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JUI MANDAL

INTRODUCTION

Water pollution is a broad term that describes any kind of contamination of bodies of water such as rivers, lakes or wetlands with substances that can pose threats to human health or the natural environment.

Such pollution is a major source of death and disease worldwide, especially in developing nations. Even in wealthier nations where piped water supplies mean that water pollution poses fewer direct threats to human health, many lakes and rivers are polluted.

Pollution can come from a wide variety of sources and these sources are often categorized as either point source or nonpoint source. Point source pollution has single identifiable source, whether it is a wastewater pipe or a ship dumping waste. Nonpoint source pollution comes from water runoff picking scattered pollutants off the ground.

Examples of water pollution include: chemical or oil spills , industrial waste, fertilizers and pesticides, that run off agricultural land into rivers; sewage that enters rivers and seas,

These combined forms of water pollution pose grave threats to human health. A 2010 report by the UN Environment Program said that more people now die from contaminated and polluted water than from all forms of violence including wars.

1. **DEFINITION :**
   Water pollution is defined as the presence in groundwater of toxic chemicals and biological agents that exceed what is naturally found in the water and may pose a threat to human health and/or the environment. Additionally, water pollution may consist of chemicals introduced into the water bodies as a result of various human activities. Any amount of those chemicals pollutes the water, regardless of the harm they may pose to human health and the environment.

- **Pollutant:**
  We may think water pollution is a problem… somewhere else. But while most Americans have access to safe drinking water,

potentially harmful contaminants—from arsenic to copper to lead—have still been found in the tap water of every single state in every nation. With a growing list of ways our water can be contaminated, it's smart to stay educated in order to protect and prevent. Here are five main types of water pollutants:

1. **MICROBIAL**
2. **ORGANIC MATERIAL**
3. **INORGANIC MATERIAL**
4. **MACROSCOPIC**
5. **THERMAL**

- **MICROBIAL**

Pathogens can be bacteria, protozoa or viruses. Bacteria, for example, are commonly found in water. However, when they start to increase above safe levels, water contamination occurs. Some examples of microorganisms found in water that cause diseases are Salmonella, Giardia lamlia, Norovirus, Cryptosporidium parvum, and E. coli. High levels of pathogens may result from on-site sanitation systems or inadequately treated sewage discharges. Older cities with aging infrastructure may have leaky sewage collection systems, which can cause sanitary sewer overflows. Pathogen discharges may also be caused by poorly managed livestock operations. The presence of E. coli bacteria usually indicates that water has been contaminated with human or animal waste.

- **ORGANIC MATERIAL**

Organic materials are things like petroleum, insecticides and herbicides, detergents, disinfecting cleaners, and prescription

drugs. One of the most frequently detected highly toxic organic chemicals is methyl tert-butyl ether (MTBE). MTBE was formerly used as an air-cleaning gas additive. Although it is now a banned chemical, it will take years before it is thoroughly removed from contaminated water systems. Water contaminated with this organic chemical can cause leukemia, lymphoma and tumors in the testicles, thyroid glands and kidneys.

- **INORGANIC MATERIAL:**

Inorganic materials include things like ammonia, chemical waste, fertilizers, and heavy metals. Heavy metals like arsenic, mercury, copper, chromium, zinc and barium — though harmless in very small amounts, act as pollutants when they end up concentrated in water. This can be due to leaching from waste disposal, increased human activity or industrial accidents. This kind of water pollution, especially in higher concentrations, can cause severe health problems in humans and other organisms, including death.

- **MACROSCOPIC:**

Macroscopic pollutants are large, visible items in waterways or bodies of water. Trash, either intentionally dumped into bodies of water, or discarded on the ground and washed by rainfall into storm drains, are eventually discharged into waterways. This has led to the formation of the "great Pacific garbage patch," which is now the size of France. Other types of macroscopic pollution include nurdles (small plastic pellets), pieces of wood, and metal. Though it may seem easy enough to manage, time is of the essence. These larger pollutants must be removed in order to avoid disruption of aquatic ecosystems and contamination upon the chemical breakdown of these objects.

- **THERMAL**

Thermal pollution is the rise or fall in the temperature of a natural body of water caused by human influence. A common cause of thermal pollution

is the use of water as a coolant by power plants and industrial manufacturers. It can also be caused by the release of very cold water from the base of reservoirs into warmer rivers. Elevated water temperatures decrease oxygen levels, which can kill fish and alter food chain composition, and reduce species biodiversity. Urban runoff may also elevate temperature in surface waters.

1. CAUSE OF POLLUTION:

   There are many causes of water pollution. Below, we will focus on seven of the major way that water can become polluted.

   1. **Industrial Waste:**

      Industries and industrial sites across the world are a major contributor to water pollution. Many industrial sites produce waste in the form of toxic chemicals and pollutants, and though regulated, some still do not have proper waste management systems in place. In those rare cases, industrial waste is dumped into nearby freshwater systems. When industrial waste is not treated properly (or worse, not treated at all), it can very easily pollute the freshwater systems that it comes into contact with.

      Industrial waste from agricultural sites, mines and manufacturing plants can make its way into rivers, streams and other bodies of water that lead directly to the sea. The toxic chemicals in the waste produced by these industries not only have the potential to make water unsafe for human consumption.

2. Marine Dumping:

The process of marine dumping is exactly what it sounds like, dumping garbage into the waters of the ocean. It might seem crazy, but household garbage is still collected and dumped into oceans by many countries across the world. Most of these items can take anywhere from two to 200 years to decompose completely.

3. Sewage and Wastewater:

Harmful chemicals, bacteria and pathogens can be found in sewage and wastewater even when it's been treated. Sewage and waste water from each household is released into the sea with fresh water. The pathogens and bacteria found in that wastewater breed disease, and therefore are a cause of health-related issues in humans and animals alike.

3. Oil Leaks and Spills:

The age-old phrase “like water and oil” is used when describing two things that do not mix easily or at all. Just as the saying states, water and oil do not mix, and oil does not dissolve in water. Large oil spills

and oil leaks, while often accidental, are a major cause of water pollution. Leaks and spills often are caused by oil drilling operations in the ocean or ships that transport oil.

1. Agriculture

In order to protect their crops from bacteria and insects, farmers often use chemicals and pesticides. When these substances seep into the groundwater, they can harm animals, plants and t used in the creation of nuclear energy, is a highly toxic chemical.

Unfortunately, accidents still occur at these facilities, and toxic waste is released into the environment. The coal and gas industries are, in many ways, no better. This is one of the major impetuses behind the development of alternative, clean sources of energy, including solar and wind.

Additionally, when it rains, the chemicals mix with rainwater, which then flows into rivers and streams that filter into the ocean, causing further water pollution.

6. Global Warming

Rising temperatures due to global warming are a major concern in terms of water pollution. Global warming causes water temperatures to rise, which can kill water-dwelling animals. When large die-offs occur, it further pollutes the water supply, exacerbating the issue.

7. Radioactive Waste

Radioactive waste from facilities that create nuclear energy can be extremely hazardous to the environment and must be disposed of properly. This is because uranium, the element used in the creation of nuclear energy, is a highly toxic chemical.

EFFECTS OF WATER POLLUTION

1. ON THE ENVIRONMET:

Water pollution truly harms biodiversity and aquatic ecosystems. The toxic chemicals can change the color of water and increase the amount of minerals - also known as eutrophication - which has a bad impact on life in water. Thermal pollution, defined by a rise in the temperature of water bodies, contributes to **global warming** and causes serious hazard to water organisms.

2. ON HUMAN HEALTH:

Water pollution has very negative effects on public health. A lot of diseases result from drinking or being in contact with contaminated water, such as diarrhea, cholera, typhoid, dysentery or skin infections. In zones where there is no available drinking water, the main risk is dehydration obviously.

- **DISEASES:**

While the **most common water pollution diseases** involve poisoning episodes affecting the digestive system and/or causing human infectious diseases, water pollution may cause a large variety of health diseases including:

- Infectious diseases caused by **pathogens** (usually microorganisms) from animal fecal origins, of which the most common occur in developing countries, including:
    - **Typhoid**
    - **Giardiasis**
    - **Amoebiasis**
    - **Ascariasis**
    - **Hookworm**
- Diseases caused by **polluted beach water**, including:
    - **Gastroenteritis**
    - **Diarrhea**
    - **Encephalitis**
    - **Stomach cramps and aches**
    - **Vomiting**
    - **Hepatitis**
    - **Respiratory infections**
- Liver damage and even cancer (due to DNA damage) – caused by a series of chemicals (e.g., chlorinated solvents, MTBE)
- Kidney damage caused by a series of chemicals
- Neurological problems - damage to the nervous system – usually due to the presence of chemicals such as pesticides (e.g. DDT)
- A series of less serious health effects could be associated to bathing in contaminated water (i.e. polluted beach water) including:
    - Rashes
    - Earaches

CONTROL ON WATER POLLUTION

“Just because it disappears, doesn’t mean it goes away”

1. 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.

2. 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.

3. Storm water management:

Storm water 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

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4. 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.

5. 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.

6. 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.

CONCLUSION:

- Freshwater is a finite and limited resource on Earth and, increasingly, much of it is polluted, by both pathogenic microbes and chemical contaminants.
- Human demand for freshwater is increasing; in particular, water is required to irrigate crops to feed the rapidly expanding human population.
- Water cycles globally, through the oceans, the atmosphere and freshwater river systems. At certain points in the cycle, water is purified, both naturally and by treatment plants.
- Freshwater is very unevenly distributed in the world, such that a large proportion of the world's human population has insufficient water for growing crops, for drinking and for sanitation.