

1.5 Humans and pollution

1.5.1 Defining pollution

Pollution is the addition of a substance to the biosphere, due to human activities. This addition occurs at a greater rate than that the environment can render making it harmless. Therefore, it has an adverse effect on organisms and it can be considered as the inevitable consequence of economic development.

Primary pollutant: active on emission

Secondary pollutant: formed by primary pollutants undergoing physical or chemical changes

Point source pollutant: is generally more easily managed because its impact is more localized, making it easier to control emission, attribute responsibility and take legal action. It refers to the release of pollutants from numerous, widely dispersed origins. Examples include the gases dispersed from vehicles or chemicals spread on fields.

Non-point source pollutant: refers to the release of pollutants from a single, clearly identifiable site. For example, the chimney of a factory or sewage pipes. Since there are many non-point sources adding to pollution, it is virtually impossible to detect where it is coming from. So the solution would be to set limits to all industries and farmers to reduce emissions and then monitor what they actually do.

Biodegradable pollutant: do not persist in the environment and break down quickly

Acute pollution: large amount at the same time, causing a lot of harm

Chronic pollution: long-term release of pollutant in smaller amounts, often goes undetected and is difficult to clean up

Persistent organic pollutants

- Often manufactured as pesticides. They are resistant to breaking down and remain active in the environment for a long time. They bioaccumulate in animal and human tissue and biomagnify in food chains and cause significant harm. Examples include DDT, aldrin, dieldrin, chlordane.
- PCBs: widely used in electric appliances and as coolants since 1930s but were banned in 2001
- They cause cancer and disrupt hormone functions and have a similar structure and action and animals to dioxin which is one of the most deadly chemicals

Biodegradable Pollutants

- Do not persist in the environment and break down quickly
- They may be broken down by decomposers or physical processes

Examples include: soap, domestic sewage, degradable plastic bags, glyphosate

Acute pollution and Chronic pollution

- When large amounts of a pollutant are released, causing a lot of harm
- For example chemical aluminium sulfate was accidentally tapped into the wrong place in a water treatment works in Cornwall in 1988 or Bhopal 1984
- It is the result of the long-term release of a pollutant but in small amounts
- This is serious as it often goes undetected for a long time, it is usually more difficult to clean up and it spreads widely
- Air pollution is often chronic causing non-specific respiratory diseases for example bronchitis and asthma

DDTs

- These used as an agricultural insecticide and to kill mosquitoes (*Anopheles* spp) which is a factor for the malarial parasite
- It is cheap, persistent and effective
- It was banned in the US in 1972 and most MEDCs since, but not banned for public health use in most areas around the world where malaria is endemic
- DDT prevented millions of deaths from malaria
- But Rachel Carson's *Silent Spring* identified that it leads to bioaccumulation