International Journal of Innovative Research in Computer Science & Technology (IJIRCST)
ISSN: 2347-5552, Volume-10, Issue-3, May 2022
https://doi.org/10.55524/ijircst.2022.10.3.32
Article ID IRP1280, Pages 197-202
www.ijircst.org

Pollution Abatement of Devika and Tawi River at Udhampur Town

Imran Fayaz[1], and Simarjot Kaur[2]

[1] Student, Department of Civil Engineering, RIMT University, Punjab, India.
[2]Assistant Professor, Department of Civil Engineering, RIMT University, Punjab, India.

Correspondence should be addressed to Imran Fayaz; imranfayaz1099@gmail.com

ABSTRACT- In India, rapid industrialization & socio-economic adjustments have caused an accelerated urban boom. However, up-gradation & implementation of the vital infrastructure has no longer kept tempo with the developing urban population. The result has been extreme pollutants of the rivers, as both untreated or partially treated sewage is being discharged into the water resources & affects the lifelines of humans of the town. At River Devika water excellent is poor for consumption and bathing requirements. Silt deposition is a fundamental issue together with the river being flooded with waste materials, excessive BOD and COD are recorded, the holy dip is sort of impossible so people are concerned about these shabby conditions. Tawi River is the main river of Udhampur city originating from Bhaderwah and walking due north to south, passing with the aid of the town Udhampur. The falling ecological health of the Tawi is a major concern nowadays. GIS is now an efficient and affordable planning information system. It is fetching an essential part of the preparation support system. The sanitation system not only deals with environmental issues but here also talks to religious advocates throughout the city, many religious activities are carried out in the Holy River Devika area. It is not at all easy to evaluate the benefits of providing a proper sanitation system and waste disposal systems in public health, the importance of which is well known.

KEYWORDS- Water Quality, Water Quality Analysis, Udhampur, Jammu, GIS, Tawi River.

I. INTRODUCTION

Water is the necessity of every living being. Due to modernization and increased population, the quality of water has deteriorated and left water polluted. Water in large quantities is discharged from domestic and industrial after use and the water get contaminated with pollutants in certain concentration making it unfit for use. Water pollutants are the contamination of our bodies' water This type of environmental degradation occurs when pollution is delivered directly or indirectly into water or our bodies without enough treatment to remove hazardous substances. Any chemical, physical, or organic exchange within the good of water that hurts any living feature that liquids, uses, or lives (in) it is referred to as water pollution. When people consume dirty water, it has a negative impact on their health. It is frequently the result of human sports-specific human assets combined with water contamination. Calcium and carbonate are just two of the many chemicals found in water. [1].

In India, water pollution is a major environmental concern Unwashed sewage is India's most important source of water pollution. Agricultural flow and small industries that can be controlled by two other sources of pollution. India has many lakes, rivers, and surface water that are contaminated. Due to the pressure of growing industries, population, urbanization, life style, energy intensive, deforestation, environmental unawareness, disposal of unwashed waste from industry and municipalities, use of pesticides, pesticides / herbicides / fungicides / pesticides, the use of chemical fertilizers instead of natural manure, etc. all contribute to the loss of forest cover. Apart from finding their way to lakes and upstream rivers, sewage from the commercial river and sewage also sinks into the groundwater. [2].

Water is an important source of herbal worldwide. We cannot survive without water but can survive without food for couple of days. Miles is not enough to survive all living things, including humans, economic growth and food production. Water envelops three-quarters of the earth’s area. Due to high salinity, about 98% of seawater is deemed unfit for human consumption. Only about 2 percent of the earths water is pure, but 1.6 percent is trapped in glaciers. Any remaining 0.36 percent is found in groundwater and in groundwater sources. As a result, rivers and lakes account for only about 0.036 percent of the world's water. [3].

In India, speedy industrialization & socio-financial adjustments have led to expanded city increase. however, up-gradation & implementation of the essential infrastructure has now not stored tempo with the growing city populace. The result has been extreme pollutants of the rivers, as both untreated or partially handled sewage is being discharged into the water resources & impacts the lifelines of human beings of the town. The ministry of the surroundings, wooded area & climate adjustments (MoEF & CC) is offering help to the diverse state authorities for enforcing the countrywide River Conservation Plan (NRCP) for abatements of the (STP’s), low fee sanitation/community lavatories complexes, electric powered/stepped forward wooden crematoria and so forth. the river conservation software, which started in 1985 in 25 cities along river Ganga, has now extended to

pollutes stretches of 40 rivers in 121 cities unfold over 19 states.

II. SAMPLING OF WATER

Water sampling is a method of taking a small portion of water as a representative for testing to obtain the required data of the quality of water at the site. whilst accumulating samples, one must follow predetermined sampling protocols (techniques and methods) to meet the purpose of the survey, which can be suitable to the media being investigated. Figure-1 shows the sampling steps.

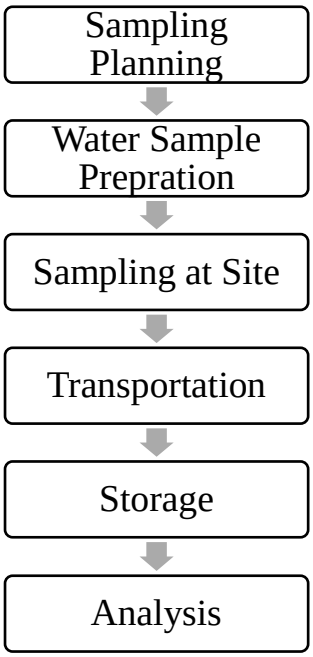

Figure. 1: Sampling of Water Sample

III. CLASSIFICATION OF WATER

Water is classified as floor water or surface water mostly based on its source [4]. Both types of water can be contaminated by agricultural, industrial, and domestic activities, which can include a variety of pollutants such as heavy metals, pesticides, fertilizers, hazardous chemicals, and oils [5]. Drinking water, fresh water, contaminated (contaminated) water, and contaminated water are the four main types of water [6]. The most common medical categories of these types of high-water districts were identified. Drinking water, fresh water, wastewater (polluted), and contaminated water are four types of water [7]. The following are the most common clinical definitions of different types of fluids:

Potable water: it's far secure to drink, first-class to taste, and usable for domestic purposes [7].

Palatable water: it is aesthetically captivating; it reflects the occurrence of chemical substances that don't motive a risk to human fitness [7].

Infected (polluted) water: It's that water containing unwanted bodily, chemical, organic, or radiological substances, and its miles not worthy for drinking or home use [7].

Inflamed water: its miles contaminated with pathogenic organisms [7].

IV. PARAMETERS OF WATER QUALITY

From all the purposes of water nice evaluation, various parameters must be considered to make sure water is exactly exceptional. Physical, chemical, and organic factors are the three types of parameters that make up water quality, pH, Temperature, colour, flavour, odour, hardness, conductivity (C), turbidity, salinity, total suspended solids (TSS), and overall dissolved solids are all physical characteristics (TDS). Fluorides, steel irons, organics, vitamins, alkalinity, insecticides, dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD), and disinfection by employing products are all chemical properties of water (DBP). Microorganisms, viruses, protozoa, and helminths are examples of biological parameters found in water. These three water exceptional parameters wish to be measured in accordance with the same old for water first-class. [8]

V. ABETMENT OF WATER POLLUTION

The installation of stormwater run-off structures (also known as water pools) in high-density waterlogged areas, as well as public education on the threat of stormwater runoff in rivers, streams, and underground rivers are all examples of melting. techniques. At River Devika, water first-class is negative for drinking and bathing standards. Silt deposition is the foremost difficulty along with river is flooded with waste materials, high BOD and COD is recorded, the holy dip is sort of not possible so human beings are concerned of this shabby situation. Besides it, there is an acute shortage of parking areas, restroom facilities, right bathing ghats and organizes space for fair/Mela ground. The situation of infrastructure related to residences of Devika is not right and needs improvement, it's miles necessary to check the congestion and encroachment, site visitors' bottlenecks, pilgrims go with the flow, surroundings neglect, pollution and shrinking place of Devikadur to the physical growth of constructed up area and trade inside the mindset of humans. The water nice is degraded because of the inflow of severe pollution; Tawi River is probably the maximum infected in stretches and mainly wherein it passes thru Udhampur. there is a pressing need to preserve the river from similar degradation.

VI. USE OF GIS IN TOWN PLANNING

The above functions are used differently based on the many purposes and categories of town planning. The following are some of the advantages of adopting GIS in urban planning (Royal Town Planning Institute 1992):

Improved mapping - better access to maps, improved map revenue, better theme map, and reduced storage costs;

Information is retrieved with Greater efficiency.

Fast and more comprehensive access to a variety of place information for planning and the ability to explore a wide range of 'what' if 'conditions;

Improved analysis;

Better communication with the community and staff;

Improved quality of services, for example, quick access to information processing planning applications.

VII. FLOW DIAGRAM AND DESIGN OF SBR TREATMENT SCHEME

The flow diagram of SBR Treatment Process is given in Figure-2. The complete plant including pre-treatment units as well as SBR Treatment Process is designed to handle an average sewage flow with a peak factor of 2.25. The raw sewage after coarse screening will be collected in a receiving sump from where it will be pumped into primary treatment units. One mechanical and one manual coarse screen will be provided prior to raw sewage pumps. Pumped sewage will be received at the inlet sump from where it enters into Grit chambers after fine screening into mechanical and/or manual fine bar screens. Primary treated sewage in then directly fed in two nos. SBR Process Basins operating on Cyclic Mode. Oxygen required for biological degradation of organic matte i.e., BOD is supplied through Air Blower and fine bubble membrane diffuser assembly. The design calculations of the proposed STP for Udhampur is given in technical statement. A detailed layout plan of the proposed STP has been annexed in the drawing section of this Project.

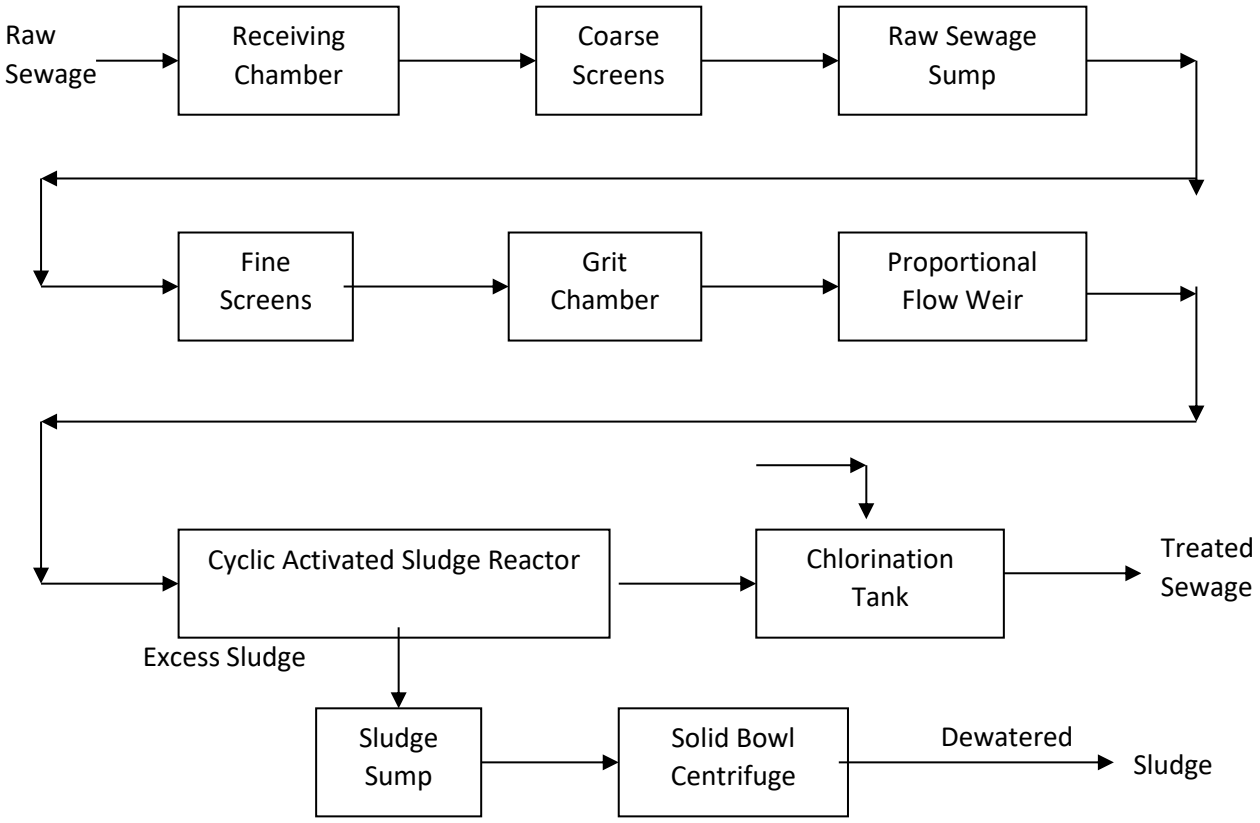

Figure. 2: Flow Chart of STP

VIII. RESULTS

Observations & Calculations for various parameters are shown in Table-1, Table-2, Table-3 & Table-4.
Calculations for Dissolved Oxygen Content:

Table 1: Calculations for Dissolved Oxygen Content

S. No	Volume of Sample	Burette readings		Conc. of water sample	Average Conc. of water sample(V1)
		Initial	Final		
1	50 ml	0.0	1.0	1.0	0.93
2	50 ml	0.0	0.9	0.9	
3	50 ml	0.0	0.9	0.9	

Calculations:
N1V1= N2V2
N/40 ×0.93=N2 ×50
N2= 1/40 ×0.93/50×8
N2= 0.025×0.0186×8
N2 =0.0372×103=3.72 ppm or 3.71 mg/l
DO= 3.71 mg/l or 3.72 ppm
Where,
N1=Normality of NA2SO3
N2= Dissolved oxygen content
V1= Conc of Sample
V2= Volume of sample
Calculations for Chemical Oxygen Demand :
Normality of FAS= 0.25 N
Volume of Sample= 10ml
Initial Blank Reading= 5.0
Final Blank Reading= 5.1
Average mL FAS used for Blank=5.05
Initial Sample reading= 3.0
Final Sample reading =2.9
Average mL FAS used for Sample= 2.95.

$$COD\ mg/l = \frac{(a-b) \times N \times Mili\ eq.wt\ of\ O_2 \times 1000}{Volume\ of\ Sample}$$

COD mg/l= (5.05-2.95) ×0.25N×8000/10
COD mg/l= 420 mg/l
Where,
a = mL FAS used for blank.

b = mL FAS used for sample.
N = normality of FAS.
8 = Mili. eq. wt. of O2.
Calculations for Biological Oxygen Demand :
DO of Blank before incubation =90 ml.
DO of Sample before incubation = 89 ml.
Average Final Value of Blank, (5th day) = 8.7 ml.
Average Final Value of Sample (5th Day) = 4.25 ml.

$$BOD\ Of\ O_2\ mg/l = \frac{(DO_{IS} - DO_{FS}) - (DO_{IB} - DO_{FB}) \times 100}{\%\ Dilution}$$

$$BOD\ Of\ O_2\ mg/l = \frac{(89 - 4.25) - (90 - 8.70) \times 100}{0.042}$$

$$= 144.9\ mg/l$$

Where,

DOIB=DO of blank (seeded dilution water) before incubation, mg/L.
DOIS=DO of sample immediately after preparation, mg/L.
DOFB=DO of blank (seeded dilution water) after incubation, mg/L.
DOFS=DO of sample after incubation period, mg/L.
At a given concentration, dissolved oxygen is soluble in wastewater. The underwater life forms would be unable to proceed at their standard rate if the water level drops underneath this level. It has the capability to kill fish and stimulate the development of certain kinds of weed species, both are toxic to aquatic life.
Calculations for Alkalinity:

Table 2: Calculate phenolphthalein (P) alkalinity as follows:

S. No.	Volume of Sample (ml)	Burette Readings		Volume of H2So4 (ml)
		Initial	Final	
1	30	0.0	0.4	0.33
2	30	0.0	0.3	
3	30	0.0	0.3	

$$P - Alkainity, as\ mg\ CaCO_3/L = \frac{A\ \times N \times 50 \times 1000}{Volume\ of\ Sample}$$

$$P - Alkainity, as\ mg\frac{CaCO_3}{L} = \frac{0.33\ \times 0.025\ \times 50\ \times 1000}{30} = 6.66\frac{mg}{L} as\ CaCO_3$$

Calculate total (T) alkalinity as follows:

Table 3: Calculations of Total Alkalinity

S. No.	Volume of Sample (ml)	Burette Readings		Volume of H2SO4 (ml)
		Initial	Final	
1	50	0.0	11	10.93
2	50	0.0	10.9	
3	50	0.0	10.9	

$$T - Alkalinity, as\ mg\ CaCO_3/L = \frac{B \times N \times 50 \times 1000}{Volume\ of\ Sample}$$

$$T - Alkalinity, as\ mg\frac{CaCO_3}{L} = \frac{10.93 \times 0.025 \times 50 \times 1000}{Volume\ of\ Sample} = 218.67\frac{mg}{L} as\ CaCO_3$$

Where,
A = mL of H2SO4 required to bring the pH to 8.3
B = mL of H2SO4 required to bring the pH to 4.5
N = normality of H2SO4.

Type of alkalinity
Three types of alkalinities, i.e., hydroxide, carbonate and bicarbonate are easily calculated from the table given as under:

Table 4: Types of Alkalinities

Values of P and T	Type of Alkalinity		
	OH-	CO3 --	HCO3-
P = O	0	0	T
P<1/2T	0	2P	T-2P
P = 1/2T	0	2P	0
P>1/2T	2P-T	2(T-P)	0
P = T	T	0	0

Interpretation of result:
Since, P<1/2T= 6.6<109.33.

Alkalinity due to OH- is 0, due to CO3 - is 12 and due to HCO3- is 205.47.

Calculations for Conductivity:

Conductivity Measure: 290 kmho/cm.

$$Conduction\ Correction = Measure\ Value \times Cell\ Constant \times Temperature\ Correction\ factor$$

$$Conduction\ Correction = 290 \times 0.96 \times 1.05 = 292.3\ kmho/cm$$

Conduction Correction=292.3 kmho/cm

$$Conduction\ Correction = Conduction\ Correction \times Average\ Factor$$

$$Conduction\ Correction = 292.3 \times 0.75 = 219.2 mg/l\ Approx.$$

Total Dissolved Solids= 219.2 mg/l Approx.

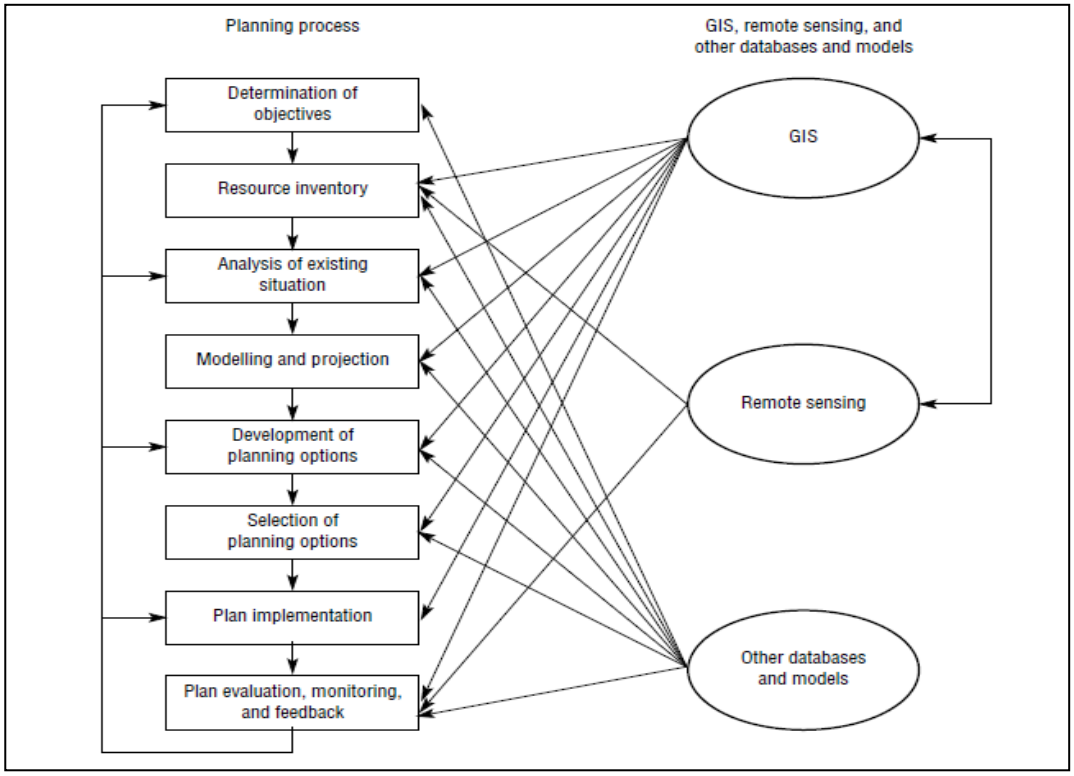

Figure.3: GIS, remote sensing, and other databases and models are all used in the planning process

Required Standards

Table-5 depicts the required standards for various parameters of water as per Indian Standards.

Table 5: Required Standards

S. No.	Parameter	Required Standards
1	pH	6.5-8.5
2	BOD (5th day)	<10mg/l
3	COD	<50mg/l
4	Suspended Solids	<10mg/l
5	Ammonical Nitrogen	<5mg/l
6	Total Nitrogen	<5mg/l
7	Fecal Coliform	<100 MPN/100 ml

The greater the BOD, the more rapidly oxygen is depleted in the stream. This means less oxygen is available to higher forms of aquatic life. The consequences of high BOD are the same as those for low dissolved oxygen: aquatic organisms become stressed, suffocate, and die. Attention needs to be paid at significant adverse effects on the quality of human life including both those, which affect him directly and those, which affect him indirectly through adverse effects on the environment. Several studies both at national and international levels have concluded that most of the diseases are either water borne or water related. Consumption of safe and clean drinking water will help to control all these infectious diseases, which are caused by pathogens. Some of the important infectious diseases related to consumption of infected water are typhoid, cholera, dysentery, diarrhea, gastro entities, and viral hepatitis etc. It is imperative to mention that there is a numerous invisible savings that are caused as result of clean and safe environment to be provided by the proposed service of Sewerage & Sewage Treatment Plant. Such savings or benefits cannot be fully quantified in terms of monetary gains, but their impact can be well perceived in form of good health, longevity of life, reduction in cost of hospitalization for fighting diseases and consequently extra working days/years and improved socio – economic conditions. These benefits are not apparently visible but cost heavily on exchequer and national economy.

As stated earlier the project area needs immediate and sincere endeavors for promoting health and sanitary environment. Provision of Planned Sewerage Scheme shall have a significant impact on the aforesaid direct and indirect benefits. It may also be pointed out that this project does not include any such proposal / activity, which at any stage might have adverse, effect either on environment or the natural resources in the project area.

IX. CONCLUSION

The State Government should propose that every house be connected to a sewage network and their septic tank so that no unwashed sewage flows into the nearby nalla, which will lead to the cleanliness of Holy River Devika and the Tawi River, even more so. religious satisfaction, cultural exhibitions, etc. ultimately the economic development of the city as a whole. Wastewater with high BOD, Turbidity, and soluble solids. We aim to make this water safer in the natural environment or to use it for other purposes. The content of DO in recorded wastewater is found to be of low value due to the presence of high organic matter as well as additional BOD and COD. This increase in BOD and COD value indicates a negative state of discharge. We should treat you at least less than 20ppm. High amounts of inorganic nutrients such as nitrogen and phosphorus were found in contaminated water. Wastewater has a pH range of 7.5-8.5. The probable value of the number was high and indicated contamination of the wastewater. Disposal without treatment in clean water may pose a risk of eutrophication as well as serious health and hygiene problems. Prolonged exposure to wastewater may alter soil characteristics and may affect the quality of groundwater. Clean clean water can be used for purposes such as farming, car-washing, garage cleaning, etc.

This study was conducted to investigate the use of a fixed adsorption bed column to treat the chlorpyrifos pesticide using an inexpensive adsorbent. Adsorption is seen as an effective and low-cost method of removing pollution from contaminated water and water and producing high-quality refined waste. The ability to remove Activated Carbon was tested, and a series of studies were conducted. Activated carbon was shown to have excellent adsorption performance. There are many parameters involved in evaluating the performance of a fixed bed column such as the initial concentration of the solution, the flow rate, the amount of adsorbent used, the final concentration of the solution, COD, etc. According to this study, the results show that increasing the amount of adsorbent in the column improves the adsorbent capacity of the bed.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

ACKNOWLEDGMENT

I would like to show appreciation to the department of Jammu and Kashmir Pollution Control Board, Jammu for supporting and permitting me to pursue the project and provide the required data.

REFERENCES

[1] A., Premkumar & Williams, Royal. (2018). WATER POLLUTION IN INDIA-AN AN OVERVIEW.
[2] Smt: Meenakshi K. Changte Water Pollution in India_ Causes and Remedies, IJSR - International Journal of Scientific Research, Vol: 4, Issue: 8 August 2015.
[3] Rozina Khatun Water Pollution: Causes, Consequences, Prevention Method and Role of WBPHED with Special Reference from Murshidabad District International Journal of Scientific and Research Publications, Volume 7, Issue 8, August 2017 269 ISSN 2250-3153.
[4] Gray N. Water Technology. 3rd ed. London: CRC Press; 2017.
[5] Davis ML, Masten SJ. Principles of Environmental Engineering and Science. NewYork: McGraw-Hill; 2004.
[6] Chatterjee A. Water Supply Waste Disposal and Environmental Pollution Engineering (Including Odour, Noise and Air Pollution and its Control). 7th ed. Delhi: Khanna Publishers; 2001.
[7] Gray NF. Drinking Water Quality: Problems and Solutions. 2nd ed. Cambridge: Cambridge University Press; 2008.
[8] W. H. Organization, Guidelines for drinking-water quality: recommendations vol. 1: World Health Organization, 2004