

## CHAPTER-17

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# Environmental Pollution Problems of Guwahati

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— *Siddhaswer Sarma*

As human being is the main user of earth's resources, he is either consciously or unconsciously responsible for environmental pollution. Nowadays, every conscious individual, social worker, scientist and administrator consider it as a serious problem. Guwahati was born as a small township. In 1901 it had about 11.7 thousand population which increased to 5.8 lakh in 1991. The rich environmental endowment consisted of mixed vegetation and uneven topography of hills, plains, *bills* etc. The population then could easily adjust to the gross environment of Guwahati without problems of pollution or environmental degradation. The phenomenal growth of the town, is now exerting powerful stress and strain on the environment. The ecosystem is now under tremendous pressure because of clearing of original vegetation through wanton felling of trees and cutting of hills followed by erosion which have brought undesirable conditions inside the city area. Improper location of industries and ever increasing traffic are also partly responsible for environmental pollution (Table 1). These are more than 50 industrial units in Guwahati. The sources of water used by the city dweller and the air they inhale are polluted which may cause various diseases, and many a times leading to death.

### I. Water Pollution

The general agents of water pollution are animal and plant wastes, municipal discharge, industrial wastes and agricultural chemicals. As we all know that the water body is fluid in nature which contains physio-chemical and biological equilibrium and normally

active waterway has a large capacity to assimilate wastes. This capacity of assimilation is either being reached or has exceeded, as a result water bodies are becoming increasingly contaminated.

The river Brahmaputra is receiving all "foul water" from the built-up areas of the city (Table 2). The contaminated water not only adversely affects the human health and hygiene but also reduces spawning of fish in the river; thereby creating an imbalance in the fresh water ecology. Contamination of water by sewage is the principal cause of water-borne diseases including cholera, typhoid and paratyphoid, dysentery and infectious hepatitis. Bio-chemical Oxygen Demand (B.O.D.) measurement of the quality of water does not accurately indicate the risk of disease. Hence, more specific indices are required. One of the most common factors is the presence of number of coliform bacteria (some times specifically the faecal coliform — intestinal bacteria, especially of the genus 'Escherichia') per unit volume of water. As per "United States Public Health Service" (USPHS) drinking water standard for coliform organism specifies that the Most Probable Number (MPN) shall not exceed 10,000 coliform per 100 millilitres of water. The population of coliform bacteria in the water of river Brahmaputra is significantly higher than the standard recommendation. Even after processing in municipal water — treatment plants, the water supplied for drinking in Greater Guwahati is not always safe. The increased contents of chlorine in water may be due to the improper management of water — treatment plants which may lead to the water toxicity. The increased quantity of mutagenic and carcinogenic compounds in drinking water may cause death due to cancer as happened in Louisiana.

The river Bharalu flowing through the city is the dumping ground of industrial wastes and domestic sewerage of the city (Tables 3 and 4). The colour of water and foul smell emitted by it, suggest a highly polluted river. Fresh water of the river Bharalu originally oozes out from the three holy springs, namely Sandhya, Lalita and Kanta. But, is completely changes while crossing the city area. Significantly chlorine (cl), sulphate ( $SO_4$ ), oil and grease increase towards the downstreams of the river. This is due to drainage of domestically used water and industrial waste water into the river. The water sample of river Bharalu also indicates presence of high bacterial coliform as against the standard recommendation quality. The polluted water has endangered the survival of the living creatures in and around the river.

## II. Air Pollution

Air pollution is due to the presence of gaseous matter (e.g. sulphur oxides, nitrogen oxides, hydrocarbons, carbon monoxides) and due to particulate matter (e.g. solid particles or liquid suspended in the air causing smoke, mists etc.). Though, it is difficult to make definite statements about the health effects of air pollution, but its impact on human life (from the petro-chemical complex and emission of smoke from vehicular traffic for example) is decisively harmful. The calcination unit for Calcinating Raw Petroleum Coke (R.P.C.), a by — product of Guwahati Refinery has also created a health hazard in one part of the city. The tall chimneys of such units blow up small particles of (coke) dust along with smoke. It spreads throughout a large area in the city as in Noonmati area. These particles are so tiny, that people around this area inhale it. Regular inhaling of such particles has led to tuberculosis, lung cancer, asthma and eye diseases. Measures suggested by National Environmental Control Board has been implemented by the industries under the general direction of Guwahati Municipal Corporation. However, the benefits of such acts are felt only by the employees rather than the general public which continues to suffer from ill-effects of pollution.

Besides, most harmful of the contaminants is carbon monoxide resulting from incomplete combustion of carbon. The atmosphere of the city becomes more polluted by emissions of carbon monoxide, oxides of nitrogen, aldehydes etc., during rush hours when too many vehicles ply on the road. This leads to lung cancer. Unfortunately there are no such devices installed in the city to measure and control the rate of pollution by vehicles.

Decomposition of organic matter, sewage, petroleum industries, refineries, etc. are the main source of sulphurated hydrogen gas ( $H_2S$ ) emission. Barchala *bil* in the heart of the city is fast becoming the reservoir of sulphurated hydrogen gas which pollutes the air of nearby residents.

## III. Other Factors

There are only a few sewage treatment plants within Greater Guwahati, of which the Railway, the Refinery, Medical College could be named. Most of the houses inside the city are equipped with ordinary septic tanks. These septic tanks do not function during the

rainy season because of high water table, thus polluting surface water as well as ground water around the area. Hence, civic authorities should ensure that either a proper sewage disposal system should be provided for in the city area or special septic tanks should be designed to ensure that pollution is minimised.

The urban sprawl and small industrial units in and around Guwahati are responsible for releasing undesirable effluents and pollutants, even in the stagnant pools in and around the city environment. The industrial effluents pass through Greater Guwahati are very strong. Most of the effluents are drained out openly through human habitation in the city. Unless these drains are covered or the effluents flow through underground pipes, people cannot escape the hazards created by such open effluent drains.

### **Suggestions**

So far water pollution is concerned, the two rivers i.e., Brahmaputra and Bharalu have a considerably high risk potential as a source of infections to human subjects. The author collected some information regarding the water qualities for a continuous period of seven years from both the rivers of Guwahati and found the level of contamination rather very high. Hence water supply authority should look into the matter and there should be an inbuilt arrangement for periodic bacteriological examination and treatment of water so as to maintain its quality.

Lack of monitoring air pollution is another serious concern to the people of Guwahati. The Board for Prevention and Control of Water and Air Pollution should take into account all the factors responsible for air and water pollution and should extend all possible measures for the welfare of the inmates of Guwahati. It is necessary to provide for a civic authority with legal power that will equip it with stringent power, so that it can ensure and prevent further deterioration in respect to environmental pollution in the city.

**Table 1**  
**Physical and Chemical Analysis of Effluent at Different Points of Greater Guwahati**

Source of Effluent	Main Outlet, Industrial Estate	Kamrup Paper Mills	Indian Oxygen Ltd.	Discharge Water Associated Industries (Chem. Unit)	Nezone Tube Ltd.	G.L. Industry before Dis- charge in the Bill	Standard (per litre)
Place of Collection	Bamunimaidan	Amingaon	Dispur	Chandrapur	Pachim Boragaon, Jalukbari	Dispur	-
Date of Collection	1.8.84	20.9.84	20.9.84	19.10.84	6.11.84	21.12.84	-
<b>PHYSICAL CHARACTERISTICS</b>							
Appearance	Turbid	Blackish & Turbid	Whitish Turbid & thick slevery	Not very clear	Turbid	Turbid	-
pH	7.1	6.32	11.7	2.4	7.1	5.15	0.3 mg
Temperature in °C	30	26	28	35	34	20	-
Weather	Sunny	Cloudy	N.R.	Sunny	Sunny	N.R.	-
<b>CHEMICAL CHARACTERISTICS</b>							
B.O.D.	-	Not Examined	-	-	9.2	-	-

(Table 1 Contd.)

Source of Effluent	Main Outlet, Industrial Estate Paper Mills	Kamrup Paper Mills	Indian Oxygen Ltd.	Discharge Water Associated Industries (Chem. Unit)	Nezone Tube Ltd.	G.L. Industry before Dis- charge in the Bill	Standard (per litre)
C.O.D.	142.0	360.0	172.0	8.0	120.0	16,560.0	-
Suspended Solids	1043.0	1674.0	-	6.0	35.0	-	80 mg
Oil and Grease	Sample in sufficient	Nil	Nil	Nil	Nil	-	-
Phenolic Compd. as $C_6H_5CH$	Sample insufficient	Nil	Nil	Nil	Nil	301.13	-
M - Alkalinity as $CaCO_3$	232.0	212.0	170,000.0	Nil	143.0	1700.0	-
P - Alkalinity as $CaCO_3$	Nil	Nil	170,000.0	Nil	Nil	Nil	-
Total Acidity as $CaCO_3$	Nil	Nil	Nil	470.0	Nil	Nil	-
Amomical Nitrogen as $NH_3$	20.0	0.48	10.4	0.08	0.04	160.0	0.89 mg
Chloride as Cl	62.0	22.0	15.0	12.0	10.0	Nil	-
Residual Chlorine as Cl	Nil	Nil	Nil	Nil	Nil	-	-
Sulphate as $SO_4$	8.5	330.0	92.0	175.0	8.5	-	250 mg
Remarks							Very Strong Effluent

Source : State Public Health Laboratory, Assam, Guwahati - 21.

Table 2  
Water Quality Trends of Brahmaputra River, 1980-1986

Sl.No.	Indicator	1980	1983	1984	1985	1986	Standard Recommendation*
<b>CHEMICAL CHARACTERISTICS</b>							
1.	D.O.	-	6.45	8.36	7.10	7.94	-
2.	B.O.D.	-	1.66	1.67	1.65	0.85	-
3.	C.O.D.	-	9.04	7.78	10.30	5.76	-
4.	Total Nitrogen (NH <sub>3</sub> + Org.N)	0.19	0.75	0.67	0.63	0.49	0.89 mg/l
5.	Nitrogen (NO <sub>2</sub> + NO <sub>3</sub> )	0.08	0.08	0.07	0.13	0.06	0.9 mg/l
6.	M-Alkalinity as CaCO <sub>3</sub>	76.80	63.20	61.80	67.00	84.50	-
7.	Total Hardness as CaCO <sub>3</sub>	64.40	62.00	71.60	66.25	68.00	-
8.	Calcium as CaCO <sub>3</sub>	44.80	44.00	52.00	45.75	47.00	-
9.	Magnesium as CaCO <sub>3</sub>	19.40	16.80	19.60	20.50	16.62	-
10.	Sodium as Na	-	5.03	4.27	4.94	5.90	-
11.	Chloride as Cl	5.00	4.16	7.03	5.00	5.08	-
12.	Sulphate as SO <sub>4</sub>	34.4	8.48	10.50	11.12	13.60	250 mg/l
<b>BACTERIOLOGICAL CHARACTERISTICS</b>							
13.	Total Coliform (M.P.N. per 100 ml)	-	50,155	30,473	11,504	8260	10,000/100ml
14.	Fecal Coliform (M.P.N. per 100 ml)	-	3,932	5,975	1,606	850	2,000/100ml.

Source : Calculated from the data of Board for Prevention and Control Water and Air Pollution, Assam, Guwahati -7.  
\*Standard recommendation source is C.E.Q. Environmental Quality, 1974, p. 366.

**Table 3**  
**Water Quality of Bharalu River 1985-1986**

S.No.	Indicator	1985	1986	Standard Recommendation
1.	pH	6.86	7.04	-
2.	Turbidity	191.11	51.40	-
3.	Conductance	250.71	227.09	-
4.	D.O.	6.03	2.26	-
5.	B.O.D.	13.01	9.81	-
6.	C.O.D.	39.82	35.90	-
7.	Total Nitrogen (NH <sub>3</sub> + Org.N)	4.20	1.24	0.89 mg/l
8.	Nitrogen (NO <sub>2</sub> + NO <sub>3</sub> )	0.20	0.04	0.9 mg/l
9.	P-Alkalinity as CaCO <sub>3</sub>	Nil	Nil	0.001 mg/l
10.	M-Alkalinity as CaCO <sub>3</sub>	114.00	106.00	-
11.	Total Hardness as CaCO <sub>3</sub>	83.75	91.27	-
12.	Calcium as CaCO <sub>3</sub>	58.00	31.23	-
13.	Magnesium as CaCO <sub>3</sub>	25.75	12.78	-
14.	Sodium as Na	12.08	22.92	-
15.	Chloride as Cl	18.20	24.54	-
16.	Sulphate as SO <sub>4</sub>	17.50	15.27	250 mg/l
17.	Total Coliform MPN/100 ml	81042	45210	10,000/100 ml
18.	Fecal Coliform MPN/100 ml	22660	5272	2,000/100 ml

Source : Calculated from the data of B.P.C.Q.A.P., Assam.

Table 4

## Physical and Chemical Analysis of Water in Bharalu River

Date of Receipt : 9.7.70

Date of Collection : 8.7.70

Sample Points	A	B	C	D	E	F
Tech. No.	42/70	43/70	44/70	45/70	46/70	47/70
Colour	Slightly Brownish	Slightly Yellowish	Not Very Clear	Slightly Yellowish	Grey	Slightly Yellowish
Turbidity	Slightly Turbid	Turbid	Not Very Clear	Turbid	Turbid	Turbid
Smell	No Smell	No Smell	No Smell	No Smell	No Smell	No Smell
Sediment	Present (Iron)	Present (Clay)	Present (Silicious Matter)	Present	Present	Present (Clay)
pH	6.9	7.3	6.9	7.1	7.0	6.8
Total Solid	197.0	213.0	138.0	258.0	267.0	281.0
Total Soluble Solid	118.0	109.0	61.0	127.0	157.0	184.0
Total Hardness	40.0	19.0	19.0	32.0	58.0	51.0

Cl	6.0	5.5	5.0	12.0	5.5	13.0
SO <sub>4</sub>	Trace	0.82	Trace	1.97	8.24	6.76
Dissolved Oxygen	4.24	7.47	5.75	7.37	7.17	8.98
B.O.D.	26.66	17.90	21.00	9.11	14.03	12.92
Oil and Grease	Trace *****	4.0 1:0	4.8 4:0	7.2 7.2	8.8	3.3
Phenolic Compound	Trace	Negligible	Negligible	Negligible	Negligible	Negligible
Chlorine Demand	3.1	3.0	2.9	3.1	2.6	2.9
Acidity as CaCO <sub>3</sub>	5.25	-	-	-	-	5.25

A = Water sample at U/S of Concrete bridge, west of Coca-Cola factory, Narengi

B = Water sample at U/S of Concrete bridge of Bharalu, A.T. Road Crossing near Khanapara

C = Water sample at U/S of Concrete bridge near Basistha on the N.H. Diversion

D = Water sample at D/S of Wooden bridge near concrete bridge of N.H. Diversion

E = Water sample at U/S of Concrete bridge on A.T. Road (outlet of Diper Bil)

F = Water sample at D/S of Bharalu Sluice gate

Source : Date Collected from T.P.O., Assam Guwahati, Analysed in the State Public Health Laboratory, Assam Guwahati.

N.B. : U/s - Upstream

D/s - Downstream.