

CHAPTER # 22 (NOTES)

HUMANS AND THE ENVIRONMENT

TOPIC 3: POLLUTION

SOURCES AND EFFECT OF POLLUTION OF LAND AND WATER

PESTICIDES:

INSECTICIDES:

- eg DDT controls spread of malaria by killing mosquitos which carry the protoctist parasites that cause the disease.
- Remains in the environment after it has been sprayed and can be absorbed in sub-lethal doses by microscopic organisms – can enter food chains and accumulate as it moves up them.
- Persist for a long time in the soil, rivers, lakes and bodies of animals, including animals.

HERBICIDES:

- If herbicides do not break down straight away, they can leach from farmland into water systems. such as rivers and lakes, where they kill aquatic plants, removing the producers from food chains.
- Herbivores lose their food source and die or migrate. Carnivorous animals are then affected as well.
- May blow onto surrounding land and kill plants other than weeds putting rare species of wild flowers at risk.

NUCLEAR FALL-OUT:

- Leak from a nuclear power station or nuclear explosion
- Radioactive particles carried by the wind or water and gradually settle in the environment.

- If radiation has long half-life, it remains in the environment and is absorbed by living organisms. The radioactive material bioaccumulates in food chains and can cause cancer in top carnivores.

SOURCES AND EFFECTS OF POLLUTION OF WATER.

CHEMICAL WASTE:

- Many industrial processes produce poisonous waste products.
- Electroplating produces waste containing copper and cyanide. If these chemicals are released into rivers they poison the animals and plants and could poison humans who drink the water.
- Any factory getting rid of its effluent into water systems risks damaging the environment.
- Some detergents contain a lot of phosphate. This is not removed by sewage treatment and is discharged into rivers.
- The large amount of phosphate encourages growth of microscopic plants (algae).

DISCARDED RUBBISH:

- The domestic waste from a town of several thousand people can cause disease and pollution in the absence of effective means of disposal.
- Much ends up in landfill sites, taking up valuable space, polluting the ground and attracting vermin and insects, which can spread disease.
- Air pollution can be caused by burning waste.

SEWAGE:

- Diseases like typhoid and cholera are caused by certain bacteria when they get into the human intestine.

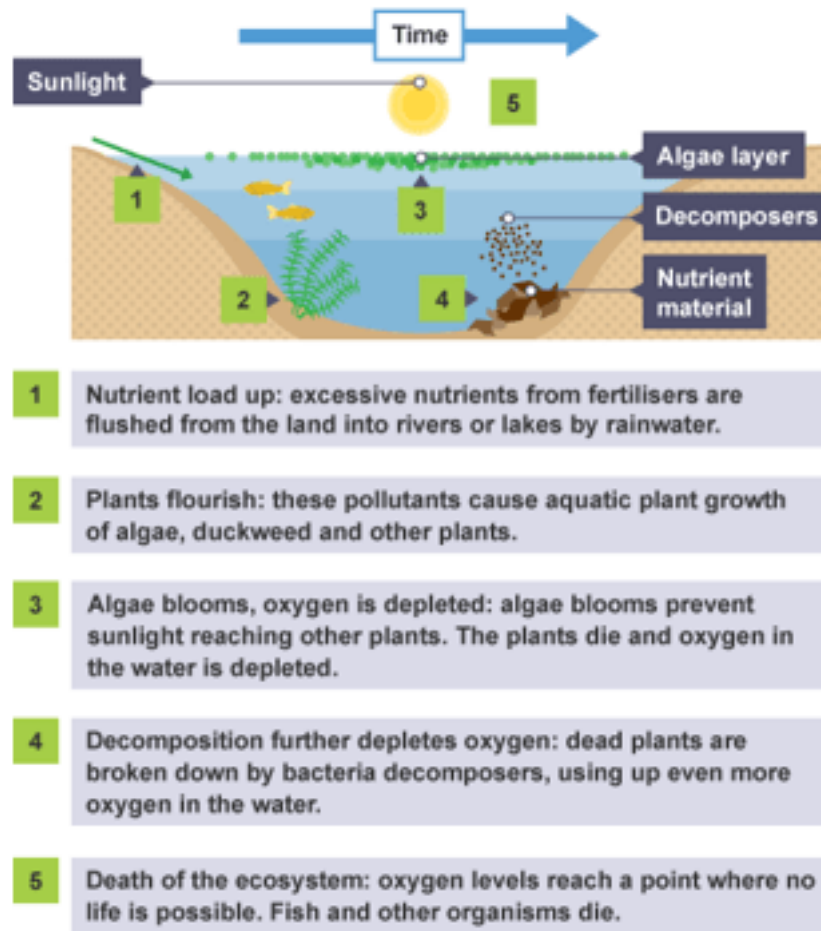
- **The faeces passed by people suffering from these diseases will contain the harmful bacteria.**
- **If this bacteria get into drinking water they may spread the disease to hundreds of other people.**
- **For this reason, among others, untreated sewage must not be emptied into rivers**

FERTILISERS:

- **When nitrates and phosphates from farmland and sewage escape into water they cause excessive growth of microscopic green plants.**
- **This may result in a serious oxygen shortage in the water, resulting in the death of aquatic animals – a process called eutrophication.**

EUTROPHICATION:

- **A major problem with the use of fertilisers occurs when they are washed off the land by rainwater into rivers and lakes.**
- **This leaching causes an increase in the levels of minerals such as nitrate and phosphate in the water, a process called eutrophication.**
- **Eutrophication encourages the growth of algae. These form a green bloom over the water surface, preventing sunlight reaching other water plants.**
- **These plants die because they are unable to carry out photosynthesis.**
- **Bacteria decompose the dead plants, respiring and using up the oxygen in the water as they do this.**
- **The low oxygen levels make it difficult for aquatic insects and fish to live, and eventually the lake may be left completely lifeless.**



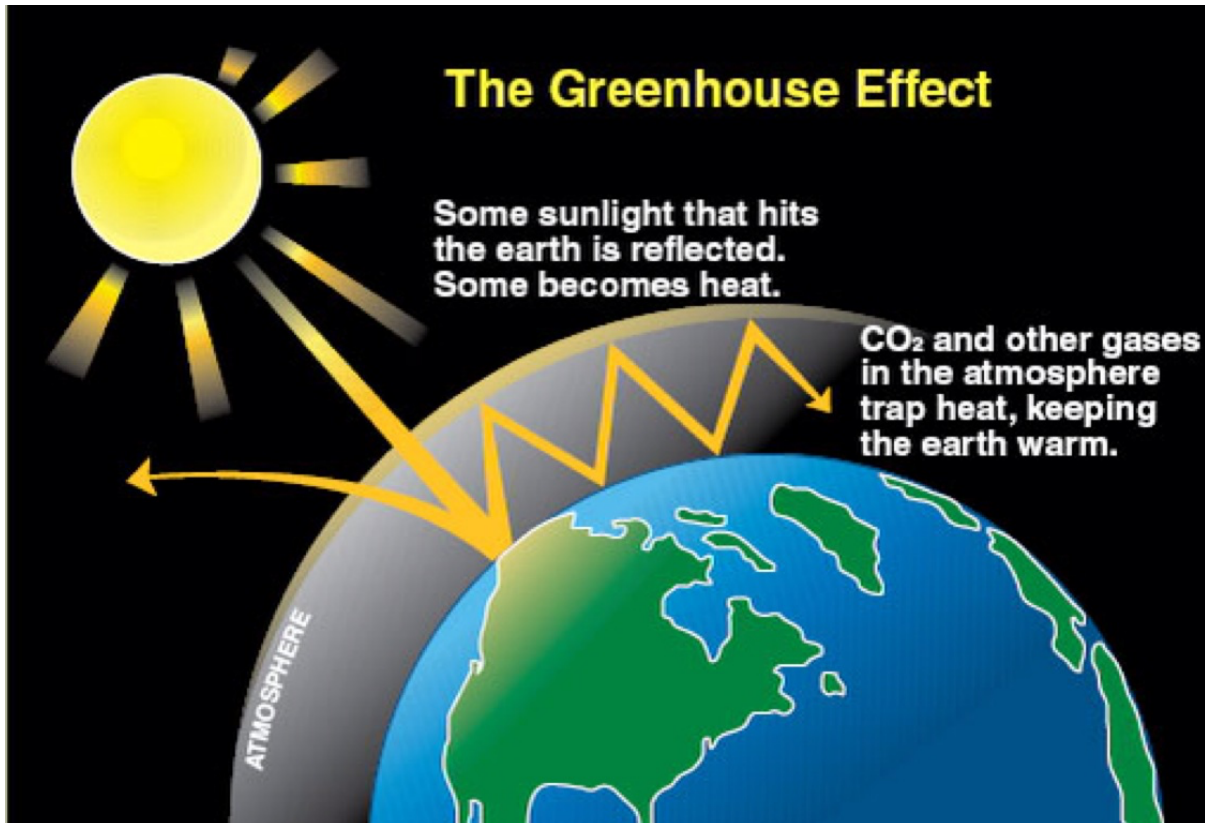
It is possible to reduce eutrophication by using:

- Detergents with less phosphates.
- Agricultural fertilisers that do not dissolve so easily.
- Animal wastes on the land instead of letting them reach rivers.

PLASTICS AND THE ENVIRONMENT:

- Plastics that are non-biodegradable are not broken down by decomposers when dumped in landfill sites or left as litter.
- This means that they remain in the environment, taking up valuable space or causing visual pollution.
- Discarded plastic bottles can trap small animals; nylon fishing lines and nets can trap birds and mammals such as seals and dolphins.

- As the plastic in water gradually deteriorate, they fragment into tiny pieces, which are eaten by fish and birds, making them ill.
- When plastic is burned, it can release toxic gases.



THE GREENHOUSE EFFECT AND GLOBAL WARMING:

- Carbon dioxide is produced by burning of fossil fuels.
- Methane is produced from the decay of organic matter and as a waste gas from digestive processes in cattle.
- Carbon dioxide and methane are greenhouse gases.
- They are called greenhouse gases as they trap heat in the earth's atmosphere in the same way a greenhouse traps heat.
- As the concentration of these gases increase in the atmosphere more heat is trapped, making the atmosphere warmer. This is called enhanced greenhouse effect.
- It is causing global warming –Earth's average temperature is rising.

GLOBAL WARMING IS CAUSING THE FOLLOWING PROBLEMS:

- Melt polar ice caps, causing flooding of low-lying land;
- Change weather conditions in some countries by increasing flooding or reducing rainfall;
- Cause the extinction of some species that cannot survive at higher temperatures.

CAUSES AND EFFECTS ON THE ENVIRONMENT OF ACID RAIN

<i>Causes</i>	<i>Main sources</i>	<i>Effects</i>	<i>Possible solutions</i>
Sulphur dioxide, Oxides of nitrogen	Burning of fossil fuels Combustion of petrol in car engines.	1. Damage to leaves, killing plants; 2. Acidification of lakes, killing animals; 3. Increased risk of asthma attacks and bronchitis in humans; 4. Corrosion of stonework on buildings; 5. Release of aluminium from the soil into lakes that are toxic to fish.	1. Changing the power stations from coal and oil to renewable energy sources. 2. Using 'scrubbers' in power station chimneys sulphur dioxide. 3. Using catalytic converters in car exhausts to convert oxides of nitrogen to harmless nitrogen.

THE 'GREENHOUSE EFFECT' AND GLOBAL WARMING:

- Increase in carbon dioxide and methane concentrations in the atmosphere have caused an enhanced greenhouse effect.
- With emissions being produced daily, a large imbalance is being created which is enhancing the greenhouse effect and making it stronger.
- As there are naturally occurring greenhouse gases in the atmosphere that help keep the Earth warm, additional amounts of these gases leads to more heat being trapped on the planet.
- This extra heat is causing global warming as well as affecting the Earth's weather patterns

POLLUTION BY CONTRACEPTIVE HORMONES:

- **When women use the contraceptive pill, the hormones in it (oestrogen or progesterone) are excreted in urine and become present in sewage.**
- **The process of sewage treatment does not extract the hormones, so they end up in water systems such as rivers, lakes and the sea.**
- **Their presence in this water affects aquatic organisms as they enter food chain.**
- **male frogs and fish can become 'feminised' (they can start producing eggs in their testes instead of sperm).**
- **This causes an imbalance between numbers of male and female animals.**
- **Drinking water, extracted from rivers where water from treated sewage has been recycled, can also contain the hormones.**
- **This has been shown to reduce the sperm count in men, causing a reduction in fertility.**