Water Pollution

Compiled by
Anamika Das
Assistant Professor
Department of Agriculture
Netaji Subhas University, Jamshedpur

Water-the most vital natural resource on earth

- The earth has more than two-thirds of its surface covered with water.
- However, less than 0.3% is accessible for human consumption.

Water pollution

- Water pollution can be defined as alteration in physical, chemical or biological characteristics of water making it unsuitable for designated use in natural state.
- Water pollution (or aquatic pollution) is the contamination of water bodies (such as rivers, lakes, oceans, groundwater and aquifers), usually as a result of human activities, that negatively affects its uses.
- It adversely affects all lifeforms that directly or indirectly depend on this source.

Types of water pollution

1. Based on water bodies:

a. **Surface water pollution-** water pollution which affects surface water bodies like oceans, lakes, rivers and streams.

b. **Groundwater pollution-** affects underground water in aquifers.

Types of water pollution

2. Based on source:

a. **Point source pollution-** When contamination originates from a single source. E.g.- wastewater (also called effluent) discharged by a manufacturer, oil refinery, or wastewater treatment facility, as well as contamination from leaking septic systems, chemical and oil spills, and illegal dumping.

b. **Nonpoint source pollution-** contamination derived from diffuse sources. E.g.- agricultural or stormwater runoff or debris blown into waterways from land.

Types of water pollution

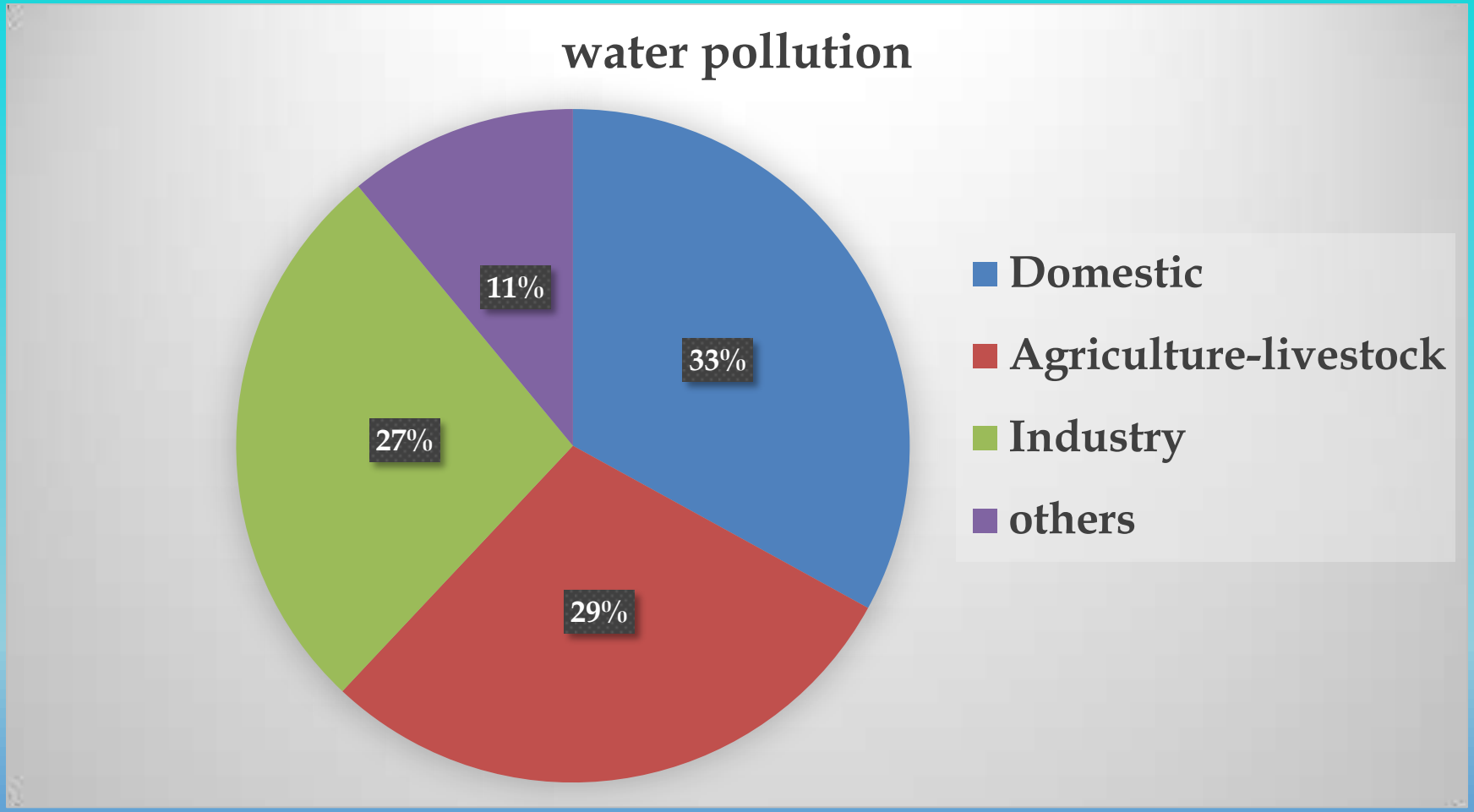
3. Based on pollutant compositions:

a. **Chemical pollution-** pesticides and fungicides used in farming, metals and solvents from industrial sites.

b. **Microbiological pollution-** Microorganisms such as bacteria, protozoa and viruses can infiltrate water supplies

c. **Thermal Pollution-** comes from power plants discharging cooling water into rivers.

Sources of water pollution



Sources of water pollution

1. Domestic-

- Sewage water from households
- Contains both organic and inorganic pollutants
- Synthetic detergents from washing & cleaning

2. Agriculture-

- Fertilizers
- Pesticides- DDT

Sources of water pollution

3. Industries-

- Mining industries- cyanide by gold mining industries
- Oil refineries- oil spill in the ocean (70% of oil pollution)
- Radioactive waste

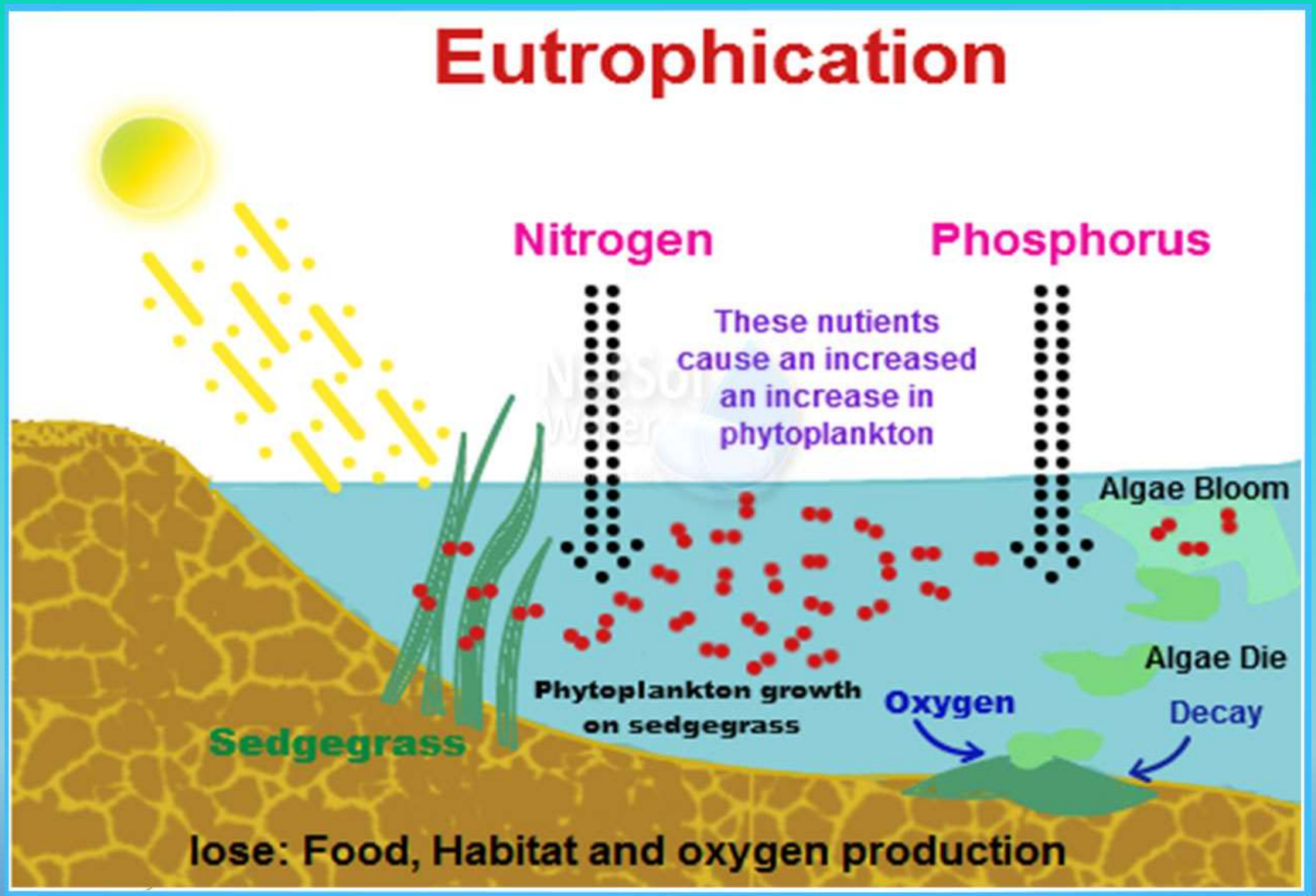
4. Other sources-

- Fine particulate sediments, soil with rain drainage

Global Impact of water pollution

1. Eutrophication

- It refers to the enrichment of freshwater bodies by inorganic nutrients like nitrates, phosphate, which may occur naturally but more readily as the result of human activity.
- The eutrophic water body has excessive nutrients and hence favours the growth of algal blooms resulting in poor water quality along with lowering the dissolved oxygen.

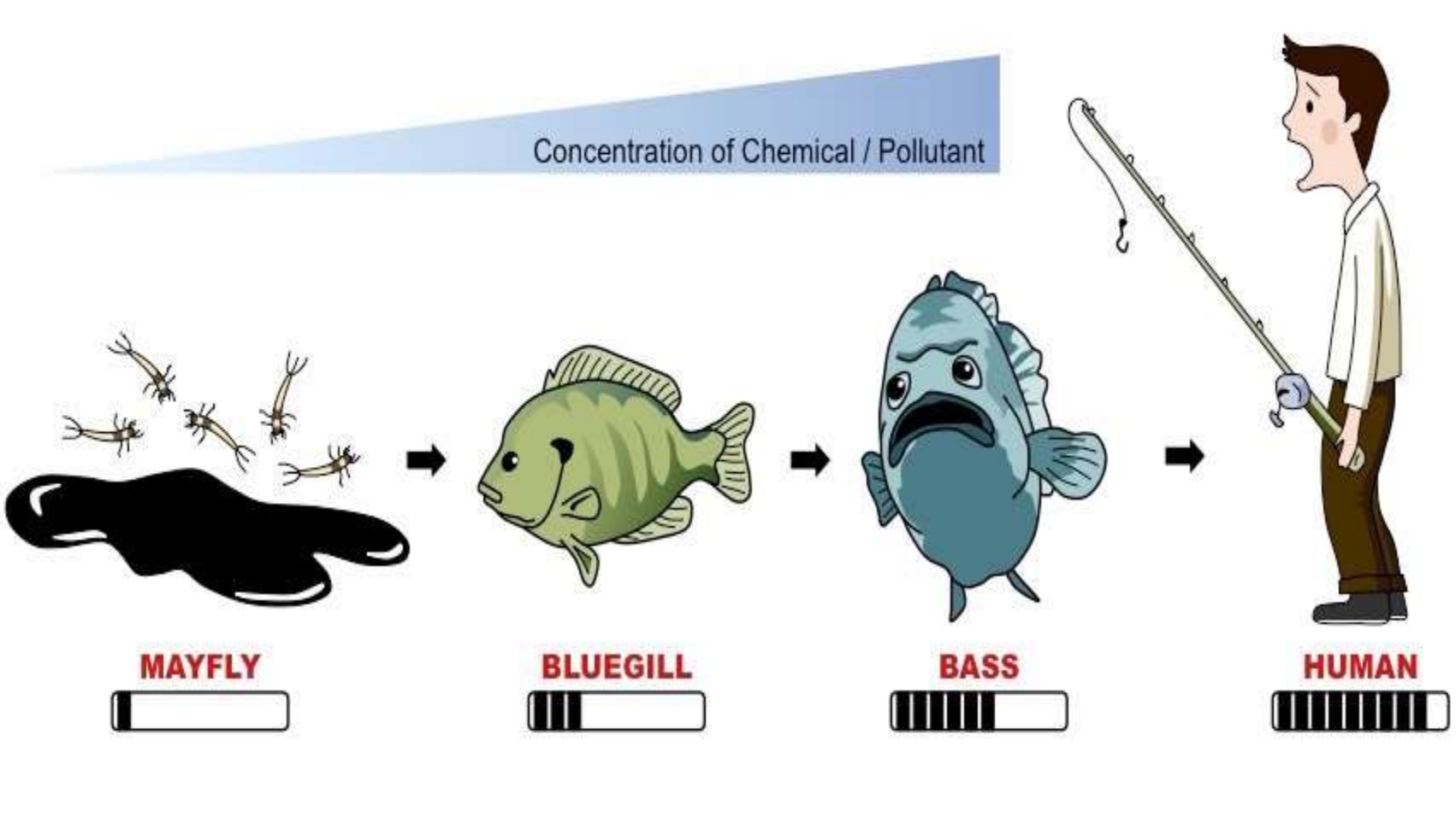

Eutrophication
Nitrogen
Phosphorus
These nutients
cause an increased
an increase in
phytoplankton
Algae Bloom
Algae Die
Decay
Oxygen
Phytoplankton growth
on sedgegrass
Sedgegrass
lose: Food, Habitat and oxygen production

Global Impact of water pollution

2. Bioaccumulation and biomagnification

- Bioaccumulation is the aggression of substances like pesticides, metals, and various organic compounds into the body of a living organism over a period of time.
- Biomagnification or bio amplification is the amplification in concentration of a substance up the tropic level.
- E.g.- DDT or mercury build up in trophic level.

Biomagnification



Impact of water pollution on human

1. **Scarcity of quality water-** reduced DO, heavy metals
2. **Neurological Problems (Liver and Kidney Failure)**
3. **Arsenicosis**- can lead to cancers of the skin, bladder, lungs, and kidneys.
4. **Lead Poisoning-** leads to anaemia, high blood pressure, and reproductive system disorders.
5. **Intestinal Worms-** cause stunted growth, anaemia, and malnutrition, particularly in children.

Heavy metals in water

- **Minimata Disease** (1953), Japan- 50 people lost their lives & 700 paralyzed due to consumption of methyl mercury contaminated fish caught from Minimata bay.
- **Itai-itai disease-** bones, liver, kidney, lungs, pancreas and thyroid were affected by cadmium contaminated rice in Japan.
- **Blue baby syndrome-** excess nitrate in drinking water
- **Fluorosis**- excess fluoride, affects bones and teeth

Impact of water on the ecosystem

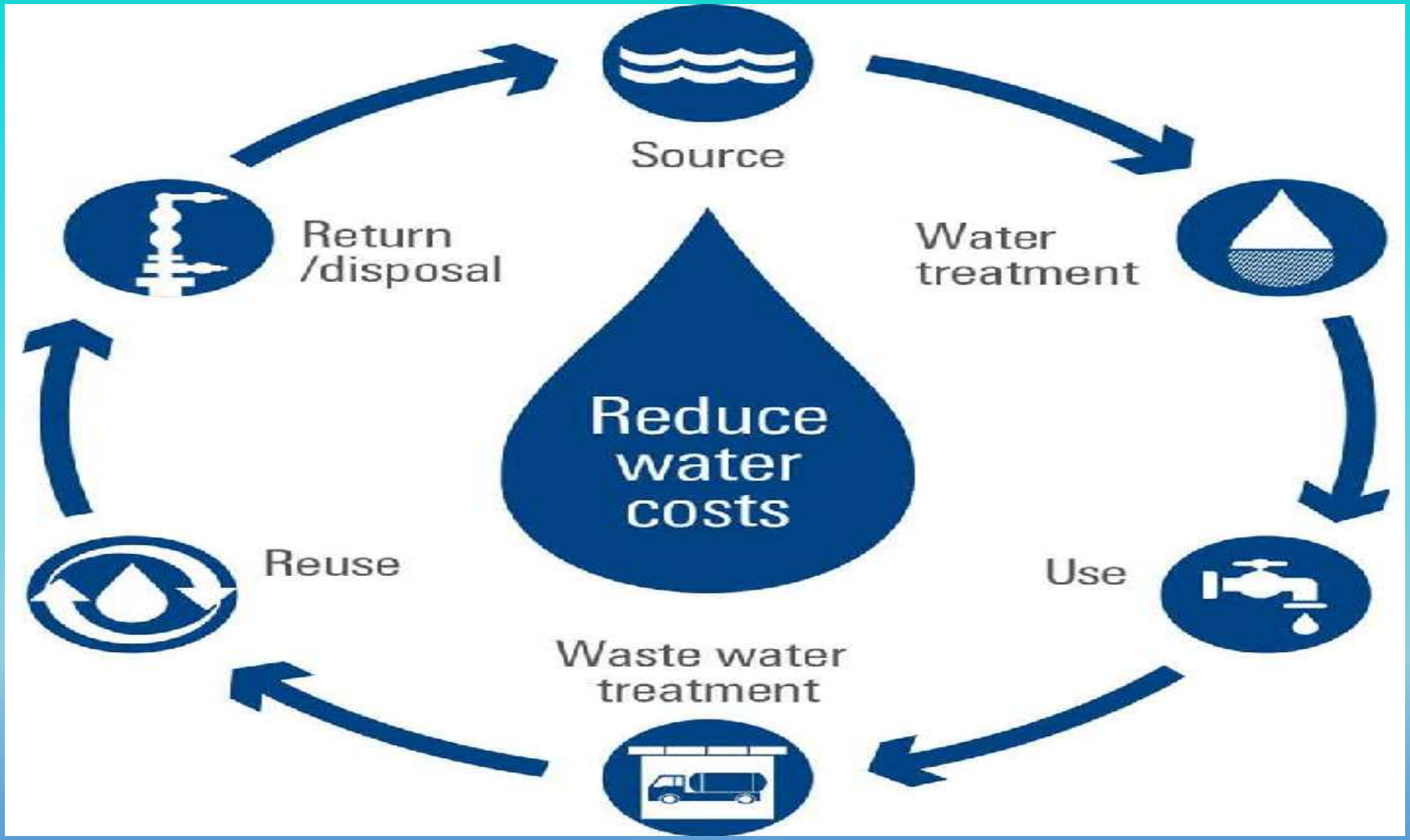
- **Increase in toxic substances**-which can be consumed by livestock or wild animals leading to serious diseases or death.
- **Harming growth of aquatic plants**

- **Suffocating aquatic creatures**

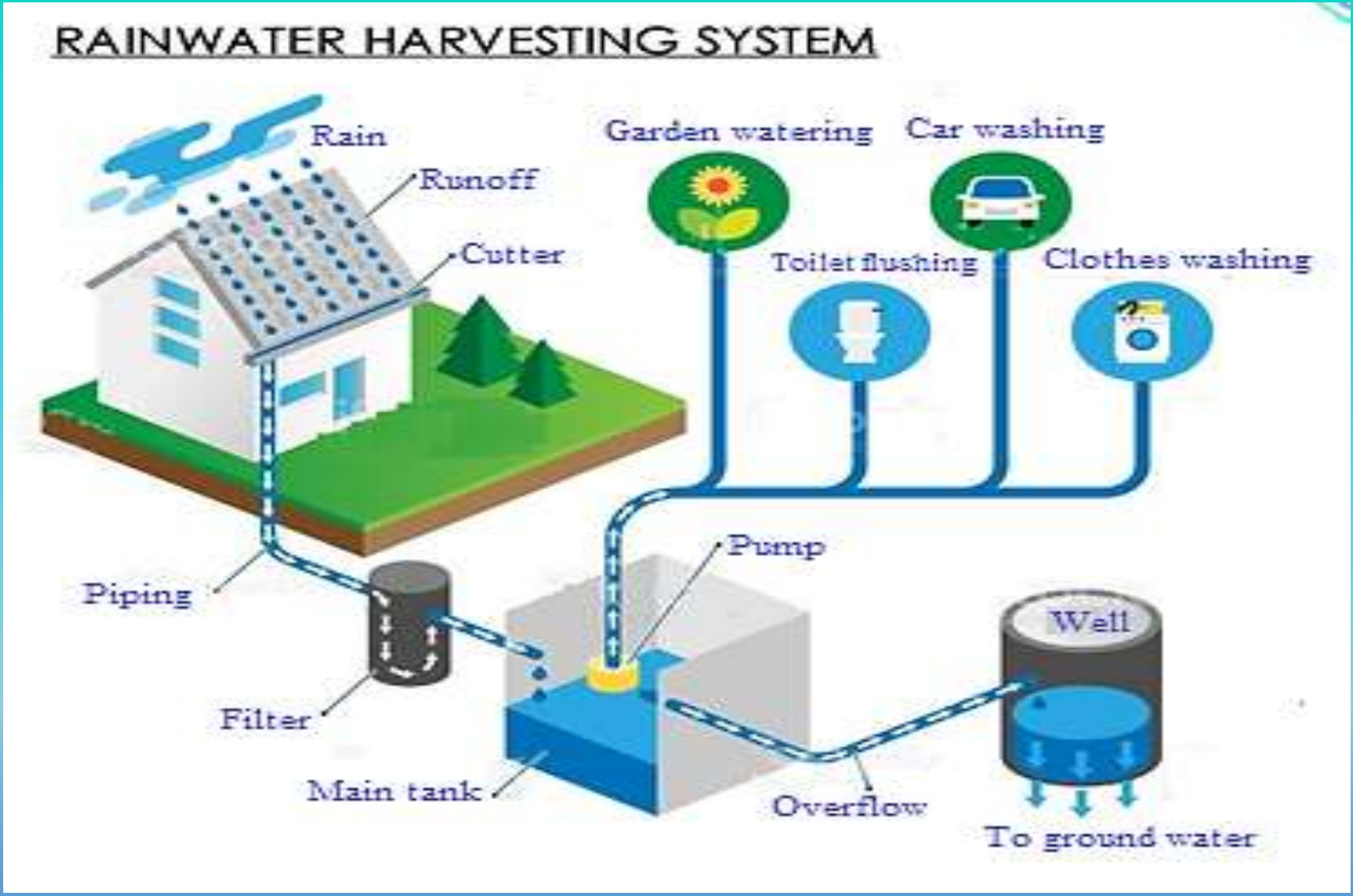
Recycling and management of water & waste water (domestic & industrial)

- Recycling of wastewater is done to treat the wastewater to a level suitable for various purposes.
- Water recycling is reusing treated waste water for beneficial purposes such as agricultural and landscape irrigation, industrial processes, toilet flushing and replenishing a ground water basin.

Recycling and management of water

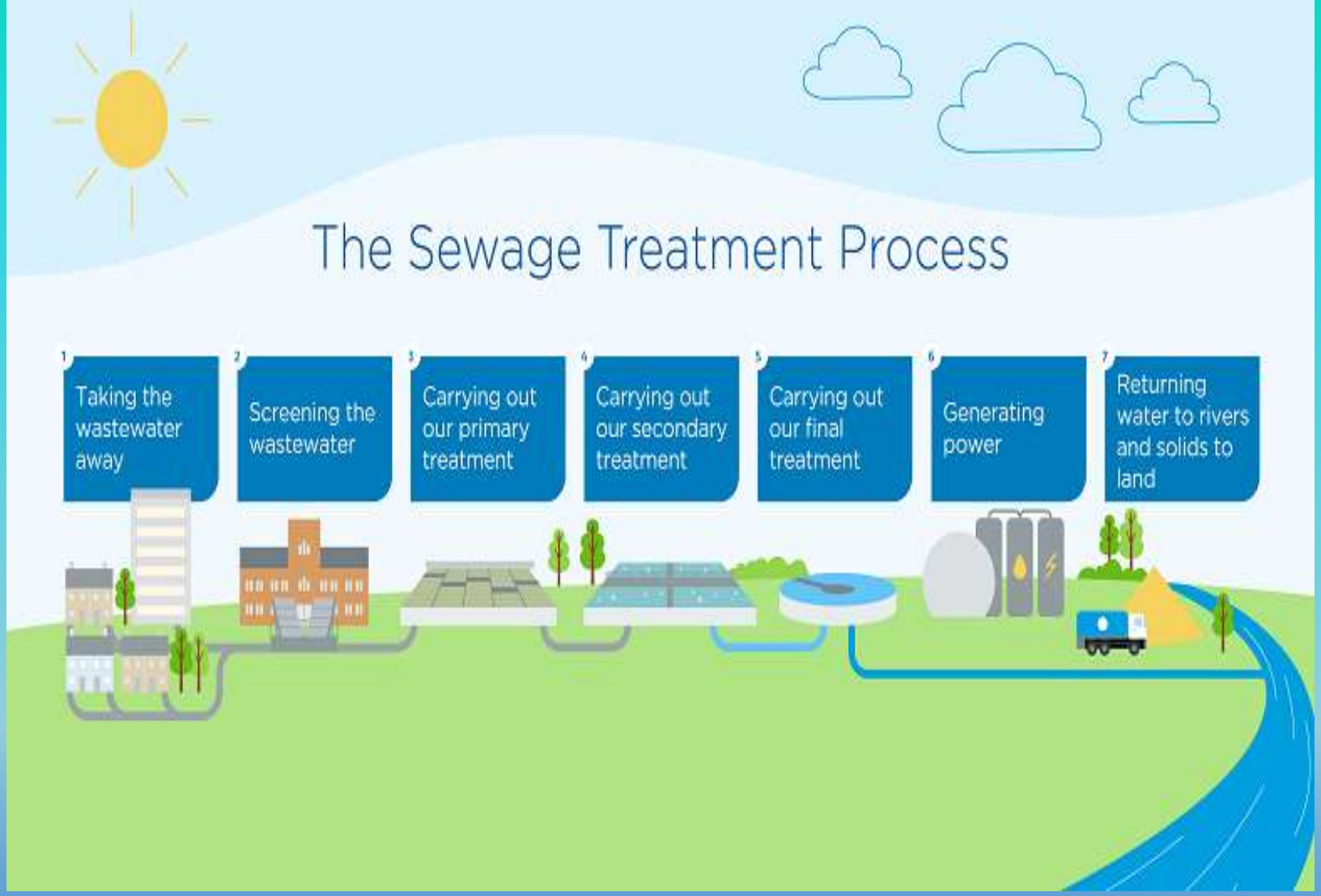


Water management




WASTE?WATER
FROM WASTE TO RESOURCE
Worldwide, the majority of wastewater is neither collected nor treated.
Wastewater is a valuable resource, but it is often seen as a burden
to be disposed of. This perception needs to change.
Wastewater from homes,
cities, and industry
WASTEWATER TREATMENT PLANT
(Water Resource Recovery Facility)
80% of global wastewater is
released to the environment
without adequate treatment

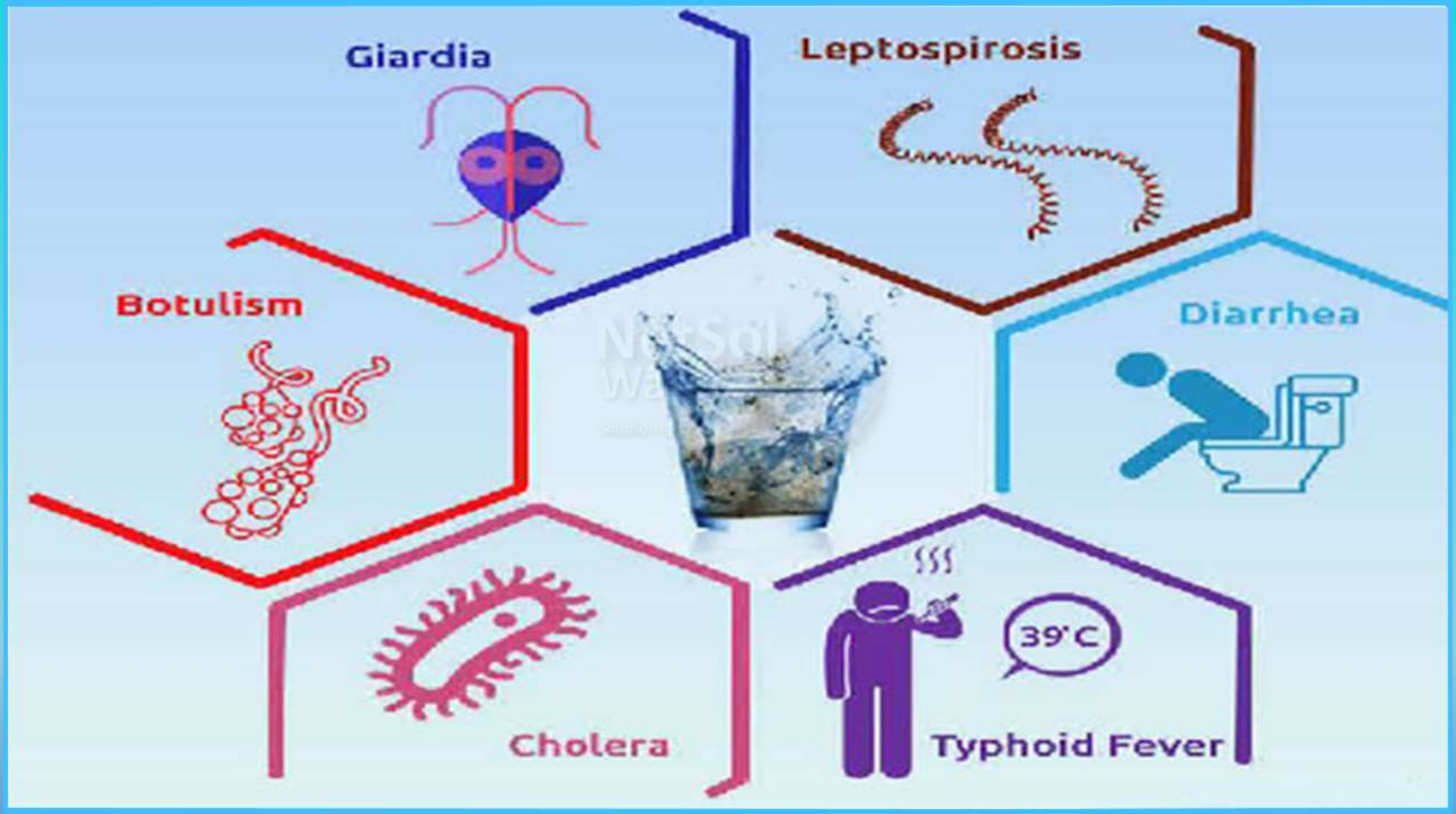
The Sewage Treatment Process



Water borne diseases

- Adverse effects on human health, such as death, disability, illness or disorders caused by pathogenic micro-organisms that are transmitted by water.
- These diseases can be spread while bathing, washing, drinking water, or by eating food exposed to contaminated water.

Water borne diseases



Thank You