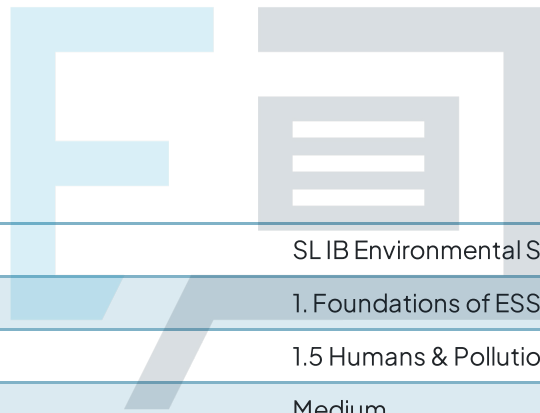




# 1.5 Humans & Pollution

## Mark Schemes



Course	SL IB Environmental Systems & Societies (ESS)
Section	1. Foundations of ESS
Topic	1.5 Humans & Pollution
Difficulty	Medium

# Exam Papers Practice

To be used by all students preparing for  
SL IB Environmental Systems & Societies (ESS)  
Students of other boards may also find this useful

1a

Indicative Content	Commentary
<p><i>Pollution is:</i></p> <ul style="list-style-type: none"> <li>The addition of a harmful substance/agent (produced by human activity) to an environment/ecosystem <b>OR</b> a substance added to an environment/ecosystem resulting in negative effects; [1 mark]</li> <li>...at a greater rate than it can be rendered harmless/removed/assimilated/absorbed by the environment/ecosystem <b>OR</b> which has a clear/notable/measurable negative effect on the organisms/air/water/soil (within that environment/ecosystem); [1 mark]</li> </ul>	<p>The command word 'define' requires you to give the precise meaning of a word, phrase, concept or physical quantity</p> <p>The number of marks available here indicates that there are two parts to this definition that the examiner will be looking for</p> <p>Pollution results from the release of substances that degrade the sustainable quality of air, water, and soil, negatively impacting human quality of life</p>

1b

Indicative Content	Commentary
<p><i>Unnatural or human sources of particulate pollution include:</i></p> <p>Any <b>two</b> from the following:</p> <ul style="list-style-type: none"> <li>Industrial emissions; [1 mark]</li> <li>Vehicle emissions; [1 mark]</li> <li>Construction activities; [1 mark]</li> </ul>	<p>The command word 'list' requires you to simply give a sequence of brief answers with no explanation</p> <p>If the question had asked you to 'outline' these sources, you would need to provide more information - for example:</p> <p>Unnatural sources:</p>

<p>mark]</p> <ul style="list-style-type: none"> <li>• Burning to clear forest / slash-and-burn; [1 mark]</li> <li>• Residential wood burning for heating; [1 mark]</li> </ul> <p><i>Natural sources of particulate pollution include:</i></p> <p>Any <b>two</b> from the following:</p> <ul style="list-style-type: none"> <li>• Volcanic eruptions; [1 mark]</li> <li>• (Natural) forest fires; [1 mark]</li> <li>• Dust storms; [1 mark]</li> </ul>	<ul style="list-style-type: none"> <li>• Combustion of fossil fuels in factories and power plants releases particulates, including soot and smoke</li> <li>• Exhaust from cars, trucks, and other vehicles contains particulate matter, especially from diesel engines</li> <li>• Construction sites can produce dust and other particulates during excavation and demolition works</li> </ul> <p>Natural sources:</p> <ul style="list-style-type: none"> <li>• Volcanic activity releases ash and other particulates into the atmosphere, contributing to particulate pollution</li> <li>• Large-scale wildfires emit smoke and ash, which can become airborne particulate matter</li> <li>• Wind erosion of soil and sand during dust storms can generate large amounts of particulate matter</li> </ul>
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2a

Indicative Content	Commentary
<p><i>Point source and non-point source pollution can be distinguished as follows:</i></p> <p>Any <b>two</b> from the following:</p> <ul style="list-style-type: none"> <li>• Point source pollution originates from a single source, whereas non-point source pollution comes from multiple/dispersed sources; [1 mark]</li> </ul>	<p>The command word 'distinguish' requires you to make clear the differences between two or</p>

- Point source pollution is easier to manage/clean up, whereas non-point source pollution is difficult to manage/clean up; [1 mark]
- Point source pollution can be more easily/clearly identified/monitored, whereas non-point source pollution is difficult/less clear to identify and monitor / often requires more resources; [1 mark]
- Solutions to point source pollution can be more straightforward to implement / can directly address the pollution, whereas solutions to non-point source pollution are more complex / may not directly stop the pollution; [1 mark]
- Point source pollution lends itself to easier compliance/(environmental) enforcement due to its single/localised origin, whereas non-point source pollution presents challenges in ensuring compliance/(environmental) enforcement because of its widespread/dispersed nature (harder to identify/regulate all contributing sources); [1 mark]

more concepts or items

Whenever you are asked to contrast or distinguish between two approaches, a good technique is to use the word 'whereas' in the middles of each of your contrasting points, to demonstrate to the examiner that you are directly contrasting one approach with the other

# Exam Papers Practice

2b

## Indicative Content

*Potential point sources of nutrient pollution causing eutrophication in a lake include:*

Any **one** from the following:

- Sewage outfall / effluent pipe discharging directly into the lake; [1 mark]
- Agricultural waste / manure enter the lake directly through drainage systems / waterways / illegal dumping; [1 mark]

- Industrial wastewater discharge containing high levels of nutrients; [1 mark]
- Untreated / inadequately treated stormwater runoff from urban areas; [1 mark]

*Potential non-point sources of nutrient pollution causing eutrophication in a lake include:*

Any **one** from the following:

- Agricultural runoff / erosion / leaching of fertilisers from a wide area surrounding the lake; [1 mark]
- Nutrient runoff from residential lawns/gardens where fertilisers are applied; [1 mark]
- Erosion of soil from construction sites/deforested areas, carrying nutrients into the lake; [1 mark]
- Natural decomposition of organic matter in the lake (e.g. fallen leaves / plant debris) releasing nutrients into the water; [1 mark]

3a

Indicative Content	Commentary
<p><i>The use of DDT is controversial because:</i></p> <p>Any <b>four</b> from the following:</p> <ul style="list-style-type: none"> <li>• DDT is known for its high effectiveness and affordability as an insecticide; [1 mark]</li> <li>• DDT can aid in managing insect-borne diseases like malaria/zika (but its use has raised concerns); [1 mark]</li> <li>• DDT is used in the control of agricultural pests, leading to improved harvests (but its environmental impact remains</li> </ul>	<p>The command word 'identify' requires you to provide a simple answer from a number of possibilities</p> <p>Dichlorodiphenyltrichloroethane (DDT) was widely used as a pesticide from the 1940s until it was banned in many countries in the 1970s due to its environmental and health impacts</p> <p>It is an example of a conflict between the utility of a 'pollutant' and its effect on the</p>



<p>controversial); [1 mark]</p> <ul style="list-style-type: none"> <li>• DDT's persistence as an organic pollutant can cause soil degradation / aquatic pollution; [1 mark]</li> <li>• The negative effects of DDT on human health are a major factor in the ongoing debate over its use; [1 mark]</li> <li>• DDT is known to bioaccumulate in the bodies of organisms (causing environmental and health concerns); [1 mark]</li> <li>• Through biomagnification, DDT concentration increases in food chains, impacting higher trophic levels/species; [1 mark]</li> <li>• The impact on non-target species e.g. birds of prey and other top carnivores, has raised ethical and ecological concerns; [1 mark]</li> <li>• The use of DDT has been associated with reduced biodiversity (making its ecological consequences a subject of controversy); [1 mark]</li> </ul>	<p>environment</p> <p>Ideally, you should consider both the utility of DDT in controlling pests/diseases, as well as its environmental impacts, when answering a question regarding the controversial nature of its use</p>
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3b

### Indicative Content

*The difference between primary and secondary pollution can be explained as follows:*

Any **one** from:

- Primary pollution is active upon emission of pollutant, whereas secondary pollution occurs when primary pollutants undergo some kind of physical or chemical change; [1 mark]

- Primary pollutants are directly emitted into the environment, whereas secondary pollutants form when primary pollutants undergo physical or chemical reactions in the atmosphere; [1 mark]
- Primary pollutants can be controlled by implementing emission reduction measures at the source (e.g. using cleaner technologies / stricter regulations, whereas the control of secondary pollution requires managing the precursor emissions (i.e. primary pollutants) / implementing strategies to minimise their reactions in the atmosphere; [1 mark]

*Examples of primary and secondary pollution include:*

Any **one** from:

- The primary pollutants nitrogen oxides / sulphur oxides combine with water to form nitric acid / sulphuric acid / acid rain; [1 mark]
- The primary pollutants nitrogen oxides and volatile organic compounds (VOCs) combine to form tropospheric ozone / photochemical smog; [1 mark]

4a

*The table could be completed as follows:*

Stage of Pollution Management	Strategy for Reducing Impacts of Eutrophication
1	Any <b>one</b> from the following: <ul style="list-style-type: none"> <li>• Engaging with local farmers to promote the adoption of sustainable farming practices; [1 mark]</li> <li>• Using organic fertilisers / manure in agricultural fields to reduce chemical runoff; [1 mark]</li> <li>• Implementing mixed cropping / crop rotation techniques to decrease the need for excessive fertilisers; [1 mark]</li> <li>• Conducting educational campaigns to promote the use of eco-friendly detergents / discourage the overuse of harmful detergents; [1 mark]</li> <li>• Encouraging individuals to practice restraint /</li> </ul>

	minimise their environmental impact; [1 mark]
2	<p>Any <b>one</b> from the following:</p> <ul style="list-style-type: none"><li>• Enforcing policies/legislation/standards that limit and reduce the permitted amount of fertiliser used; [1 mark]</li><li>• Establishing buffer zones between fields and water bodies to absorb / filter runoff; [1 mark]</li><li>• Exploring/implementing alternatives to phosphates in detergents; [1 mark]</li><li>• Regulating/banning detergents containing phosphates to prevent water pollution; [1 mark]</li><li>• Developing measures to extract pollutants from waste emissions / improve air quality; [1 mark]</li><li>• Implementing measures to prevent leaching of slurry/sewage from their sources / treating such waste before disposal; [1 mark]</li></ul>
3	<p>Any <b>one</b> from the following:</p> <ul style="list-style-type: none"><li>• Reintroducing / restocking fish / other animal species to restore ecological balance; [1 mark]</li><li>• Utilising water screening technology to remove pollutants from water bodies; [1 mark]</li><li>• Aeration through lakes to prevent low oxygen conditions and maintain aquatic life; [1 mark]</li><li>• Dredging sediments/mud from river / lake beds to improve water quality; [1 mark]</li><li>• Physical removal / targeted use of herbicides/algicides to control excess weed growth and restore ecosystems; [1 mark]</li></ul>



The table could be completed as follows:

Stage of Pollution Management	Strategy for Reducing Impacts of CFCs
1	<p>Any <b>one</b> from the following:</p> <ul style="list-style-type: none"> <li>• Implementing the use of alternative gases / substitutes to replace ODSs/CFCs; [1 mark]</li> <li>• Adopting alternative technologies e.g. replacing aerosol deodorants with roll-on deodorants; [1 mark]</li> <li>• Enforcing bans on the use of ODSs/CFCs / implementing international treaties/protocols e.g. the Montreal Protocol; [1 mark]</li> </ul>
2	<p>Any <b>one</b> from the following:</p> <ul style="list-style-type: none"> <li>• Implementing recycling programs to recover ODSs/CFCs from disused refrigerators; [1 mark]</li> <li>• Establishing emission standards/laws/regulations to control the release of ODSs/CFCs; [1 mark]</li> <li>• Promoting the use of more efficient technology to reduce the consumption of ODSs/CFCs; [1 mark]</li> </ul>
3	<p>Any <b>one</b> from the following:</p> <ul style="list-style-type: none"> <li>• Acknowledging that the complete removal of ODSs/CFCs from the atmosphere may not be possible/feasible; [1 mark]</li> <li>• Implementing measures to protect against increased UV radiation e.g. advising the use of sunscreen / protective clothing / avoiding exposure during the hottest part of the day; [1 mark]</li> <li>• Developing technologies to make buildings/materials more UV-resistant; [1 mark]</li> <li>• Engaging in the cultivation of improved crops with higher UV resistance / genetically modified organisms (GMOs) with enhanced UV resistance; [1 mark]</li> </ul>