# 22.3 Pollution

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3. Pesticides and Female contraceptive hormones
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# Greenhouse gases

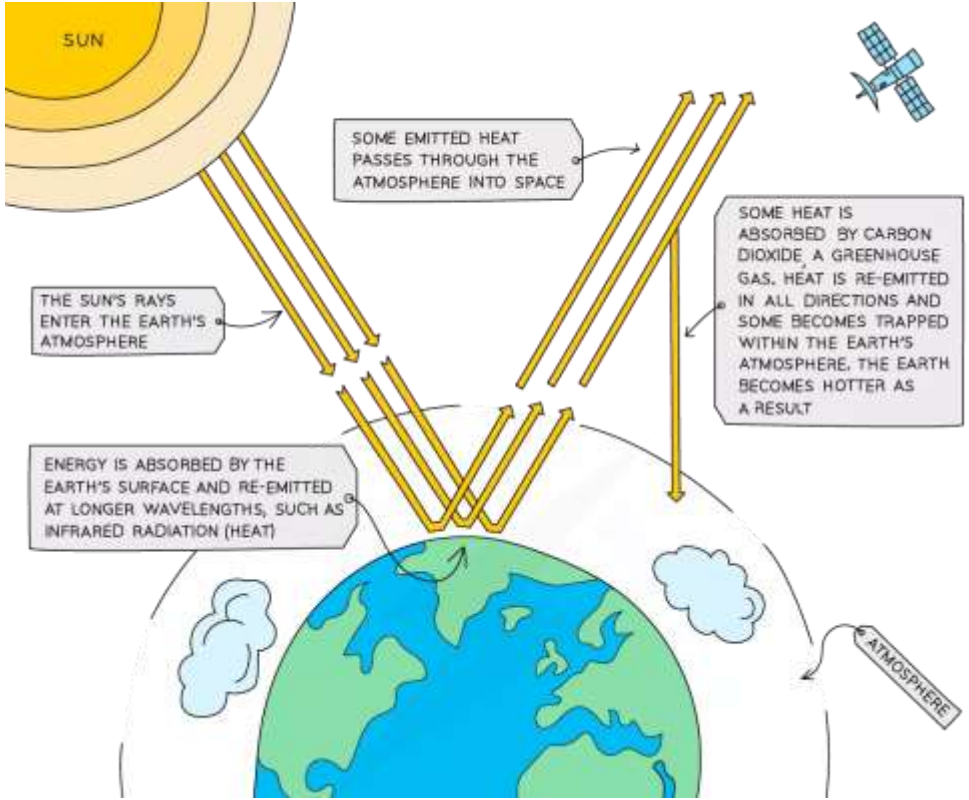
**A greenhouse gas** is a gas that absorbs and emits radiant energy within the thermal infrared range, causing the **greenhouse effect**. The most important of these gases are carbon dioxide, water vapor and methane.

The greenhouse effect works in the following way:

- The sunlight passes freely through the atmosphere, and reaches the ground.
- The ground is warmed by the radiation, and emits longer wavelength, infrared radiation.
- Carbon dioxide does not let all of this infrared radiation pass through
- Much of it is kept in the atmosphere, making the atmosphere warmer.

The glass around the greenhouse behaves like carbon dioxide as let shortw ave radiation in, but does not let out the longwave radiation which making the air inside it warmer. We need greenhouse effect because it is preventing the earth would be frozen and lifeless.

# How greenhouse effect works:




However, as the levels of greenhouse gases in the atmosphere rise due to human activities, the Earth's average temperature rises beyond normal, it traps more infrared radiation, and make the atmosphere warmer. This called enhanced greenhouse effect and its effect on earth is called global warming.

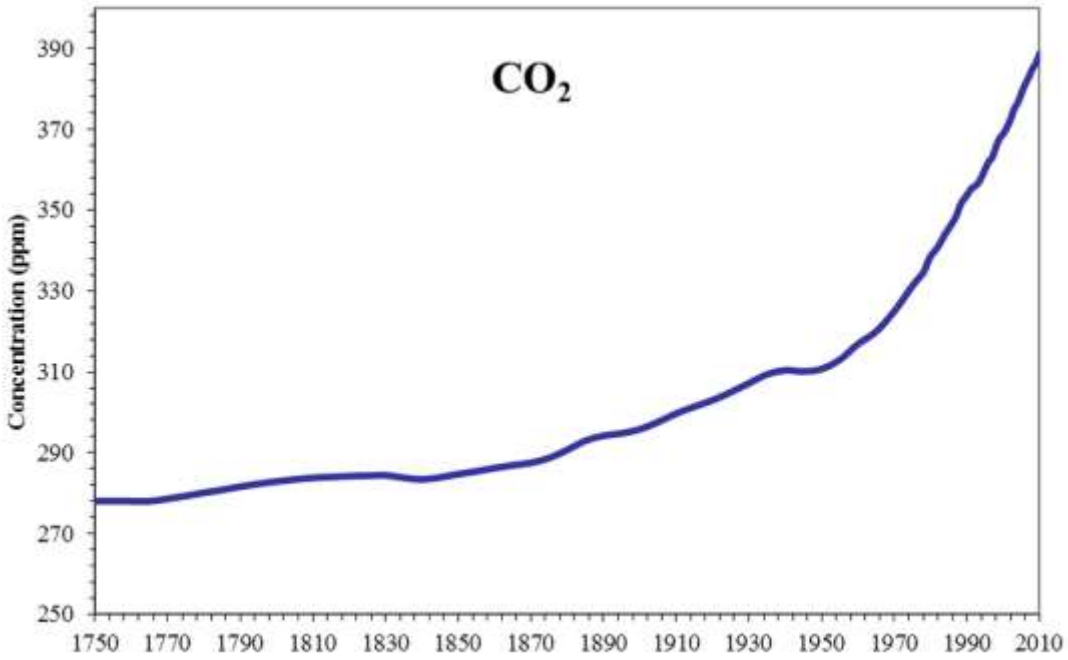
# Consequences of global warming due to an enhanced greenhouse effect

| Greenhouse Gas | Chemical Formula | Anthropogenic Sources |
|---|---|---|
| **Carbon Dioxide** | $CO_2$ | Fossil-fuel combustion, Land-use conversion, Cement Production |
| **Methane** | $CH_4$ | Fossil fuels, Rice paddies, Waste dumps |
| **Nitrous Oxide** | $N_2O$ | Fertilizer, Industrial processes, Combustion |
| **Tropospheric Ozone** | $O_3$ | Fossil fuel combustion, Industrial emissions, Chemical solvents |

- **Ocean temperatures increase** which causes melting of polar ice caps / rising sea levels / flooding / coral bleaching
- Increasing temperatures can cause **extreme weather** like super storms, flooding, droughts
- These extreme weather events can lead to **changes in or loss of habitats**

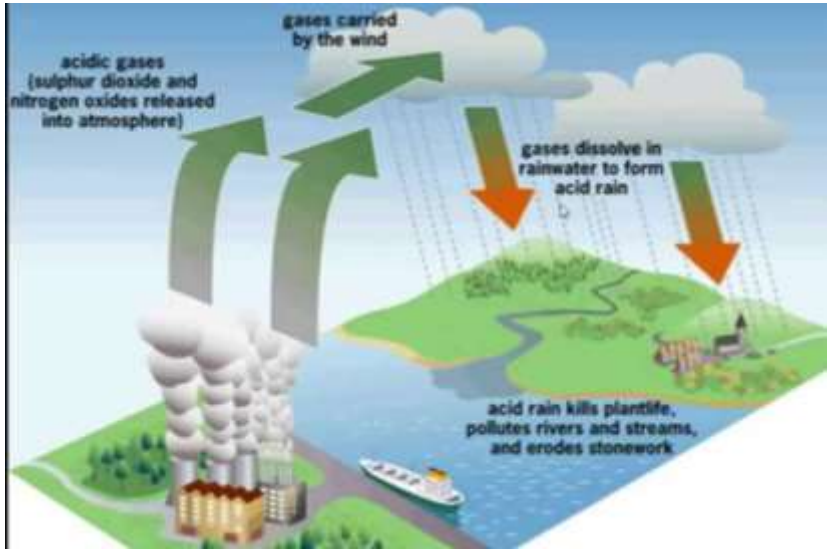
- This means that there will be a **decrease in biodiversity** as food chains are disrupted and extinction rates increase
- There could also be **increases in migration** of species to new places, increased **spread of pests and disease**

How carbon dioxide concentrations in the atmosphere changed since 1970



# Acid rain

- **Combustion of fossil fuels** that contain sulfur impurities creates sulfur dioxide
- This is released into the atmosphere where it combines with oxygen to form sulfur trioxide
- Sulfur trioxide dissolves in water droplets in clouds and forms **acid rain**



# Effect of acid rain and solution to reduce the production of acid rain

## Effect :

Dead or dying trees are a common sight in areas effected by acid rain. Acid rain leaches aluminum from the soil. That aluminum may be harmful to plants as well as animals. Acid rain also removes minerals and nutrients from the soil that trees need to grow.

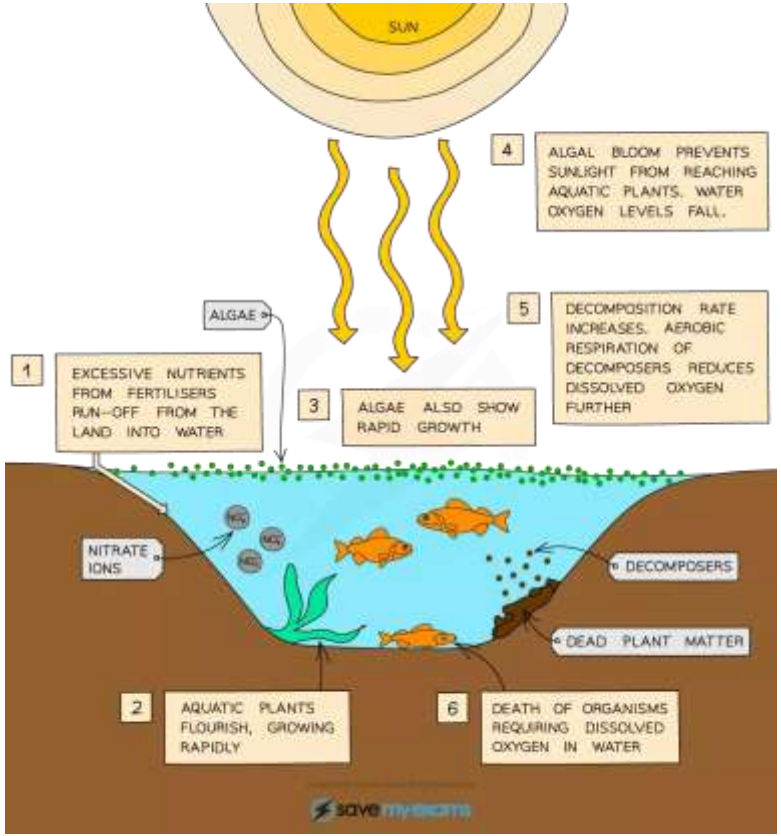
Also the ions which are washed out of the soil by the acid rain end up in lakes. Aluminum ions are very poisonous to fish because it affect their gills.

## Solution :

A great way to reduce acid rain is to produce **energy** without using fossil fuels. Instead, people can use renewable **energy** sources, such as solar and wind power.

Renewable **energy** sources help reduce acid rain because they produce much less pollution.

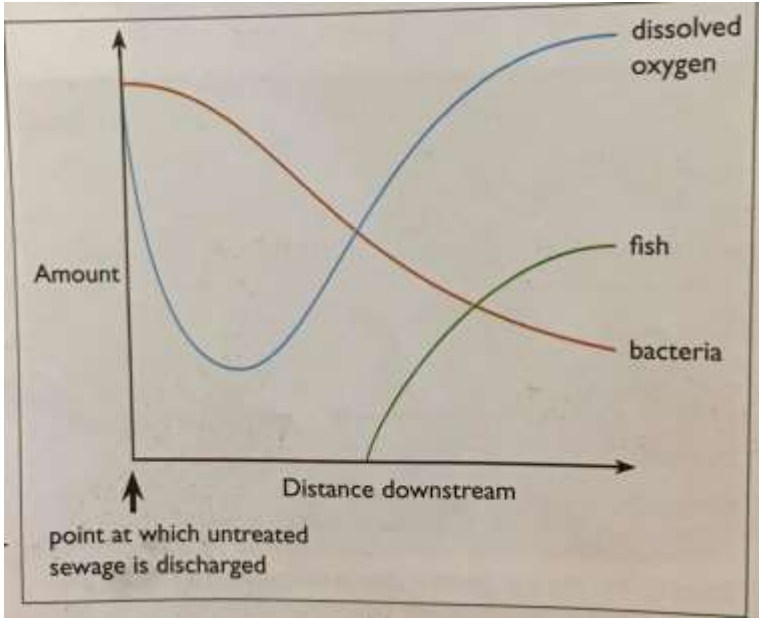
# Eutrophication:

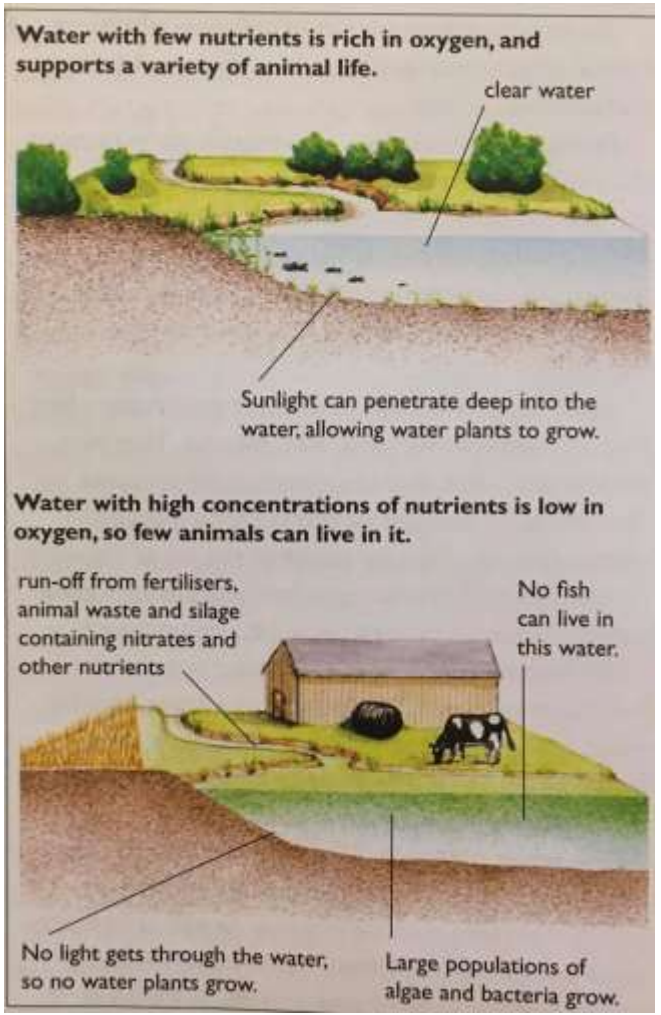



- Runoff of fertilizer from farmland enters the water and causes increased growth of algae and water plants
- The resulting ‘algal bloom’ blocks sunlight so water plants on the bottom start to die, as does the algae when competition for nutrients becomes too intense
- As water plants and algae die in greater numbers, decomposing bacteria increase in number and use up the dissolved oxygen whilst respiring aerobically
- As a result there is less oxygen dissolved in water, so aquatic organism such as fish and insects may be unable to survive

This whole process is called **eutrophication.**

# Eutrophication:



# Non-biodegradable plastics:

- Plastics have a large negative impact on both land and water habitats due to their non-biodegradability
- In marine habitats:
  - Animals often try to **eat plastic** or **become caught in it**, leading to injuries and death
  - As the plastic breaks down it can **release toxins** that affect marine organisms
  - Once it has broken down into **very small particles**, it is commonly ingested by animals and **enters the food chain**
- On land:
  - Plastic is generally disposed of by **burying in landfills**
  - As it breaks down, it releases **toxins** into the surrounding soil and as such the **land is no good for growing crops or grazing animals** and can only be used for building on several decades after burial

# Chemical waste

| | | |
|---|---|---|
| CHEMICAL WASTE | CHEMICALS SUCH AS HEAVY METALS LIKE MERCURY CAN BE RELEASED FROM FACTORIES INTO RIVERS AND OCEANS OR LEACH INTO LAND SURROUNDING THE FACTORIES | MANY HEAVY METALS AND OTHER CHEMICALS ARE PERSISTENT – THEY DO NOT BREAK DOWN AND SO CAN BUILD UP IN FOOD CHAINS (KNOWN AS BIOACCUMULATION), POISONING THE TOP CARNIVORES |

# Nuclear fall-out

| POLLUTANT | SOURCE / CAUSE | EFFECT |
|---|---|---|
| NUCLEAR FALLOUT | RADIOACTIVE PARTICLES THAT GET INTO THE ENVIRONMENT FROM ACCIDENTAL LEAKAGE FROM NUCLEAR POWER PLANTS OR EXPLOSION OF A NUCLEAR BOMB | SOME RADIOACTIVE PARTICLES HAVE LONG HALF – LIVES AND CAN REMAIN IN THE ENVIRONMENT FOR MANY YEARS. THEY CAN CAUSE INCREASED RISKS OF CANCER AND SMALLER PARTICLES CAN BE CARRIED BY WINDS HUNDREDS OF MILES FROM THE ORIGINAL SITE OF EXPOSURE |

Ionizing radiation- such as alpha, beta and gamma- damages DNA molecules in living cell. Also radiation can increase mutation rate in DNA in our cells, which may lead to cancer.

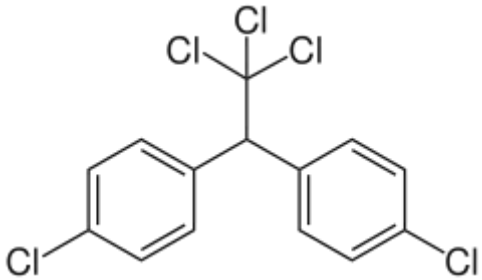
# Pesticides:

Pesticide is a substance used for destroying insects or other organisms harmful to cultivated plants or to animals.
Also pesticides are used to control organisms that are considered to be harmful, or pernicious to their surroundings. For example, they are used to kill mosquitos that can transmit potentially deadly diseases.

# DDT Pesticides:

Pesticides help farmers provide an abundance of nutritious, all-year-round foods, which are necessary for human health.

However, it is a harmful substance. If they are not used with care, some pesticides can do a lot of damage to environment. For example, the DDT is pesticide that kills insects, it is persistent ins ecticide which means that it does not break down, but remains in t heir bodies of insects or in soil.




$C_{14}H_9Cl_5$

# Female Hormones

•Female **contraceptive hormones** are excreted from the body in urine and then make t heir way
into the water supply, as they are not filtered out by sewage treatment plants
•If they reach male aquatic organisms, such as fish and frogs, which are very sensitive t o the
hormones, it causes **feminisation**
•This is where male organisms begin to produce eggs and lose the ability to reproduce
•Consequently, a smaller amount of offspring is produced which can harm the species s urvival
and also disrupts food chains for animals that usually feed off these organisms
•In addition, these hormones can reduce the sperm count in human males, which cause’ s fertility problems

Thanks for your attention