical substances that are directly or indirectly getting mixed with the water sources. Pest creates a heavy threat to human health and to stop them or control them some kind of liquids and sprays are used. These sprays are very common in the liquid waste material of the houses that are indirectly polluting the water sources. In addition to this, some phenyl types of liquids are also used which is apparently responsible for decreasing the purity level of water sources. Additionally, cattle sheds are one of the major reasons behind the pollution of the river in the middle of the city. The people living here used

to take their cattle into the rivers for bathing them and also whenever they washed this cattle-shed area the wastewater with lots of organisms of disease flow into the river. Apart from this, the solid waste that is generated from this area is also thrown randomly into the river causing the blockage of water and increasing pollution. In addition, idol immersion and the presence of a crematorium just beside the river resulted in the genesis of pollution. People through used cloths, bamboo and other substances into the river. As religious practices and customs are significant in upholding communal sentiment and identity, the river is an integral part of that sector. In an attempt to make life run its course, man engages himself in multiple works whether domestic or professional, but in completion of such work subconsciously or a kind of forcefully creating a threat to his own existence by polluting water. Poor maintenance is found to be another responsible cause behind it. Moreover, people are found to be unaware of the causes of water pollution and ignorance in addition acts as a stimulus in this.

### ***General Observation***

The study conducted in Siliguri city aimed to identify the root cause of water pollution and determine the perception of people regarding the sources of pollution. The findings of the study revealed that the water in Siliguri is not safe for consumption, as revealed by the laboratory analysis of water samples. This problem is not unique to Siliguri but is a global issue that is affecting all living beings, regardless of their caste, class, or any other differentiation. In Siliguri's context, the city is still in the process of development with respect to urban facilities and other infrastructural provisions. The rapid expansion of pollution in water sources can be attributed to the increase in pollution and its underlying causes. The study highlights the need to address this issue effectively to ensure the safety of the population and the environment.

One of the significant issues faced by Siliguri is pollution of its water bodies. While industrialization and urbanization are the primary contributors to this problem, the industries in Siliguri are found to have a relatively minor role in polluting the water. Instead, the reckless use of river water for domestic purposes and the unregulated discharge of wastewater into the river are the leading causes of water pollution in the region. Moreover, the religious practices of some communities are also found to be responsible for the deteriorating quality of the water bodies. Many religious substances are used during various ceremonies, and these substances often end up floating or getting stuck in the river water, leading to further pollution. It is crucial to address these issues urgently to protect the environment, prevent further damage to the water bodies, and ensure the well-being of the people and the ecosystem.

Apart from these as the base of this uncontrolled upswing in the quantity of water pollution, the socio-economic status of people is found further accountable. Those who are residing close to the water system are suffering due to a lack of proper maintenance of tidiness and are lack of awareness regarding its downside on their livelihood. In addition, one of the unrevealed factors behind water pollution in the city is unawareness and lack of proper recognition of accountable sources. Numerous informants have been found who are unaware of the process of wastewater getting mixed into the river. Unless the source is in lack of consideration it is difficult to solve the issue. To prevent the rising damages due to water pollution, a primary requirement awareness of the people should be increased by providing them with proper knowledge regarding this. Moreover, with this, the drains by which the waste material of the city is being collected are linked with the river, and as a subsequent effect, it is harming the river quality and making the water quality unusable. Behind all of the reasonable sources, the rapid increase in population density in the last few years is the fore-most ground based on which all the causes are getting vital because population growth requires more subsistence that is held to be responsible for the production of both domestic and industrial waste material that is affecting the water.

The pollution of water in Siliguri is a major issue that has been caused due to various reasons. One of the primary reasons is the lack of proper arrangements in the administrative sector regarding the cleaning of river banks and the maintenance of rivers throughout the year. This has led to the accumulation of waste and pollutants in the water bodies, resulting in the degradation of water quality. However, this is not the only cause. The incautious frame of mind regarding the damage to society and the environment is also responsible for the pollution of water in Siliguri. People have been found to be careless and negligent in their approach towards the disposal of waste and other harmful substances, which ultimately end up in the rivers and other water bodies. This irresponsible behaviour has had a detrimental effect on the environment and has also put the health and well-being of the local population at risk. Therefore, it can be said that the pollution of water in Siliguri is a result of multiple factors, with the incautious frame of mind and the lack of proper arrangements in the administrative sector being the most significant contributing factors. It is imperative that steps are taken to address these issues and create a sustainable and healthy environment for the people of Siliguri.

**Recommendations:** The study's findings highlight the need for a comprehensive approach to tackling water contamination. To this end, it is recommended that both civil society and government agencies work together to implement a multi-pronged strategy. Firstly, it is crucial for the administrative sector to put in place proactive

regulations that prevent the mixing of wastewater from various sources in the river. This could be achieved through regular inspections and monitoring mechanisms, as well as through the imposition of fines and penalties for non-compliance. Secondly, all wastewater, irrespective of its source, must go through a purification process that is accessible and affordable to all. This could involve the establishment of treatment plants in areas where wastewater is generated or the development of decentralized treatment systems that can be easily installed and operated by households and businesses. The treated water can then be safely disposed of in the river without causing any harm to the environment or human health. Finally, we must manage our waste responsibly. Garbage should not be thrown into rivers or adjacent areas, as this can lead to the accumulation of pollutants in the water and the surrounding ecosystem. Instead, we should adopt responsible waste management practices such as recycling, composting, and proper disposal in designated landfills. This will not only help to reduce water contamination but also promote a healthier environment for all of us.

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