

WATER POLLUTION IN INDIA AT A GLANCE



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CERTIFICATE

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Place: Purba Bardhaman

Date: 19. 07.2021



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(Dr. Irani Biswas)

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Place: Purba Bardhaman

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(Shruti Sadhu)

Sem-VI (Gen)

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INTRODUCTION

India is one of the World's most polluted country. Water Pollution is a major environmental issue in India. Around 80% of India's water is severely polluted because people dump raw sewage, silt and garbage into the country's river and lakes. Other sources of pollution include agriculture runoff and unregulated small-scale industry. Most river, lakes surface water in India are polluted due to industries, untreated sewage and solid wastes. This has led to water being undrinkable and the population having to rely on illegal and expensive sources. Many Indian children die from Diarrhea. 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. Geo-genic contaminants, including salinity, iron, fluoride, and arsenic have affected groundwater in over 200 districts spread across 19 states.

Water Pollution is a major global problem. It requires ongoing evaluation and revision of water resources policy at all the levels (international down to individual aquifers and wells). It has been suggested that water pollution is the leading worldwide cause of death and diseases. Water Pollution accounted for the deaths of 1.8 million people in 2015. The Organization Global Oceanic Environmental Survey (GOES) consider water pollution as one of the main Environmental problems that can present a danger for the existence of life on Earth in the next decades. One of the main concern is that water pollution hampers phytoplankton who produce 70% of Oxygen and remove a large part of Carbon dioxide from Earth.

Water Pollution occurs when unwanted materials enter into water, changes the quality of water and harmful to Environmental and human health. Water is an important natural resources used for drinking and other developmental purpose in our lives. Safe drinking water is necessary for human health all over the world. Being a universal solvent, water is a major sources 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.

Due to historical, geographical, religious, political, and sociocultural reasons, India has a unique place in the world. Pollution-causing activities have caused severe changes in aquatic environments over the last few decades. Serious questions have been raised in context to the safe use of river water for drinking and other purposes in recent times. Numerous contaminants are playing a major role in polluting the river water. It is one of the main concerns for most of the metropolitan cities of developing nations. Rivers play a vital role in shaping up the natural, cultural, and economic aspects of any country. The Yamuna river is one such river and it provides sustenance to ecology and is therefore considered holy by the people of India. It is a tributary of the river Ganges in India. Two of them together have had substantial importance in shaping up the history and geography of our country. It passes through several states such as Uttar Pradesh, Himachal Pradesh, Uttarakhand, Haryana, and Delhi. It has a length of approximately 1,380 km. More than 600 lakh people are dependent on their living and income on this river (Census Reports of India 2001, 1971–1991).

This paper mainly attempt to provide a basic concept of the types, sources and effects of water pollution in general with a short glimpses of the recent status of water pollution in India and finally the preventive measures taken so far to check its detrimental impact for the days ahead.



OBJECTIVES

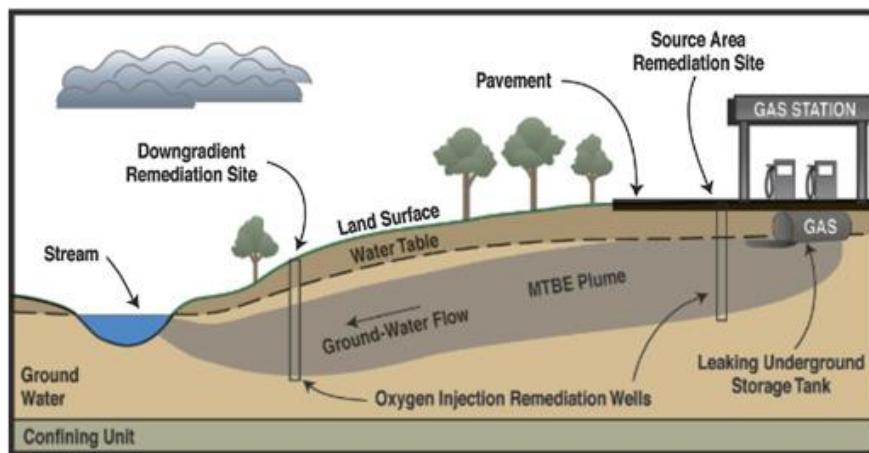
- To analyse the types, causes and effect of water pollution in general.
- To understand the extent of water pollution in the surroundings.
- To give an idea of the pollution preventive measures to the society.
- To create general awareness regarding water pollution issues and ways to recover and restore water quality at its best through enacted laws and rules framed by the Government.
- To promote research activities in developing easier and cost effective water quality checking methods primarily at domestic level.
- To provide information of the present scenario of water pollution in India in a nut shell in order to provoke awareness to act wisely to check its further deterioration and conserve water at its best.

TYPES OF WATER POLLUTION

Mainly Five Types of Water Pollution can be identified:

1. Surface Water Pollution

Surface water pollution includes pollution of rivers, oceans. It is often caused by nutrients, pathogens, plastics and chemicals such as antibiotics, heavy metals and pesticides. These pollutants have different Environmental effects. Excess nutrients, for instance may result in harmful algal blooms and hypoxia both in rivers and in coastal seas.



Surface water pollution

Surface Water pollution is almost entirely the result of human activities. Agriculture, mining, factory effluent, landfills, human/animal waste and localized pollution are just some of the most common sources of surface water pollution.

The major sources of surface water pollution are

- Sewage from household.
- Waste water from the industry.
- Nitrate and fertilizers from fields and pastures.

2. Marine Pollution

One common path of entry by contaminants to the sea are rivers. An example is directly discharging sewage and industrial waste into the ocean. Pollution such as this occurs particularly in developing nations.



Marine Pollution

Large gyres (vortexes) in the oceans trap floating plastic debris. Plastic debris can absorb toxic chemicals from ocean pollution, potentially poisoning any creature that eats it. Many of these long-lasting pieces end up in the stomachs of marine birds and animals. This results in obstruction of digestive pathways, which leads to reduced appetite or even starvation.

3. Groundwater 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.

Interactions between groundwater and surface water are complex. By its very nature groundwater aquifers are susceptible to contamination from sources that may not directly affect surface water bodies. Analysis of groundwater contamination may focus on soil characteristics and site geology, hydrogeology, hydrology and the nature of the contaminants.

Causes of groundwater pollution include-- naturally-occurring (geogenic) on-site sanitation systems, sewage, fertilizers and pesticide, commercial and industrial leaks, hydraulic fracturing, landfill leachate.

4. Microbiological Pollution

Microbiological water pollution is usually a natural form of water pollution caused by microorganisms. Different types of microorganisms such as bacteria, viruses and protozoa live in water and cause fish, land animals and humans to become ill. Serious diseases such as cholera is caused from microorganisms that lives in water. These diseases usually affects health of people in poorer countries as they do not have the facilities to treat polluted water.

Generally speaking contamination occurs if any part of a system, product or medicine gets in touch with the microbiological pathogens where it should be sterile. For example if a surgical instrument is contaminated with pathogens then the result might be a surgical wound infection. Contamination in infusion settings may occur when pathogens are carried inside of the infusion system, mostly happening during manipulation .

5. Macroscopic pollution

Large visible items polluting the water – may be termed "floatables" in an urban storm water context, or marine debris when found on the open seas, and can include such items as:

- Trash or garbage (e.g. paper, plastic, or food waste) discarded by people on the ground, along with accidental or intentional dumping of rubbish, that are washed by rainfall into storm drains and eventually discharged into surface waters.
- Nurdles, small ubiquitous waterborne plastic pellets.
- Shipwrecks, large derelict ships.

CATEGORIES OF POLLUTION SOURCES

Sources of water pollution are generally grouped into three categories based on their origin.

Point Sources

Point sources water pollution refers to contamination that enter a waterway from a single, specific and identifiable sources such as a pipe or ditch, discharges from a sewage treatment plant, a factory, or a city storm drain.

Non-point sources

Non point source pollution refers to diffuse contamination that does not originate from a single discrete source. This type of pollution is often the cumulative effect of small amounts of contaminants gathered from a large area. A common example is the leaching out of nitrogen compounds from fertilized agricultural lands, nutrient runoff in storm water from “ sheet flow” over an agricultural field or a forest .

Atmospheric deposition

Contaminants carried by air currents and precipitated into watersheds or directly onto surface waters.

CAUSES OF WATER POLLUTION

- **DOMESTIC SEWAGE AND WASTEWATER**

Inadequate sewage collection and treatment are sources of water pollution. It is reported that 75 to 80% water pollution is caused by the domestic sewage and wastewater goes back in the environment without being treated or reused. 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 . Domestic sewage contains toxicants, solid waste, plastic litters and bacterial contaminants and these toxic materials causes water pollution.

- ***INDUSTRIAL EFFLUENTS***

Industries produce a lot of waste containing toxic chemicals and pollutants. A huge amount of the industrial waste is drained in the fresh water which then flows into canals, rivers and eventually in the sea. Another source of water pollution is the burning of fossil fuels, causing air pollution like acid rain which then flows to streams, lakes, and other stretches of water. Hazardous material discharged from the industries is responsible for surface water and ground water.25% pollution is caused by the industries and is more harmful .

- **AGRICULTURAL EFFLUENTS**

Agriculture has an impact on water pollution due to the use of chemicals such as fertilizers, pesticides, fungicides, herbicides or insecticides running off in the water, as well as livestock excrement, manure and methane (greenhouse effect). Pesticides used to kill bacteria, pest and different germs in agricultural fields contain chemicals which directly pollute 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 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.

- **MARINE DUMPING**

Everyday, garbage such as plastic, paper, aluminum, food, glass, or rubber are deposited into the sea. These items take weeks to hundreds of years to decompose, and thus they are a major cause for water pollution. Regarding aquaculture, pollution is directly in the water, as excess food and fertilizers are causing dystrophication.

- **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.

The rising number of industries in India contribute heavily to water pollution as industrial waste is most often untreated. The industries with the heaviest impact on water bodies are thermal power plants, engineering industries, paper mills, steel plants and textile industries.

- **PLASTICS**

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.

- **PATHOGEN**

Disease-causing microorganisms are referred to as pathogens. Pathogens can produce waterborne diseases in either human or animal hosts. Coliform bacteria, which are not an actual cause of disease, are commonly used as a bacterial indicator of water pollution. Other microorganisms sometimes found in contaminated surface waters that have caused human health problems include: Burkholderia pseudomallei, Cryptosporidium parvum , Giardia lamblia , Salmonella, Norovirus and other viruses/

- **TOXIC WASTES**

Waste is considered toxic if it is poisonous, radioactive, explosive, carcinogenic (causing cancer), mutagenic (causing damage to chromosomes), teratogenic (causing birth defects), or bioaccumulative (that is, increasing in concentration at the higher ends of food chains). Sources of toxic chemicals include improperly disposed wastewater from industrial plants and chemical process facilities (lead, mercury, chromium) as well as surface runoff containing pesticides used on agricultural areas and suburban lawns (chlordane, dieldrin, heptachlor).

- **SEDIMENTS**

Sediment (e.g., silt) resulting from soil erosion can be carried into water bodies by surface runoff. Suspended sediment interferes with the penetration of sunlight and upsets the ecological balance of a body of water. Also, it can disrupt the reproductive cycles of fish and other forms of life, and when it settles out of suspension it can smother bottom-dwelling organisms.

- **THERMAL POLLUTION**

Thermal pollution is the rise or fall in the temperature of a natural body of water caused by human influence. Thermal pollution, unlike chemical pollution, results in a change in the physical properties of water. A common cause of thermal pollution is the use of water as a coolant by power plants and industrial manufacturers. Valuable species of game fish (e.g., trout) cannot survive in water with very low levels of dissolved oxygen. A major source of heat is the practice of discharging cooling water from power plants into rivers; the discharged water may be as much as 15 °C (27 °F) warmer than the naturally occurring water. Elevated water temperatures decrease oxygen levels, which can kill fish and alter food chain composition, reduce species biodiversity, and foster invasion by new thermophilic species. Urban runoff may also elevate temperature in surface waters.

Thermal pollution can also be caused by the release of very cold water from the base of reservoirs into warmer rivers.

- **PETROLEUM OIL SPILLS**

Petroleum (oil) pollution occurs when oil from roads and parking lots is carried in surface runoff into water bodies. Accidental oil spills are also a source of oil pollution—as in the devastating spills from the tanker Exxon Valdez (which released more than 260,000 barrels in Alaska’s Prince William Sound in 1989) and from the Deepwater Horizon oil rig (which released more than 4 million barrels of oil into the Gulf of Mexico in 2010). Oil slicks eventually move toward shore, harming aquatic life and damaging recreation areas.

- **RADIOACTIVE WASTES**

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.

- **CHEMICAL WASTES**

Detergents are relatively mild substances. Toxic chemicals such as **polychlorinated biphenyls (PCBs)**, were once widely used to manufacture electronic circuit boards, but their harmful effects have now been recognized and their use is highly restricted. Acidity caused by industrial discharges (especially sulfur dioxide from power plants), ammonia from food processing waste, petroleum hydrocarbons, including fuels (gasoline, diesel fuel, jet fuels, and fuel oil) lubricants (motor oil), and

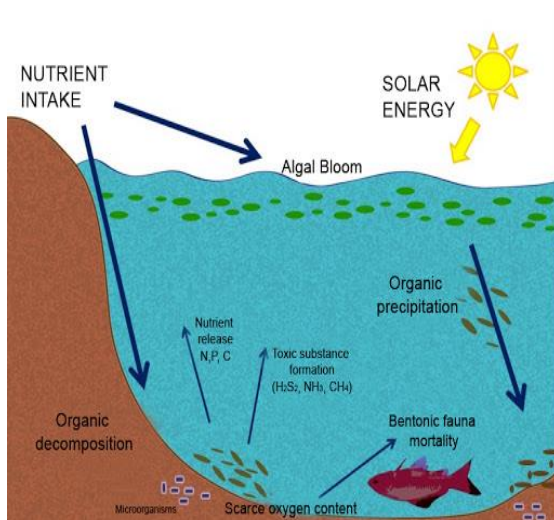
Table 20-1 Major Water Pollutants and Their Sources

Type/Effects	Examples	Major Sources
Infectious agents (pathogens) <i>Cause diseases</i>	Bacteria, viruses, protozoa, parasites	Human and animal wastes
Oxygen-demanding wastes <i>Deplete dissolved oxygen needed by aquatic species</i>	Biodegradable animal wastes and plant debris	Sewage, animal feedlots, food-processing facilities, paper mills
Plant nutrients <i>Cause excessive growth of algae and other species</i>	Nitrates (NO ₃ ⁻) and phosphates (PO ₄ ³⁻)	Sewage, animal wastes, inorganic fertilizers
Organic chemicals <i>Add toxins to aquatic systems</i>	Oil, gasoline, plastics, pesticides, fertilizers, cleaning solvents	Industry, farms, households, mining sites, runoff from streets and parking lots
Inorganic chemicals <i>Add toxins to aquatic systems</i>	Acids, bases, salts, metal compounds	Industry, households, mining sites, runoff from streets and parking lots
Sediments <i>Disrupt photosynthesis, food webs, other processes</i>	Soil, silt	Land erosion from farms and construction and mining sites
Heavy metals <i>Cause cancer, disrupt immune and endocrine systems</i>	Lead, mercury, arsenic	Unlined landfills, household chemicals, mining refuse, industrial discharges
Thermal <i>Make some species vulnerable to disease</i>	Heat	Electric power and industrial plants

fuel combustion byproducts, from storm water runoff etc. Another kind of toxic pollution comes from **heavy metals**, such as lead, cadmium, and mercury.

EFFECTS 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. 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.
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. When there is an excess of chemical nutrients mainly nitrates and phosphates in the water, it leads to eutrophication or nutrient pollution. Eutrophication decreases the level of Oxygen, reduces the quality of water, makes the water inhabitable for fish, affects the breeding process within the marine life and increases the primary productivity of the marine ecosystem.

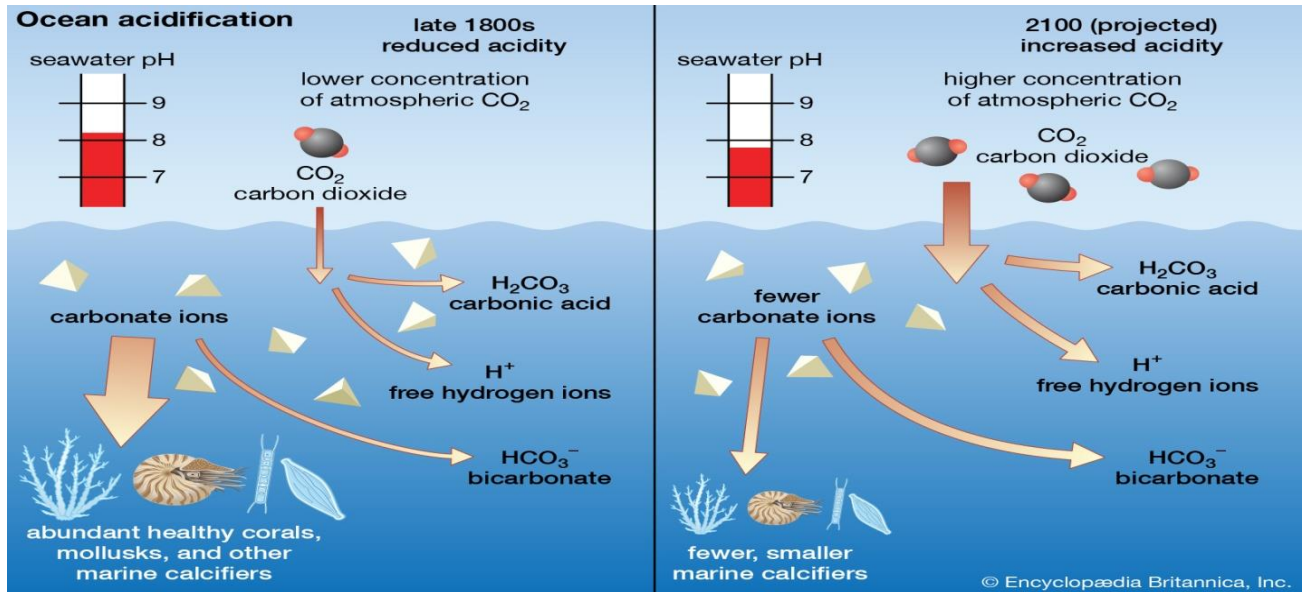


Eutrophication



Effect of Eutrophication

4. **Acidification** : Oceans act as a natural reservoir for absorbing the carbon dioxide from the Earth's atmosphere. But due to rising level of carbon dioxide in the atmosphere, the oceans across the world are becoming acidic in nature, as a consequence, it leads to acidification of oceans. Researches and scientists have not been able to uncover the potential damage ocean acidification may have on the Earth's atmosphere. But there is a strong concern that acidification might lead to dissolution of Calcium Carbonate structures, that can affect the shell formation in shellfish and also the corals.



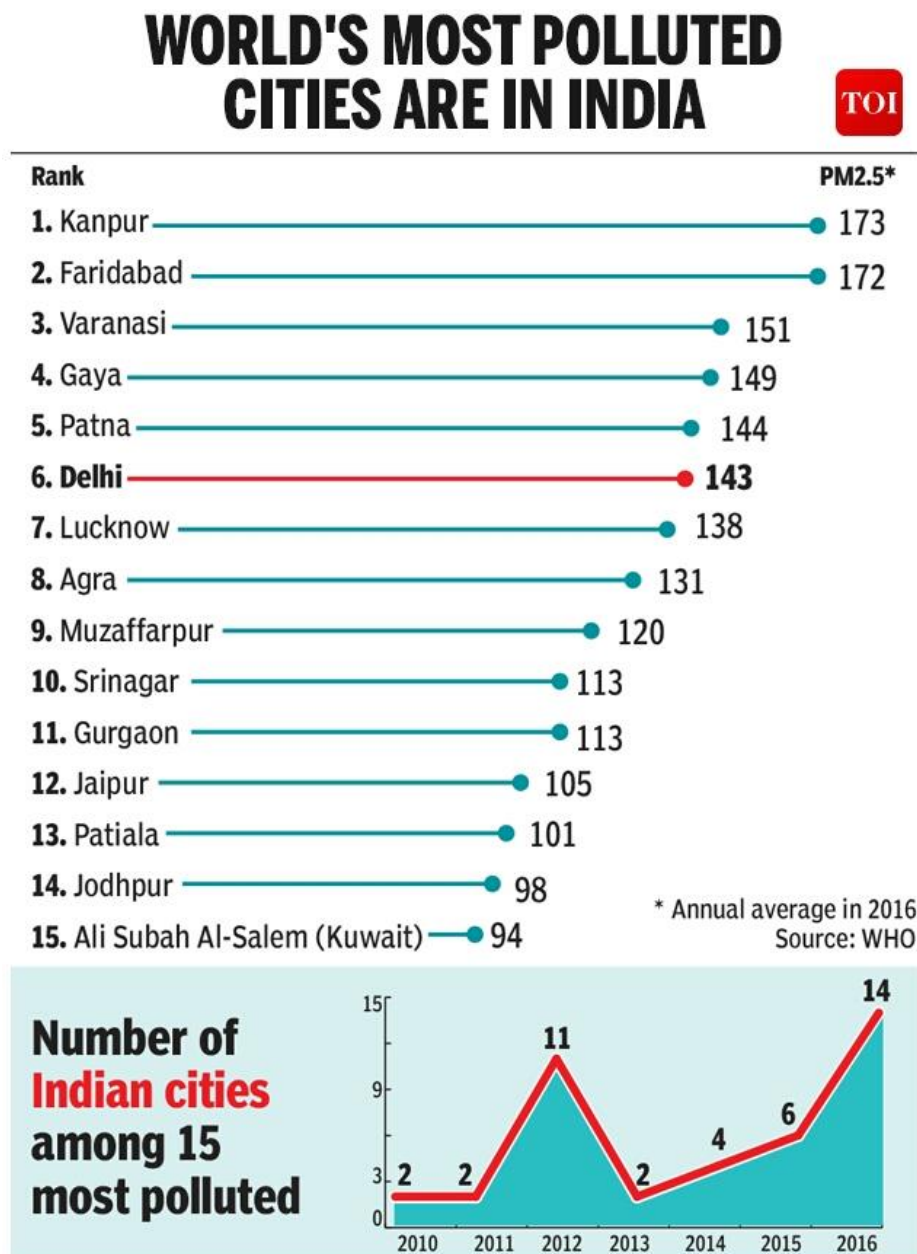
5. Effect of toxins

There are persistent toxins that do not get dissolved or disintegrate with the marine ecosystem rapidly. Toxins such as pesticides, DDT, PCBs, furans, TBT, radioactive waste, phenols, and dioxins get accumulated in the tissue cells of the marine life forms and lead to bioaccumulation, hampering their life and sometimes leads to a mutation in aquatic life forms.

PRESENT SCENARIO OF WATER POLLUTION IN INDIA

1. Most water polluted cities in India :-

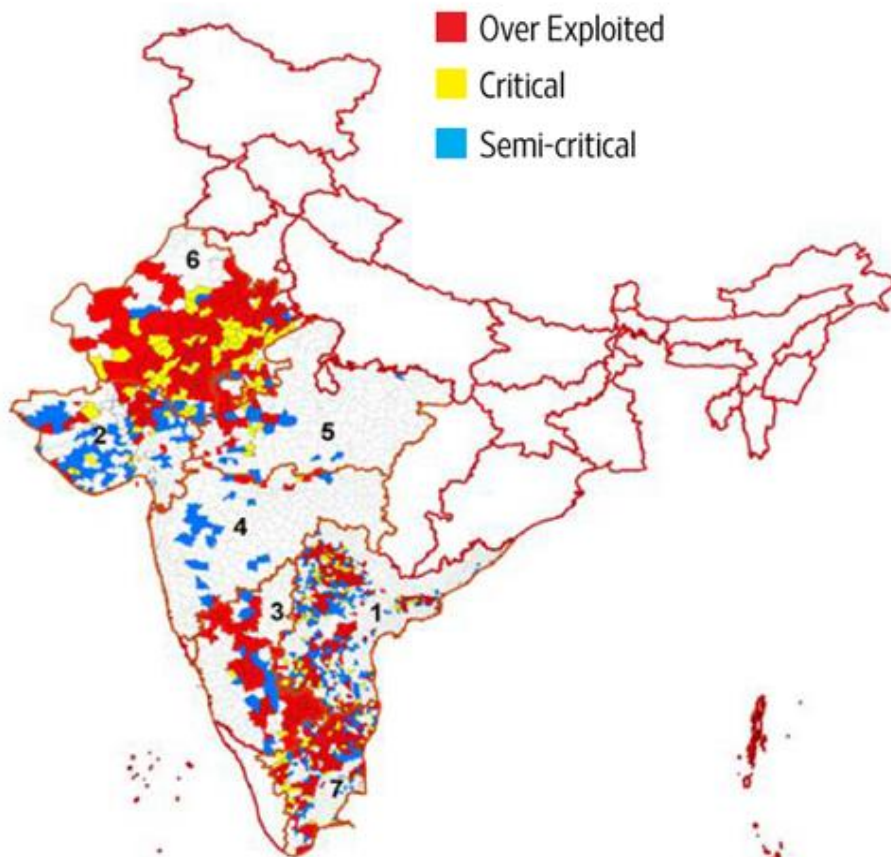
According to 2020 report, Jharkhand in the most water polluted state in India. Delhi has made marginal improvement. Delhi is 10th largest water polluted city in India.



2. Present scenario of ground water pollution in India:

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. Geo-genic contaminants, including salinity, iron, fluoride, and arsenic have affected groundwater in over 200 districts spread across 19 states.

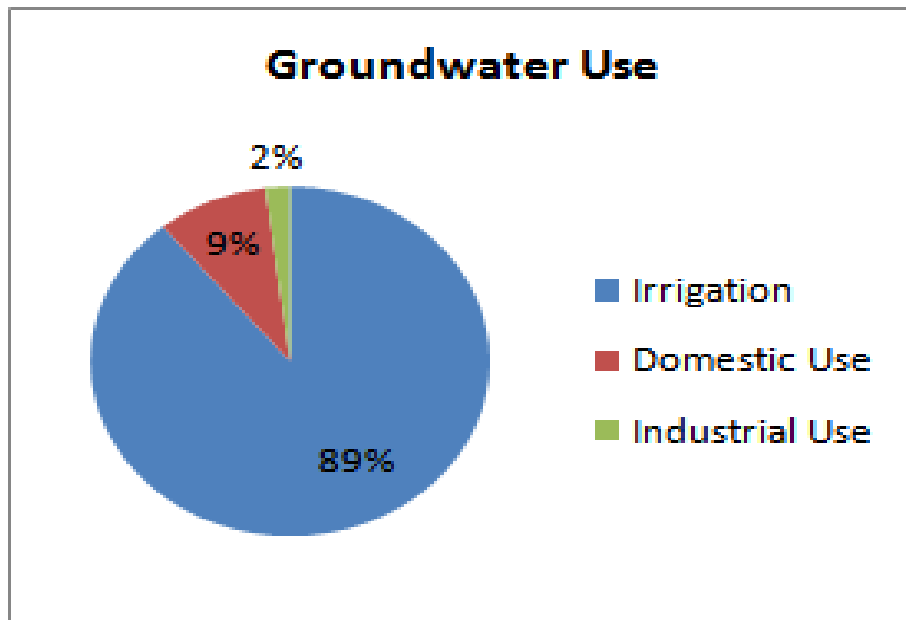
GROUND WATER STRESSED BLOCKS OF INDIA



1: Andhra Pradesh, 2: Gujarat, 3: Karnatka, 4: Maharashtra,
5: Madhya Pradesh, 6: Rajasthan and 7: Tamil Nadu

Source: IWMI

A PIE CHART DEPICTING THE RATE OF USE OF GROUND WATER IN VARIOUS PURPOSES



3. Pollution of the main waterbodies:

Rivers play a vital role in shaping up the natural, cultural, and economic aspects of any country. The Yamuna river is one such river and it provides sustenance to ecology and is therefore considered holy by the people of India. It derives from the glacier called Yamunotri in the Himalayan ranges. States through which the Yamuna river flows are the Uttarakhand, Himachal Pradesh, Uttar Pradesh, Haryana, and Delhi. The Yamuna river is also divided into several tributaries such as the Hindon, Tons, Giri, Rishiganga, Hanuman Ganga, Sasur Khaderi, Chambal, Betwa, Ken, Sindh, and Baghain as it is flowing through several cities. These cities are the Yamuna Nagar, Delhi, Faridabad, Mathura, Agra, Etawah, and Prayagraj. It is a tributary of the river Ganges in India. Two of them together have had substantial importance in shaping up the history and geography of our country. It passes through several states such as Uttar Pradesh, Himachal Pradesh, Uttarakhand, Haryana, and Delhi. It has a length of approximately 1,380 km. More than 600 lakh people are dependent on their living and income on this river (Census Reports of India 2001, 1971–1991). A) **The Ganges**



The ghats of river Ganges are polluted.

More than 500 million people live along the Ganges River. An estimated 2,000,000 persons ritually bath daily in the river, which is considered holy by Hindus. Ganges river pollution is a major health risk.

NRGBA was established by the Central Government of India, on 20 February 2009 under Section 3(3) of the Environment Protection Act, 1986. It also declared Ganges as the "National River" of India. The chair includes the Prime Minister of India and Chief ministers of states through which the Ganges flows.

B) The Yamuna



By an estimate by 2012, Delhi's sacred Yamuna river contained 7,500 coliform bacteria per 100cc of water. A number of NGOs, pressure groups, eco-clubs, as well as citizens' movements, have been active in their task to clean the river.

Even though India revised its National Water Policy in 2002 to encourage community participation and decentralize water management, the country's complex bureaucracy ensures that it remains a "mere statement of intent." Responsibility for managing water issues is fragmented among a dozen different ministries and departments without any coordination. The government bureaucracy and state-run project department has failed to solve the problem, despite having spent many years and \$140 million on this project.

C) Other polluted rivers worth mentioning are :

- Buddha Nullah, a seasonal water stream, which runs through the Malwa region
- The Mithi River, which flows through the city of Mumbai, is heavily polluted.
- The Oshiwara River is severely polluted with solid and liquid waste generated by Mumbai.
- Mithi River pollution
- Mula River pollution
- Gomti River pollution
- Vrishabhavathi River pollution

WASTE WATER TREATMENT

The treatment of the 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 stream, 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)

PREVENTION AND CONTROL MEASURES

I Preventive measures:

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.
4. **Keep pet litter and debris out of street gutters.**
5. **Use pesticides sparingly and use compost as fertilizers.**
6. **Use detergents with less phosphate.**
7. **Wastewater treatment**
Wastewater treatment consists of removing pollutants from wastewater through a physical, chemical or biological process. The more efficient these processes are, the cleaner the water becomes.
8. **Green agriculture**
Globally, agriculture accounts for 70% of water resources, so it is essential to have climate-friendly crops, efficient irrigation that reduces the need for water and energy-efficient food production. Green agriculture is also crucial to limit the chemicals that enter the water.
9. **Storm water management**
Stormwater management is the effort to reduce runoff of rainwater or melted snow into streets, lawns and other sites and the improvement of water quality” according to the US Environmental Protection Agency (EPA). It is important to avoid pollutants from contaminating the water and helps to use water more efficiently.
10. **Air pollution prevention**
Air pollution has a direct impact on water contamination as 25% of human induced CO2 emissions are absorbed by oceans. This pollution causes a rapid acidification of our oceans, and threatens marine life and corals. Preventing air pollution is the best way to prevent this from happening.

11. Plastic waste reduction

80% of plastic in our oceans is from land sources. In order to reduce the amount of plastic entering our ocean, we need to both reduce our use of plastic globally, and to improve plastic waste management.

12. Water conservation

Without water conservation, we won't go very far. It is central in making sure the world has better access to clean water. It means being aware that **water is a scarce resource**, taking care of it accordingly, and managing it responsibly.

II. Control measures:

- 1. To remove heat from wastewater generated by power plants or manufacturing plants** the following technologies are used:
 - a) cooling ponds, man-made bodies of water designed for cooling by evaporation, convection, and radiation
 - b) cooling towers, which transfer waste heat to the atmosphere through evaporation or heat transfer.
 - c) cogeneration, a process where waste heat is recycled for domestic or industrial heating purposes.
- 2. Toxic material like paints, cleaning supplies, and stain removers need to be disposed off in the right way.**
- 3. Purification of drinking water to enhance quality.**
- 4. The polluter pays principle** (means that whoever causes pollution should have to pay to clean it up) is designed to deter people from polluting by making it less expensive for them to behave in an environmentally responsible way.
- 5. Government of India enacted the Water (Prevention and Control of Pollution) Act 1974 to maintain wholesomeness of aquatic resources.** The act prescribes various functions for the Central Pollution Control Board (CPCB) at the apex level and State Pollution Control Boards at the state level.
- 6. The Federal Water Pollution Control Act** of 1948 was the first major U.S. law to address water pollution. Growing public awareness and concern for controlling water pollution led to sweeping amendments in **1972**.
- 7. Water Act 1974** aims to **prevent and control water pollution**. Under Water Act, 1974, **pollution control** boards were created, who are responsible for implementation of its provisions.

CONCLUSION

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

We can take individual action to help reduce water pollution, for example, by using environmentally friendly detergents, reducing pesticides, not pouring paints, solvents, oil, antifreeze, or other products containing harmful chemicals down the drain or onto the ground and so on.

Most effective way to attain the goal of having clean water is to value self-discipline in each individual in disposing all kinds of waste.

While effective wastewater treatment has the tendency of salvaging the water environment, **integration of environmental policies coupled with continuous periodical enlightenment on the present and future consequences of water pollution will greatly assist in conserving the water environment.**

Last but not the least, practice four R's of resource use –Refuse, reduce, recycle and reuse in order to obtain better result to check water pollution.

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