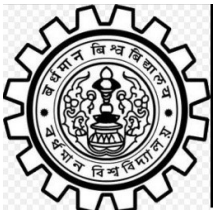
The University of Burdwan



Dissertation topic - Water Pollution in India

B.Sc general, 6th semester ,2020

Subject -Botany

Course code-DSE 2A

University roll no. =170611610022.

Registration number :-201701010534 of 2017-18

Acknowledgement :-

I would like to express my special thanks of gratitude to my teacher Dr.Irani Biswas ,who gave me this golden opportunity to do this wonderful dissertation on the topic”water pollution in India “which also helped me in doing lots of research and i came to know about a lot of new things about water pollution of which I was not aware of.

Last but not the least i would like to express my special thanks to my friend(Arpita roy) helped me in completing this dissertation within the time limit.

Contents :-

Introduction

Water pollution is a serious problem in India as almost 70 per cent of its surface water resources and a growing percentage of its groundwater reserves are contaminated by biological, toxic, organic, and inorganic pollutants. In many cases, these sources have been rendered unsafe for human consumption as well as for other activities, such as irrigation and industrial needs. This shows that degraded water quality can contribute to water scarcity as it limits its availability for both human use and for the ecosystem.

In 1995, the Central Pollution Control Board (CPCB) identified severely polluted stretches on 18 major rivers in India. Not surprisingly,a majority of these stretches were found in and around large urban areas. Besides a rapidly depleting groundwater table in different parts, the country faces another major problem on the water front—groundwater contamination,a problem which has affected as many as 19 states, including Delhi.Geogenic contaminants, including salinity, iron, floride and arsenic have affected groundwater in over 200 districts spread across 19 states.

Water pollution occurs when unwanted materials enter into water, changes the quality of water and is harmful to environment and human health. Water is an important natural resource used for drinking and other developmental purposes in our lives .Safe drinking water is necessary for human health all over the world. Being a universal solvent, water is a major source of infection. According to world health organization (WHO) 80% diseases are water borne. Drinking water in various countries does not meet WHO standards 3.1% deaths occur due to the unhygienic and poor quality of water .

Discharge of domestic and industrial effluent wastes, leakage from water tanks, marine dumping, radioactive waste and atmospheric deposition are major causes of water pollution. Heavy metals that disposed off and industrial waste can accumulate in lakes and river, proving harmful to humans and animals. Toxins in industrial waste are the major cause of immune suppression, reproductive failure and acute poisoning. Infectious diseases, like cholera, typhoid fever and other diseases gastroenteritis, diarrhea, vomiting, skin and kidney problem are spreading through polluted water. Human health is affected by the direct damage of plants and animal nutrition. Water pollutants are killing sea weeds,mollusks,marine birds, fishes, crustaceans

and other sea organisms that serve as food for human. Insecticides like DDT concentration is increasing in the food .

As India grows and urbanizes, its water bodies are getting toxic. It's estimated that around 70% of surface water in India is unfit for consumption. Every day, almost 40 million litres of wastewater enters rivers and other water bodies with only a tiny fraction adequately treated. A recent World Bank report suggests that such a release of pollution upstream lowers economic growth in downstream areas, reducing GDP growth in these regions by up to a third. To make it worse, in middle-income countries like India where water pollution is a bigger problem, the impact increases to a loss of almost half of GDP growth.

Cities in India rely on not just groundwater but also on rivers for the water supply. Delhi, for instance, gets its water supply from Yamuna, the Ganga Canal, the Bhakra canal and tubewells.But the Central Pollution Control Board in 2018 released an assessment that found 351 river stretches were polluted across India.In the assessment, Maharashtra tops the list with 53 polluted river stretches, followed by Assam, Madhya Pradesh and Gujarat. The board also found that the number of critically polluted stretches had increased from 34 in 2015 to 45 in 2018.

Objectives :-

Uncontaminated water is an essential element for human being and other organisms. The water is getting polluted day by day due to human activities. Pond,river and lake water is being use in domestic purposes like-washing clothes, utensils, bathing etc.thus polluting the lake,river and pond water.Unwanted waste from industries, factories are dumped in river and pond water.Sea and Ocean water also gets polluted when contaminated river water enters into seas and oceans. Different organism living in water bodies are affected due to the presence of harmful chemicals and substances in water.

The intake of contaminated water by human being and other organisms affects them, causing several diseases, which may ultimately lead to death.

This dissertation report highlights the following objectives based on which the overall survey of literature has been done to get a vivid idea of the causes and Impact of water pollution in India

(1)to collect wastewater from residences, industries, institutions, and so on.

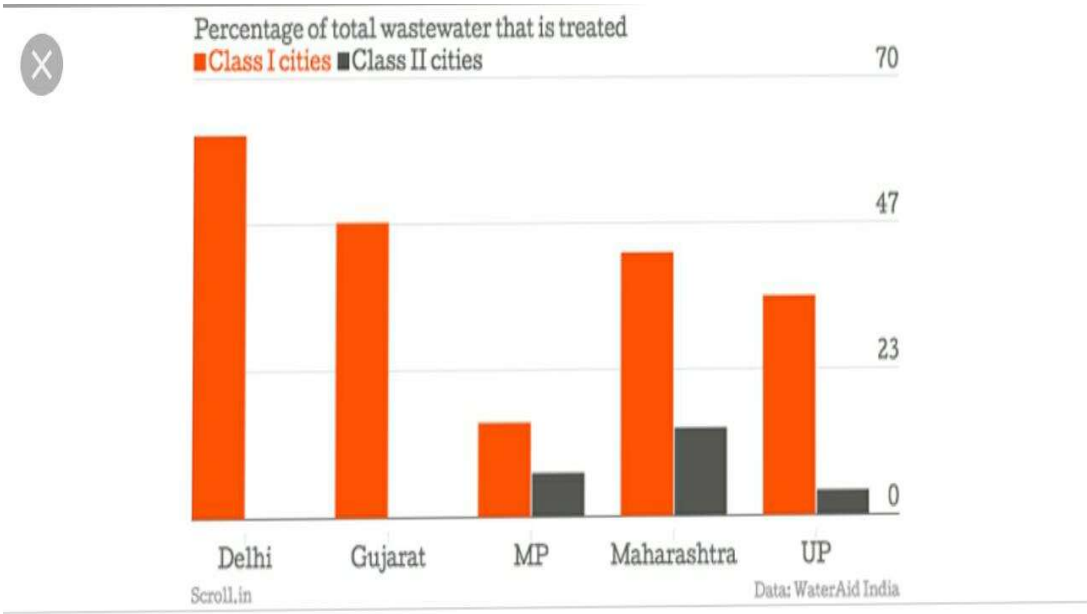
(2) to find a place to discharge the wastewate (usually the nearest water course is chosen, but wastewater could also be used for groundwater recharge or even recycled to water supply.

(3) to remove water polluants that would produce adverse impacts to the receiving water or adversely affect the health of people subsequently using the water .

(4)to do all the above in a cost - effective manner.

Indias most water polluted city:-

Coal -belching jharia in jharkhand continues to be the most water polluted citie in india, while delhi has made some marginal improvement in reducing air pollution, according to greenpeace India report released .Delhi is the 10th most polluted city in India It was at the 8th spot a year ago . jharkhand ‘s dhanbad known for its rich coal reserve and industries is the second most polluted city in india .According to the report based on analysis of pm 10 data from 287 cities across the country.



Major sources of water pollution and there impact :-

i. Domestic sewage

ii. Industrialization

iii. Population growth

iv. Pesticides and fertilizers

v. Plastics and polythene bags

vi. Urbanization

vii. Weak management system

Impact on water pollution due to domestic sewage :-

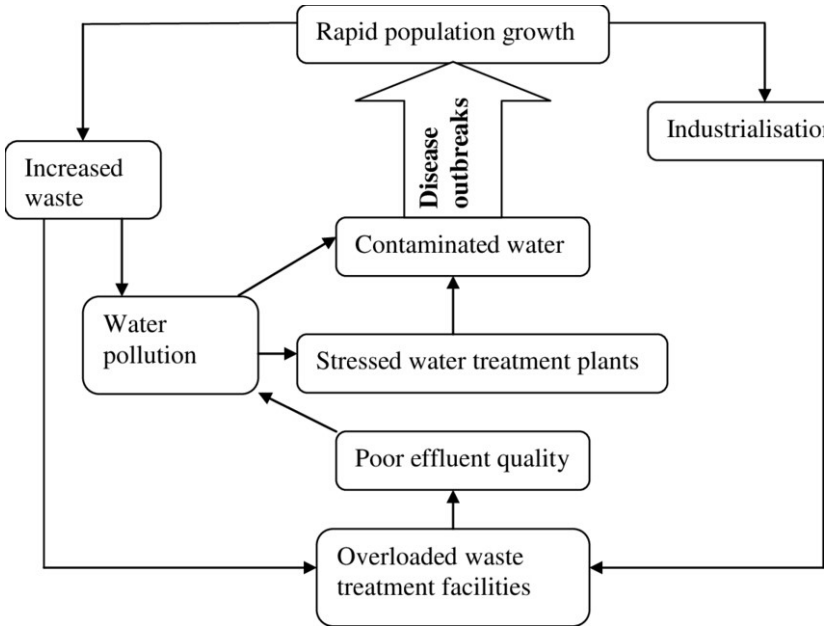
- It is reported that 75 to 80% water pollution is caused by the domestic sewage.
- Polluted river have intolerable smell and contains less flora and fauna. 80% of the world's population is facing threats to water security.
- Large amount of domestic sewage is drained in to river and most of the sewage is untreated.
- Domestic sewage contains toxicants, solid waste, plastic litters and bacterial contaminants and these toxic materials causes water pollution.

Impact on water pollution due to industrialization :-

- *Different* industrial effluent that is drained in to river without treatment is the major cause of water pollution .
- Hazardous material discharged from the industries is responsible for surface water and ground water contamination.
- Toxic metals enter in to water and reduced the quality of water .
- 25% pollution is caused by the industries .

Impact on water pollution due to population growth :-

- Increasing population is creating many issues but it also plays negative role in polluting the water .
- Increasing population leads to increase in solid waste generation .
- Solid and liquid waste is discharged in to rivers. Water is also contaminated by human excreta. In contaminated water, a large number of bacteria are also found which is harmful for human health .
- Government is incapable to supply essential needs to citizens because of increasing number of population. Sanitation facilities are more in urban areas than rural areas..



Impact on water pollution due to pesticides and fertilizers :-

- Pesticides are used to kill bacteria, pest and different germs. Chemical containing pesticides are directly polluting the water and affect the quality of water.
- If pesticides are excess in amount or poorly managed then it would be hazardous for agriculture ecosystem.
- Only 60% fertilizers are used in the soil other chemicals leached in to soils polluting the water, cyanobacteria are rich in polluted water and excess phosphate run off leads to eutrophication.
- Residues of chemicals mix with river water due to flooding, heavy rainfall, excess irrigation and enter in the food chain. These chemicals are lethal for living organisms and many vegetables and fruits are contaminated with these chemicals.
- Trace amounts of pharmaceutical in water also causes water pollution and it is dangerous to human health.

Impact on water pollution due to plastics and polythene bags :-

- most plastics are not biodegradable (they do not break down naturally in the environment), which means that things like plastic bottle tops can survive in the marine environment for a long time. (A plastic bottle can survive an estimated 450 years in the ocean and plastic fishing line can last up to 600 years.
- While plastics are not toxic in quite the same way as poisonous chemicals, they nevertheless present a major hazard to seabirds, fish, and other marine creatures. For example, plastic fishing lines and other debris can strangle or choke fish.
- The plastic and polythene bags doesn’t get damage so easily and since they are light in weight so they float on water and due to this it cause problems for the water animal .they pollute the water bodies and causes water pollution.

Impact on water pollution due to radioactive waste :-

- People view radioactive waste with great alarm—and for good reason. At high enough concentrations it can kill; in lower concentrations it can cause cancers and other illnesses. The biggest sources of radioactive pollution in Europe are two factories that reprocess waste fuel from nuclear power plants: Sellafield on the north-west coast of Britain and Cap La Hague on the north coast of France. Both discharge radioactive waste water into the sea, which ocean currents then carry around the world. Countries such as Norway, which lie downstream from Britain, receive significant doses of radioactive pollution from Sellafield. The Norwegian government has repeatedly complained that Sellafield has increased radiation levels along its coast by 6–10 times. Both the Irish and Norwegian governments continue to press for the plant's closure.

Impact on water pollution due to oil:-

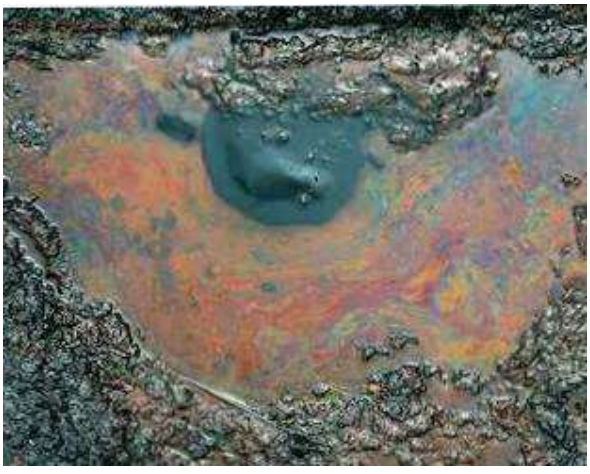
- When we think of ocean pollution, huge black oil slicks often spring to mind, yet these spectacular accidents represent only a tiny fraction of all the pollution entering our oceans. Even considering oil by itself, tanker spills are not as significant as they might seem: only 12 percent of the oil that enters the oceans comes from tanker accidents; over 70 percent of oil pollution at sea comes from routine shipping and from the oil people pour down drains on land.

Oil spilling in river and causing water pollution

Impact on water pollution due to chemicals waste :-

- Detergents are relatively mild substances. At the opposite end of the spectrum are highly toxic chemicals such as polychlorinated biphenyls (PCBs). They were once widely used to manufacture electronic circuit boards, but their harmful effects have now been recognized and their use is highly restricted in many countries.
- Another kind of toxic pollution comes from heavy metals, such as lead, cadmium, and mercury. Lead was once commonly used in gasoline (petrol), though its use is now restricted in some countries. Mercury and cadmium are still used in batteries (though some brands now use other metals instead). Until recently, a highly toxic chemical called tributyltin (TBT) was used in paints to protect boats from the ravaging effects of the oceans.

Toxic chemicals



Types of water pollution :-

- Surface Water Pollution

  Surface water pollution is the pollution of

  aquatic system that is above ground such as lakes, streams and rivers.

- Oxygen Depletion

  It is the phenomenon that occurs in aquatic

  environment as dissolved agent in water.

- Ground Water Pollution

  Ground water is one of the important sources

  of water for irrigation purpose. Groundwater

  contamination occurs when man-made products such as gasoline, oil, road salts and chemicals get into the groundwater and cause it to become unsafe and unfit for human use.

Effect of water pollution :-

1. Diseases: In humans, drinking or consuming polluted water in any way has many disastrous effects on our health. It causes typhoid, cholera, hepatitis and various other diseases.
2. Destruction of Ecosystems: Ecosystems are extremely dynamic and respond to even small changes in the environment. Water pollution can cause an entire ecosystem to collapse if left unchecked.
3. Eutrophication: Chemicals in a water body, encourage the growth of algae. These algae form a layer on top of the pond or lake. Bacteria feed on this algae and this decreases the amount of oxygen in the water body, severely affecting the aquatic life there.
4. Effects the food chain: Disruption in food chains happens when toxins and pollutants in the water are consumed by aquatic animals (fish, shellfish etc) which are then consumed by humans.

Table 20-1 Major Water Pollutants and Their Sources

Type/*Effects*	Examples	Major Sources
Infectious agents (pathogens) *Cause diseases*	Bacteria, viruses, protozoa, parasites	Human and animal wastes
Oxygen-demanding wastes *Deplete dissolved oxygen needed by aquatic species*	Biodegradable animal wastes and plant debris	Sewage, animal feedlots, food-processing facilities, paper mills
Plant nutrients *Cause excessive growth of algae and other species*	Nitrates (NO_3^-) and phosphates (PO_4^{3-})	Sewage, animal wastes, inorganic fertilizers
Organic chemicals *Add toxins to aquatic systems*	Oil, gasoline, plastics, pesticides, fertilizers, cleaning solvents	Industry, farms, households, mining sites, runoff from streets and parking lots
Inorganic chemicals *Add toxins to aquatic systems*	Acids, bases, salts, metal compounds	Industry, households, mining sites, runoff from streets and parking lots
Sediments *Disrupt photosynthesis, food webs, other processes*	Soil, silt	Land erosion from farms and construction and mining sites
Heavy metals *Cause cancer, disrupt immune and endocrine systems*	Lead, mercury, arsenic	Unlined landfills, household chemicals, mining refuse, industrial discharges
Thermal *Make some species vulnerable to disease*	Heat	Electric power and industrial plants

Pollution of water means rendering the water unfit for human consumption by

bringing changes in its natural quality. Water pollution can be defined in many ways.

Usually, it means one or more substances have built up in water to such an extent that they cause problems for animals or people.14 Pollutants in water include a wide spectrum of chemicals, pathogens and physical chemistry or sensory changes. Many of the chemical substances are toxic. Pathogens can produce waterborne diseases. Alteration of water's physical chemistry includes acidity, electrical conductivity, temperature and eutrophication. Human infectious diseases are among the most serious effects of water pollution.15. In India, every year, approximately 50,000 million liters of wastewater, both industrial and domestic, is generated in urban areas.

If the data of rural areas is also taken into account, the overall figure will be much higher.16 According to a United Nations report released on March 22, 2010 on World Water Day, 80 percent of urban waste in India ends up in the country's rivers, and unchecked urban growth

across the country combined with poor government oversight means the problem is only getting worse. A growing number of bodies of water in India are unfit for human use and in the River Ganga holy to the country's 82 percent Hindu majority, is dying slowly due to unchecked pollution.17 Water pollution is a major problem in India. Only about 10% of the waste water generated is treated; the rest is discharged as it is into our water bodies. Due to this, pollutants enter into groundwater, rivers and other water bodies.18 Contaminated water puts serious effect on human body. We can divide the causes of water pollution into two parts one is direct and the second is indirect.

Direct cause

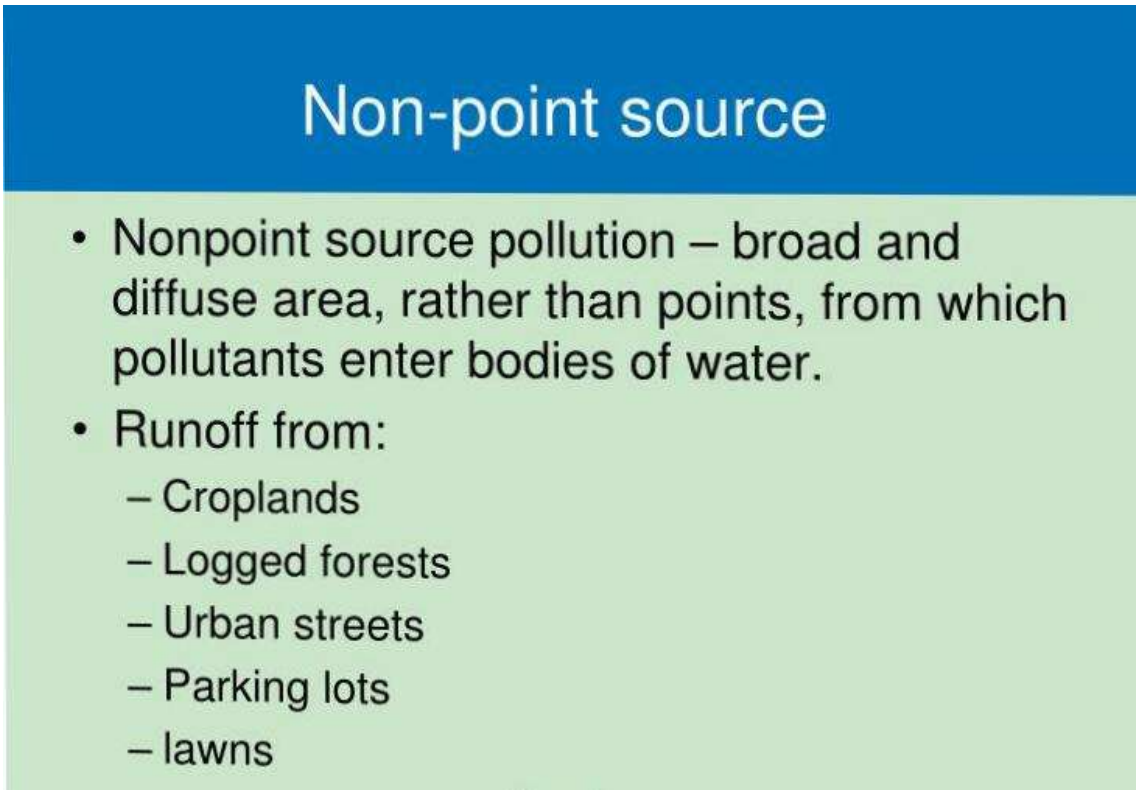
this category we can include those pollutants which directly enter into the water recourse and pollute it. In the industrial areas, industrial effluents are the main source of water pollution either surface water or ground water. There, industrial wastes are directly discharged into the waterways. Industries discharge a variety of pollutants in their wastewater including heavy metals, resin pellets, organic toxins, oils, nutrients, and solids. Discharges can also have thermal effects, especially those from power stations and these reduce the available oxygen. 20 City sewage is also the main cause of water pollution. Sewage is also known as wastewater which usually contains laundry waste, dishwashing waste, urine and faeces. Disposing these wastes is a big problem in the country today that is why the rivers and the lakes are the ones that suffer. Sewage water pollution can cause diarrhoea and such.21 In Punjab about 70 per cent of the water pollution is caused by sewage which not only pollutes drains and river water but also affects the ground water in towns and cities.

Indirect cause

The pollutants, when carried from a place to the water resources, can be called indirect causes. Rainfall or snowmelt picks up pollutants as it moves over land or through the ground and then deposits them in water sources.25 It is common for farmers to use fertilizers and other chemicals on their crops to help them grow. However, these chemicals and nutrients added to the soil can soak into the underground water supplies.

Point and non-point sources

There are also two different ways in which pollution can occur. If pollution comes from a single location, such as a discharge pipe attached to a factory, it is known as point-source pollution. Other examples of point source pollution include an oil spill from a tanker, a discharge from a smoke stack (factory chimney), or someone pouring oil from their car down a drain. A great deal of water pollution happens not from one single source but from many different scattered sources. This is called nonpoint-source pollution.



The Clean Water Act

In 1972, Congress passed the Clean Water Act to reduce water pollution. Various pieces of anti-pollution legislation have followed since that time and today the U.S. has relatively clean, safe drinking water compared with much of the world. However, water pollution is still a problem. In 2006, the Environmental News Service (ENS) reported that “more than 62 percent of industrial and municipal facilities across the country discharged more pollution into U.S. waterways than their Clean Water Act permits allowed between July 2003 and December 2004.

Prevention and control measures of water pollution :-

The best way to prevent large-scale water pollution is to try and reduce its harmful effects. There are various small changes we can make to protect ourselves from a scary future where water is scarce.

1. Save Water: Conserving water is our first aim. Water wastage is a major problem globally and we are only now waking up to the issue. Simply small changes you can make domestically will make a huge difference.
2. Better treatment of sewage: So treating waste products before disposing of it in a water body helps reduce water pollution on a large scale. Agriculture or other industries can reuse this wastewater by reducing its toxic contents.
3. Use environmentally friendly products: By using soluble products that do not go on to become pollutants, we can reduce the amount of water pollution caused by a household.

Some control measures :-

Waste water generated by household activity, industries or garbage landfills is called sewage which is classified as the municipal water pollution. Sewage contains solid matters in the form of suspended colloidal and dissolved organic matter, detergent, mineral matter, nutrients and gases. Sewage is one of the major causes of water borne diseases and therefore the treatment of sewage is one of the important tasks. For a long time treatment of municipal waste in the form of sewage Involved mainly of the removal of suspended solids,

oxygen demanding materials and harmful Bacteria. Now the disposal of the solid residue from sewage has been improved by applying municipal treatment processes.The treatment of this waste water is carried out in the following three stages:

1.Primary treatment

2. Secondary treatment,

3.tertiary treatment.

- Primary treatment :-

When the waste water is to be dumped off into a river or flowing steam, the treatment is carried out by sedimentation, coagulation and filtration. This is known as primary treatment.

- Secondary treatment :-

The water after primary treatment is not fit for drinking purposes and has to undergo further treatment. This is done through secondary or biological treatment. A commonly used method is to allow polluted water to spread over a large bed of stones and gravel so that the growth of different microorganisms needing nutrients and oxygen is encouraged.

- Tertiary treatment : tertiary treatment is actually disinfecting water. Chlorine is the most commonly used disinfectant used for killing bacteria. However, chlorine also reacts with traces of organic matter present in water and forms undesirable chlorinated hydrocarbons (toxic and potentially carcinogenic)

There is no easy way to solve water pollution; if there were, it wouldn't be so much of a problem. Broadly speaking, there are three different things that can help to tackle the problem—education, laws, and economics—and they work together as a team.

Education

Making people aware of the problem is the first step to solving it. In the early 1990s, when surfers in Britain grew tired of catching illnesses from water polluted with sewage, they formed a group called Surfers Against Sewage to force governments and water companies to clean up their act.

Laws

One of the biggest problems with water pollution is its transboundary nature. Many rivers cross countries, while seas span whole continents. Pollution discharged by factories in one country with poor environmental standards can cause problems in neighboring nations, even when they have tougher laws and higher standards. Environmental laws can make it tougher for people to pollute, but to be really effective they have to operate across national and international borders. This is why we have international laws governing the oceans, such as the 1982 UN Convention on the Law of the Sea (signed by over 120 nations),

Economics

Most environmental experts agree that the best way to tackle pollution is through something called the **polluter pays principle**. This means that whoever causes pollution should have to pay to clean it up, one way or another. Polluter pays can operate in all kinds of ways.

Conclusion :-

- Clearly, there is an urgent need to create awareness for pressing environmental problems and
  to develop solutions in close cooperation between science, governments, industry, and other
  relevant stakeholders.
  Water pollution is a global issue and world community is facing worst results of polluted water. Major sources of water pollution are discharge of domestic and agriculture wastes, population growth, excessive use of pesticides and fertilizers and urbanization. Bacterial, viral and parasitic diseases are spreading through polluted water and affecting human health. It is recommended that there should be proper waste disposal system and waste should be treated before entering in to river. Educational and awareness programs should be organized to control the pollution

- The present study finds that the right to access clean water is not specifically guaranteed either by the constitution of India or by any other Acts. Duty is imposed on the state to provide clean water and prevent and control the water pollution. The present study reveals that Water pollution is a major issue in India. The power of the Supreme Court under Article 32 is not only injunctive in ambit that is preventing the infringement of fundamental rights, but it is also remedial in scope and provides relief against a breach of the fundamental rights already committed.39 This paper unravel that the waste water treatment plants in India are not adequate. Efforts are being made. To save aquatic life in the Ganga and to effectively treat waste water, two pilot projects have been initiated by WWF in the city.40 The study stresses to

establish sewage treatment plant in every urban settlement. Preferably the sanction to the urban settlement should be given only after the establishment of the sewage plant. In India there is lack of clean drinking water and sanitation. Level of ground water is reducing. There is need of an effective water policy. The first policy was adopted by National Water Resources Council in 1987. This was revised and updated in April 2002. Government, NGO‟s and educated people should have done efforts to aware the people about the water pollution and its effects. The NGO Green Earth organized competitions Programme, poster making, slogan writing and an environment quiz for creating awareness about the environment, health and sanitation at Brahm Sarovar of Kurukshetra.42 Such type of activities should be done on war footing. The study stresses to establish the separate environmental courts in each state to reduce the burden of the judiciary and to implement the recommendations of the 186th Report of India’s Law Commission.

Reference :-

- https://www.alliedacademies.org/articles/water-pollution-and-human-health-7925.html
- https://www.explainthatstuff.com/waterpollution.html
- https://www.toppr.com/guides/biology/natural-resources/water-and-water-pollution/
- https://www.intechopen.com/books/water-challenges-of-an-urbanizing-world/water-pollution-effects-prevention-and-climatic-impact
- https://www.safewater.org/fact-sheets-1/2017/1/23/water-pollution
- https://www.nrdc.org/stories/water-pollution-everything-you-need-know

...Thank you...