# Impact of Water Pollution in Assam- A study

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**Introduction:**

Pollution means the undesirable state of the natural environment being contaminated with harmful substances as a consequence of human activities. Pollution is an undesirable change in the physical, chemical or biological characteristic of our air, land water that may attach human life, or industrial process, living condition and cultural assets. So pollution is that quantity of pollutant, which is sufficient to cause injury to human beings, and other living creatures.

Water is natural resource and fundamental need of living being and invaluable national wealth. Planning development and management of water resource need to be governed by National perspective.

Fresh water is a very precious commodity. Although India has sufficient water at its disposal due to favorable climatic condition, yet it has been estimated that about 70% of available water in India is polluted.

**Objectives of the study:-**

The present study is based on the following objectives:-

1. To find out the present quality of water in Assam.
2. How polluted water harmful to human health and animals like fishes, amphibians, mall uses etc.

**Methodology:-**

The study is based on both primary and secondary data. It is descriptive. It is also based on Internet surfing. Visit to different government offices. Some books, journals, reports are also undertaken for secondary data.

**Causes of Water pollution:-**

1. **Industrialpollutants:** Rain water carries the effluents from the industries and through them into the water system (river, pond, Lake Etc,) and pollutes them. Because these effluents contained some toxic substances like chlorine, phenol, cyanide, ammonia, mercury, lead, arsenic, cadmium etc. Besides, some industries discharge hot water, which cause thermal pollution. Marine ecosystem in the coastal region is greatly affected by the toxic industrial effluents.

2. **Urbanization:** The urbanization is one of the most important causes of the water pollution. Household's wastes passes through municipal sewage system and are poured into rivers, ponds and other water bodies. These wastes include food wastes, modern synthetic detergent, polythene carry bags, human excreta, water based paints, paper, kitchen garbage, medicines etc.
The degradation of water may lead to oxygen depletion which may kill all aquatic plants and animals. In the rural areas rivers and ponds are used as place of bathing, washing cloths and domestic animals which cause water pollution. Because, all these activities mix germs of diseases and chemicals like nitrogen, sulphate etc. into the water and thereby causes water pollution.

3. **Agricultural pollution: -** Due to over population, people have to use different chemical fertilizers, insecticides, fungicides, herbicides, pesticides etc. in the crop fields to grow maximum crops in minimum land. These are not fully utilized by the crops and remain on the fields which are rich in nitrogen, potassium and phosphorus. Theresidues of these toxic chemicals and wasted away by the rain water and deposited in

various rivers, lakes, ponds and other bodies which cause pollution to the aquatic ecosystem. It is estimated that in India 1, 00,000 tons of pesticides are used per year. They may reach the ground water through leaking and contaminate them.

4. **Automobile pollution**: - Many petroleum products leak from oil refineries, oil tankers, ships etc. pollute the aquatic system of the surrounding water bodies. Oil spill is the accidental discharge of oil into the ocean or other water bodies from offshore oil mines or tankers. Due to oil spill during transport and offshore extraction oil spread over many hundred kilometers. Over ten million tons of oil is spilled into the ocean annually which quite a significant amount.

5. **Radio-active pollution**:-Radio-active materials which are liberated from nuclear explosions and nuclear testing laboratories reach the water bodies with the rain water and thus pollute the aquatic ecosystem.

**Water pollution inAssam**

In Assam there are 101 monitoring stations at present. Assam is very rich in water resource both in terms of surface water and ground water. The economy and the life style of the people of Assam is closely linked with the water resources, and therefore the monitoring of water quality and maintenance of its wholesomeness is of paramount important.

The PCBA has established 101 monitoring stations across the state for monitoring of both surface and ground water quality under the NWMP. Among the 101 stations-42 are on rivers, 27 on ponds, 32 are ground water stations.

**Ground water quality of Assam:-**

To assess the problem of ground water quality the PCBA is carrying out ground water quality monitoring in the state under the program. There are 32 numbers of ground water quality monitoring stations across the state. These stations are either well or tube well.

A brief summary on the ground water quality of Assam based on the monitoring data of the said monitoring stations selected parameters.

pH of the ground water is observed in the range of 4.7 to 8.3 and the lowest value is observed at Karbi Anglong District is 4.7 in 2011.

pH observed below the desired range is one or more occasions during the study period at Ledo (5.0), Nazria (6.3), North Lakhimpur(5.6),Nagaon(6.4),Jagiroad(5.8), Barpeta Road(5.8), Kokrajhar(5.8), Dhubri(6.3), Diphu(5.6),Halflong(5.6),Panchgram Market(5.0),Digboi(5.9),Sivsagar(6.2),Jorhat(6.1), Silchar(5.8), Bongaigoan(6.0) and Guwahati(6.4).

**Biochemical Oxygen Demand**

- BOD ranges from 0.2 to 50.0 mg/l.
- Highest value of BOD is observed at Guwahati (50.0 mg/l),
- BOD is not meeting the desired criteria in one or more occasions during the study period at Ledo(3.0mg/l), Nazria (3.7mg/l), Numuligarh (3.2mg/l), Semanchapori (3.1mg/l), North Lakhimpur(14.6mg/l),Tezpur (Mission Chariali)(13.4mg/l),Nagoan(4.8mg/l), Jagiroad(6.0mg/l),Gurchuk (Guwahiti)(5.0mg/l), Nalbari(4.2mg/l), Barpeta Road(3.7mg/l),Bongaigoan(BRPL)(4.2mg/l), Kokrajhar(3.9mg/l), Dhubri(4.8mg/l),Goalpara (Goalpara College)(5.8mg/l), Halflong(6.5mg/l), Karimganj(5.4mg/l) Hailakandi((3.4mg/l),

Panchgram Market(near Cachar Paper Mill)(6.6mg/l),Digboi(5.4mg/l),Karbi Anglong(4.6mg/l),Sivsagar(Sonari)(3.9mg/l), Jorhat(4.3mg/l), Silchar(6.5mg/l), Barpeta(3.5mg/l),

**Total Coliform**

- The Total Coliform count varies from 0 to 2800 MNP/100ml.
- Fecal Coliform is meeting the desired criteria at all monitoring stations.

**Findings of special studies on contamination of underground water with Fluoride and Arsenic**

The Pollution Control Board, Assam with the financial support of Central Pollution Control Board, Delhi carried out the study of estimation of fluoride and arsenic content in ground water of eleven (11) nos. of District of Assam and results reported in the study
report are given in the following Table:-

**Estimation of fluoride and arsenic content in ground water of 11 nos. district in Assam**

| Sl. No. | District | No. of Samples | Fluoride Conc (mg/l) | | Arsenic Conc. (mg/l) | | No. of Samples having concentration higher than permissible limit | |
|---|---|---|---|---|---|---|---|---|
| | | | Max | Min | Max | Min | Fluoride | Arsenic |
| **1** | Golaghat | 37 | 1.73 | 0.38 | 107.08 | 1.97 | 10 | 24 |
| **2** | Kaimganj | 37 | 0.91 | 0.25 | 102.2 | 0.488 | | 10 |
| **3** | Karbi Anglong | 7 | 3.47 | 0.04 | 0.80 | 0.35 | 2 | |
| **4** | Cachar | 11 | 0.54 | 0.331 | 34.12 | 0.04 | | 1 |
| **5** | Lakhimpur | 16 | 0.84 | 0.64 | 11.42 | 2.89 | | 1 |
| **6** | Nagaon | 44 | 0.96 | 0.31 | 9.53 | 0.22 | | |
| **7** | Kamrup | 122 | 2.1 | 0.06 | 15.62 | 0.01 | 17 | 2 |
| **8** | Dhubri | 30 | 0.851 | 0.44 | 9.27 | 1.29 | | |
| **9** | Hailakandi | 19 | 0.71 | 0.25 | 40.49 | 1.43 | | 2 |
| **10** | Dhemaji | 13 | 1.01 | 0.50 | 5.80 | 1.89 | | |
| **11** | Jorhat | 19 | | 0.69 | 90.03 | 47.46 | 1 | 8(Titabor area) |
| | **Total** | **355** | | | | | | |

It has been observed from the results that in Golaghat district fluoride content in ground water ranges from 0.38 to 1.73 mg/l and 27% of the collected samples fluoride content are more that maximum permissible limit. Similar is the case with Arsenic content also. In about 72.9% of water samples.Arsenic content was found to be more than of maximum permissible limit of 10 µg/l.Arsenic content in the ground water samples from Golaghat district ranges from 1.97µg/l to 107.28 µg/l.

In Titabor area of Jorhat district,42% of water samples collected for analysis revealed that Arsenic content is higher than permissible limit and 13.9% ground water samples has been identified for fluoride content more than permissible limit of 10 mg/l.

In Kamrup district, 17 nos of ground water sample out of 122 nos. has fluoridecontent more than permissible limit.

Further more, on getting information about suffering of large number of people of Hailakandi village located on Doboka-Diphu Road due to fluoresis the Pollution Control Board, Assam deputed a team of Scientists ot collect water sample from various drinking water sources as well as soil from different parts of Haldiati village. The sample collection party of the Pollution Control Board, Assam collected sample from Tapajuli, Nizparkhowa and main Haldiati village areas. The drinking water from following types of sources available in the village were collected:

i) Kacha well,
ii) Deep Tube Well,
iii) Ring Well fitted with Tara pump under UNICEF Project,
iv) Flowing Stream water,
v) Water being supplied by PHE from UrdhaPaniJoganAsoni.

The samples were analyzed for pH, Conductivity, iron and Fluoride contents at Central Laboratory of Pollution Control Board, Assam

**Water Quality of Haldiati, Tapajuri and NizparaKhowa villages located along Doboka-Diphu Road**

| Lab.Ref No. | Date of Receipt | Source | Date & Time of Collection | pH | Cond. (µS/cm) | T.Fe (mg/L) | F (mg/L) |
|---|---|---|---|---|---|---|---|
| **GW-30/12** | 12/10/2012 | Water from KachanWell from the residence of Mrs. Bhagwati Malakar,Tapajuri,Haldiati | 11/10/2012 at12-24 PM | 6.10 | 132 | 3.16 | 0.34 |
| **GW-31/12** | 12/10/2012 | Water from Deep Tube Well from the residence Of Md.Abdul Rahim, Tapajuri,Haldiati. | 11/10/2012 at12-38 PM | 7.10 | 209 | 0.88 | 12.9 |
| **GW-32/12** | 12/10/2012 | Water from Deep Tube Well from the residence Of Md. Hasan Ali, Tapajuri, Haldiati | 11/10/2012 at12-50 PM | 6.95 | 233 | 1.60 | 7.14 |
| **GW-33/12** | 12/10/2012 | Water from Deep Tube Well from the residence Of Md. Fazar Ali, Tapajuri, Haldiati | 11/10/2012 At 1-06 PM | 7.05 | 277 | 1.28 | 11.10 |
| **GW-34/12** | 12/10/2012 | Water from Deep Tube Well from the residence Of Md. Monuddin, Tapajuri, Haldiati | 11/10/2012 at 1-15 PM | 7.15 | 254 | 1.24 | 9.20 |
| **GW-35/12** | 12/10/2012 | Water from Ring Well (TSRS Pump, UNICEF) from the Tapatjuri Senior Madrass, Haldiati | 11/10/2012 at 1-21 PM | 6.30 | 238 | 3.00 | 0.42 |
| **GW-36/12** | 12/10/2012 | Water from stream water, Tapatjuri, Haldiati | 11/10/2012 at 1-46 PM | 6.80 | 75 | 2.40 | 0.32 |
| **GW-37/12** | 12/10/2012 | Water from Deep Tube Well from the residence Of Mr.PabanRansang, Tapajuri,Haldiati. | 11/10/2012 at 1-51 PM | 7.00 | 253 | 0.84 | 10.70 |
| **GW-38/12** | 12/10/2012 | Water fromKacha Well from the residence Of Mrs.PranitaTisupi, Tapajuri, | 11/10/2012 at 2-09 PM | 5.20 | 43 | 0.28 | 0.24 |
| **GW-39/12** | 12/10/2012 | Water from Deep Tube Well from the residence Of Md.MoneswarEupi, Tapajuri, | 11/10/2012 | 6.70 | 243 | 3.96 | 0.43 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | at 2-15 PM | | | | |
| **GW-40/12** | 12/10/2012 | Water from Deep Tube Well from the residence Of Mr. Botin Ch.Rangsang, Tapajuri, | 11/10/2012 at 2-25 PM | 5.75 | 159 | 0.06 | 0.90 |
| **GW-41/12** | 12/10/2012 | Water from Kacha Well from the residence Of Mr.Chandra Tisu, Tapajuri, | 11/10/2012 at 2-35 PM | 6.10 | 188 | 0.94 | 0.62 |
| **GW-42/12** | 12/10/2012 | Water from Urdha Ganga Pani Jogan Asoni, Urdha Ganga | 11/10/2012 at 3-00 PM | 6.50 | 163 | 0.32 | 0.35 |
| **GW-43/12** | 12/10/2012 | Water from Urdha Ganga Juri near KNLF Designated Camp, Para Khowa | 11/10/2012 at 3-10 PM | 6.35 | 32 | 0.62 | 0.33 |
| **GW-44/12** | 12/10/2012 | Water from Ring Well (Tara Pump, UNICEF) from the residence of Mrs. Ketiki Betri, Nizpara Khowa | 11/10/2012 at 3-20 PM | 6.50 | 376 | 1.72 | 1.62 |
| **GW-45/12** | 12/10/2012 | Water from Deep Tube Well from the residence Of Mr Pitaram Terang Nizpara Khowa | 11/10/2012 at 3-25 PM | 7.10 | 281 | 0.98 | 3.40 |
| **GW-46/12** | 12/10/2012 | Water from Ring Well (Tara Pump, UNICEF) near Karbin Namghar,Nizpara, Khowa. | 11/10/2012 at 3-40 PM | 6.55 | 254 | 2.96 | 1.27 |
| **GW-47/12** | **12/10/2012** | **Water from Deep Tube Well from the residence Of Mr Ajoy Krow Nizpara Khowa** | **11/10/2012 at 3-50 PM** | **7.25** | **275** | **0.60** | **4.59** |

**Analysis of results:**

The results confirm the following:

1. All the 3 samples of the water from Kacha wells have fluoride contents in the range of 0.24 to 0.62 mg/l which is bellow the permissible limit and safe in respect of fluoride concentration of Coliform and Faecal Coliform bacteria in this water, making it not safe for drinking as such without treatment.

2. 2 samples collected from free flowing stream (Urdhu Ganga Juri) have fluoride concentration of approx 0.33 mg/l which is quite in safe range.

3. Out of 3 samples collected from Ring wells fitted Tara Pump by PHE Deptt. Under UNICEF project two samples tested to have fluoride contents higher than permissible limit in the range of 1.27 to 1.62 mg/l. Thus the water of 67% of ring wells fitted with Tara Pump is not safe for drinking.

4. The sample of water collected from Urdha GangaPaniJoganAsoni of PHE was found to contain fluoride within the permissible limit and thus was found to be safe for drinking but quantity of water being made available to the people is too meager.

5. The worst result was found in respect of samples collected from Deep Tube Wells. Out of 9 samples 8 samples ie.88% of samples were found to have fluoride content in the range of 3.44 to 12.90 mg/l which is 240 to 1200% higher than the permissible limit of 1mg/land incidentally the largest number of people of the

village (-88%) depend on Deep Tube Wells for drinking water and many of the wells have been provided to people under Government scheme.

**Effects of water pollution:-**

1. The polluted water of ditches, ponds, lakes, rivers etc. contain many pathogenic and non-pathogenic micro-organism and many viruses and bacteria. They spread various water bone diseases like **Cholera, dysentery, typhoid, amoebiosis, jaundice** etc.
2. Most of the chemicals like arsenic, lead etc. released from industries and factories finally penetrate into surface and ground water. These chemicals have severe adverse effects on human, plant and animal health. Chronic exposure to arsenic causes **Black foot disease, diarrhea** and **lung cancer.** Land contaminated water can lead to anemia, brain and kidney damage.
3. Consumption of fluoride contaminated water causes **osteofluorosis**in human. This is characterized by deformed bones and teeth and painful joints. According to specialist men can consume 1.5 mg of fluoride per million mg of water.
4. Nitrate is a toxic pollutant. Excess nitrate consumption along with drinking water causes **blue baby** (death of fetus) as nitrate reduces the oxygen carrying capacity of hemoglobin.
5. Consumption of nickel (Ni) contaminated water causes **dermatitis** and **respiratory disorder** including **lung cancer.**

**Control measure of water Pollution**

There is various techniques, methodologies, strategies, rules and acts jointly can form a platform to reduce the level of water pollution. Some of the measures are discussed below:

1) The polluted water running through the municipal and industrial sewage be treated properly before releasing into the water bodies. In general three types of treatments are adopted to purify the water plants:-

a) **Primary treatment:-** In primary treatment, screens, filters, grift chambers and sedimentation tanks are joined one after another. The water is treated with chlorine gas, which kills the harmful bacteria, viruses, fungi etc. However, this method is not advantageous because chlorinated compounds like trihalomethanes are formed which is carcinogenic in nature and only 60% of the solid materials and 30% of the oxygen demanding wasted are removed by this treatment.

b) **Secondary treatment:-** In this treatment, the organic matters are biologically degraded by different types of microorganisms under acrobat conditions.The sludge materials settle down in the sedimentation tank and the purified water can be finally treated with chlorine gas for removal of harmful micro-organisms. However, most of the salts, nitrates, phosphates, pesticides and radio-active materials still remain in the water streams.

c) **Tertiary treatment:-** Tertiary treatment is a chemical method of clearing polluted water.In this method, chemicals remaining in the waste water are removed after primary and secondary treatments. Tertiary method includes sedimentation, adsorption, oxidation, reverse osmosis and biological methods.

2. Use of fertilizers, pesticides,insecticides, fungicides should be controlled and be replaced by bio-fertilizers.
3. Gobor gas plant should be introduced at village level so that domestic wastes could be property utilized.
4. The source of natural water should be conserved. The industries and factories should be set up far away from these sources.
5. Utmost care should be taken to prevent oil spills while transporting oils and other petroleum products through the sea route.
6. Rivers, lakes and ponds should not be used for bathing and washing as it pollutes water.
7. Plantation of trees would reduce pollution by sediments and it will also prevent soil erosion.
8. Laws should be implemented, so that industrial wastes cannot be discharged directly into the water bodies.

9. Besides, media should take a role to inform the people about the harmful effects of water pollution.

**Conclusion:-**

In Assam, both ground water, surface water is becoming polluted day by day for various reasons like, industrial pollutants, urbanization, agricultural pollution, automobile pollution etc. For which general people suffer from cholera, dysentery, typhoid, jaundice, lung cancer etc. So, control measure of water pollution, like primary treatment, secondary treatment and tertiary treatment are done for cleaning polluted water which will help the future generation to live a peaceful life.

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