

Name: \_\_\_\_\_

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Class: \_\_\_\_\_

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**IB ESS**

# 1.5 Humans and Pollution

## **Significant Ideas:**

Pollution is a highly diverse phenomenon of human disturbance in ecosystems

Management strategies can be applied at different levels.



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## What is pollution?

1. Define "pollution"

Pollution is the contamination of the Earth and atmosphere to such an extent that normal environmental processes are adversely affected. They are added to the environment faster than they can be rendered harmless.

2. Pollutants can be categorized as "primary" and "secondary" pollutants. Using **examples**, explain the difference between these two terms.

Primary - directly created and active on emission e.g. carbon monoxide from incomplete combustion.

Secondary - created by primary pollutants undergoing chemical change e.g. when  $\text{SO}_2$  reacts with water it forms sulphuric acid.

3. The table below lists a number of different examples of pollution. From the list, choose the matching pollution type.

light, sound, inorganic substances, organic substances, heat

Pollution Type	Example
inorganic substance	Sulphur dioxide from a factory entering the air
organic substance	Manure used as fertilizer on farmland washing into a lake
light	A bright garden light shining into the neighbour's house
sound	Disruptive noise coming from a busy road near a housing estate
heat	Warm water entering a river from a factory



4. a) State one example of point and non-point source pollution

Point source pollution: discrete source of contaminants

Waste disposal pipe of sewage works into river

Non-point source pollution: dispersed source of contaminants

Gases from exhaust system of cars

b) Explain how point and non-point source pollution differ

Point source pollution comes from a single identifiable source so it is easier to see who is causing it and how to manage it.

Non-point source pollution because of its many sources is harder to track and manage

5. Air quality in Beijing is particularly poor as a result of coal-burning amongst other pollutants. This is an example of **chronic** pollution. Using an example of **acute** pollution to support your answer, explain why Beijing air pollution is an example of chronic pollution.

Acute pollution occurs after a short, intense exposure and symptoms are usually experienced within hours e.g. Gulf oil spill, Pollution ducts

The coal-burning in China is chronic as it results in low-level, long term exposure and the symptoms develop much later.

6. Some pollutants are considered **persistent**, while others are **biodegradable**. Using an example of each to support your answer, explain what these terms mean.

Persistent Pollutant

- resistant to breaking down and can remain active in the environment for a long time meaning they bioaccumulate in animal tissue  
e.g. DDT

Biodegradable Pollutant

- do not persist in the environment, not stored in biological matter or passed along food chains. They are broken down by decomposers, heat or light e.g. glyphosate (herbicide)



## DDT

1. State **two** uses of DDT

- used to control lice that spread typhus and mosquitoes that cause malaria. Used in farming as an insecticide.

2. With reference to biomagnification, describe the harmful effects of DDT on birds.

Biomagnification is the process whereby the concentration of a chemical increases at each trophic level. As DDT is persistent it will become more and more concentrated as it passes from soil to insect to insect eating birds. The birds have thinning egg shells due to the high concentrations of DDE (breakdown product of DDT)

3. List some of the potential impacts of DDT on humans.

- increased incidence of asthma and or diabetes in farmers, higher risk of liver, breast and/or pancreatic cancer (carcinogenic and endocrine disruptor), increased infertility and pregnancy issues

4. Summarise the effect that Rachel Carson's *Silent Spring* book had on public opinion on DDT use.

General public responded well. Public awareness was heightened about the impact that human activity could have on the environment. Significant moment in environmental history.

5. Evaluate the use of DDT, and justify your own opinion on its use.

Malaria is a public health challenge in many parts of the world resulting in about 1 million deaths. DDT is effective in controlling mosquitoes and is affordable as many of the countries most affected are poorer countries.

However it is a persistent pollutant that has negative impact on environmental and human health, some of which are not clearly seen yet. An alternative to DDT should be found but until it is the use of DDT should be closely regulated.



## Pollution management

Plastics are a major source of pollution with many negative consequences, particularly for aquatic organism and marine birds if the plastic enters the oceans (and it often does). Plastic can enter the environment in a number of ways. Poor waste management as well as littering adds plastic to the environment, and drinks bottles in particular are a major problem. Micro-beads, which are tiny balls of plastic added to shower gels and cosmetic products, are washed down the sink and enter water ways directly. Another source is micro-fibers which are degraded from clothes and are washed away in the laundry.

Plastics that enter the ocean can affect some marine birds; the Laysan Albatross, for example, feeds by skimming the surface of the water with its beak, meaning it will scoop up and swallow any plastic that is floating. This often results in the death of young albatrosses, as they are not able to regurgitate the material. Fish can be harmed by ingesting microplastics, which are bioaccumulated and then biomagnified through the food chain to higher organisms such as larger fish, birds and even humans.

1. Using the pollution management model (figure 1.5.6), summarise possible management strategies for plastics at each of the three levels. You're expected to make your own sensible suggestions.

Process of pollution	Level of pollution management	Possible strategy for plastic pollution
Human activity producing pollutant	Altering human activity	<ul style="list-style-type: none"> <li>• education on impact of pollution</li> <li>• reduction in the consumption of plastic with increased prices</li> <li>• financial incentives for recycling</li> <li>• provide alternatives (reusable bottles and water filling stations)</li> </ul>
Release of pollutant into the environment	Controlling release of pollutant	<ul style="list-style-type: none"> <li>• legislation against plastic pollution</li> <li>• development of recycling</li> <li>• development technology to break down and reuse plastics</li> </ul>
Impact of pollutant on ecosystem	Clean-up and restoration of damaged systems	<ul style="list-style-type: none"> <li>• beach clean ups</li> <li>• removing plastic from environment</li> <li>• education</li> </ul>



