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Environmental systems and societies
Standard level
Paper 2

5 May 2025

Zone A morning | **Zone B** morning | **Zone C** morning

Candidate session number

2 hours

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Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer two questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[65 marks]**.

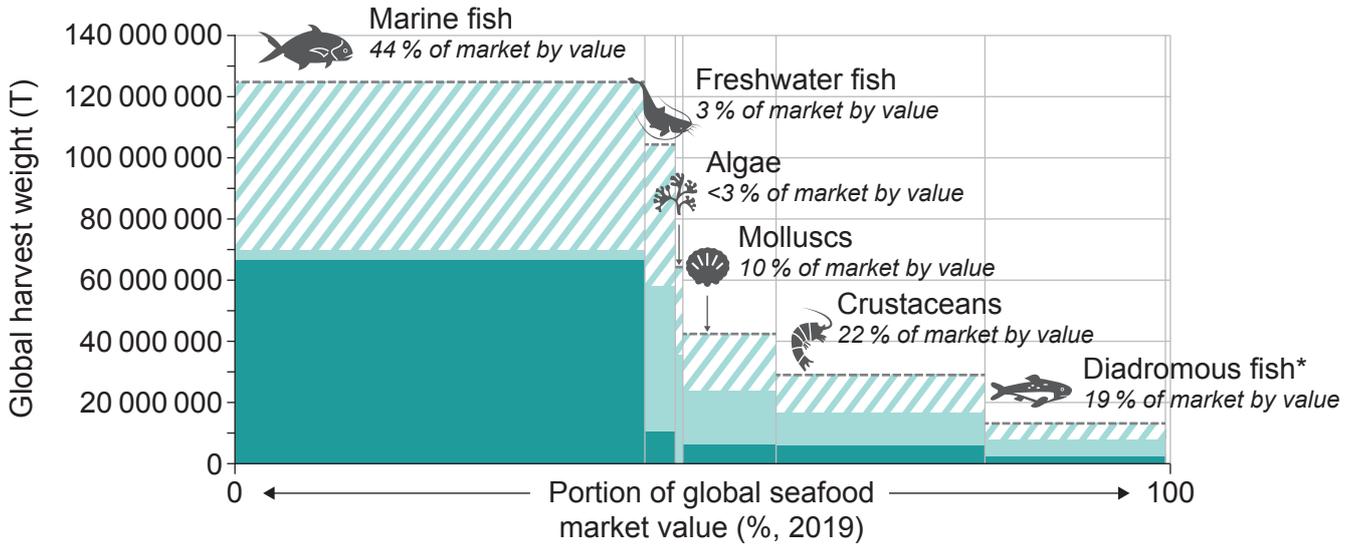


Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

Figure 1: Global seafood harvests for 2019 and projected harvest for 2050

Key: ■ capture (2019) ■ aquaculture (2019) ▨ projected harvest (2050)



*fish which migrate between marine and freshwater



1. (a) Identify the category with the lowest global harvest weight from aquaculture in **Figure 1**. [1]

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(b) (i) Using **Figure 1**, calculate the projected increase in the harvest of freshwater fish between 2019 and 2050. [1]

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(ii) Outline **one** reason for the increase referred to in (b)(i). [1]

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(c) Describe **two** possible reasons for the difference in the global aquaculture harvest between marine fish and molluscs in **Figure 1**. [2]

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(d) Evaluate the use of aquaculture in meeting the projected harvest of global seafood, as shown in **Figure 1**. [4]

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Figure 2(a): Ozone concentration by altitude in the atmosphere

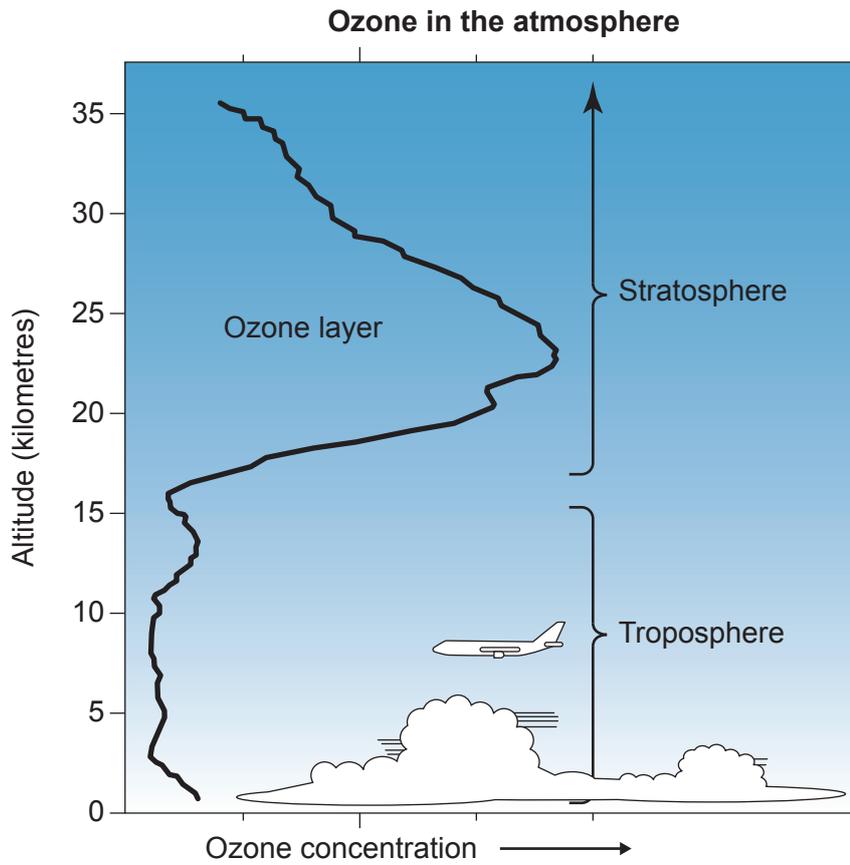
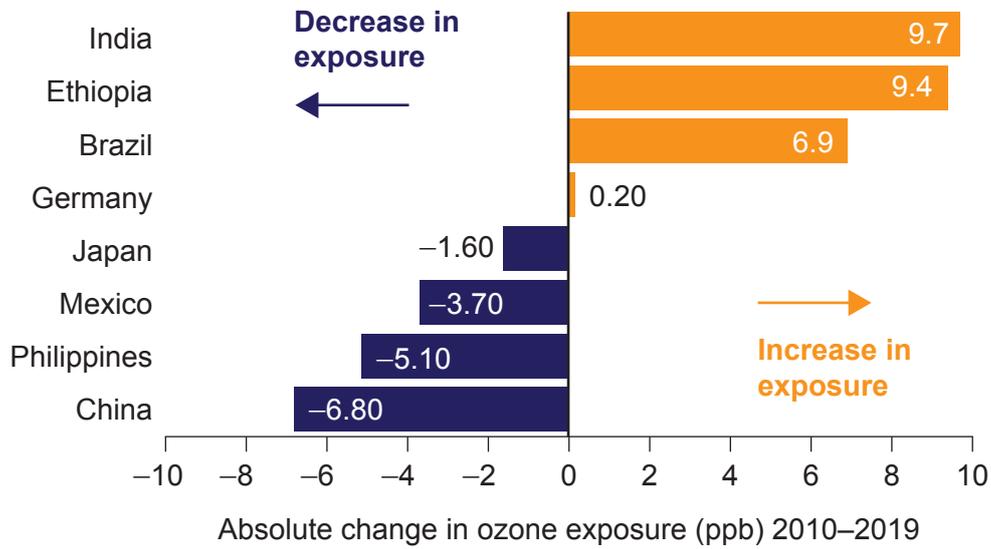


Figure 2(b): Percentage change in tropospheric ozone exposure 2010–2019



[Source: Reprinted with permission from Health Effects Institute 2020.]



2. (a) Identify the altitude with the highest concentration of ozone shown in **Figure 2(a)**. [1]

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(b) With reference to **Figure 2(a)**, describe reasons why a decreased concentration of ozone between 20 and 30 kilometres would have impacts on the earth's surface. [2]

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(c) State **one** possible impact of increased ground-level ozone concentration on human health. [1]

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(d) Outline **two** possible reasons for the change in ozone exposure for Brazil shown in **Figure 2(b)**. [2]

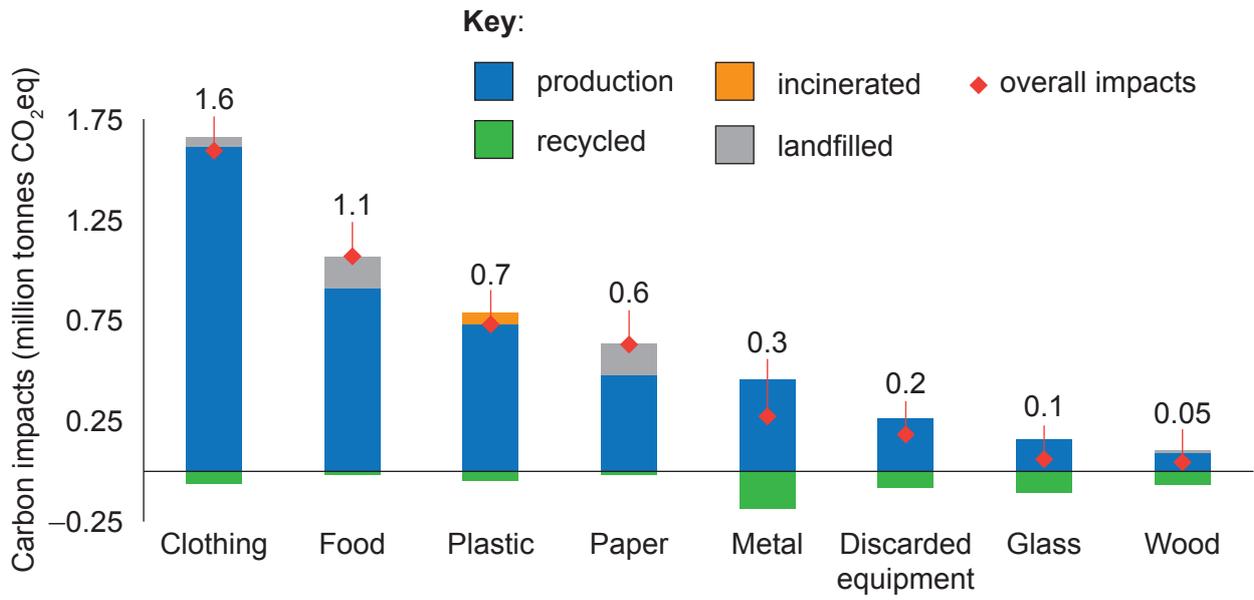
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(e) Outline **two** possible ways countries can reduce their tropospheric ozone exposure, as shown in **Figure 2(b)**. [2]

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Figure 3: Total carbon impacts of Scotland's 2018 household waste



3. (a) Identify the household waste category with the highest carbon impact from production in **Figure 3**. [1]

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(b) Describe **one** possible reason why paper waste has higher overall carbon impacts than metal waste in **Figure 3**. [1]

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(c) Outline **two** disadvantages of using landfill to dispose of food waste, as shown in **Figure 3**. [2]

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(d) Outline **two** disadvantages of recycling clothing as an approach to decreasing carbon impacts, as shown in **Figure 3**. [2]

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(e) Suggest **two** pollution management strategies that could be used to decrease the carbon impacts from paper waste in Scotland. [2]

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Section B

Answer **two** questions. Answers must be written within the answer boxes provided.

4. (a) Identify **four** characteristic features of the tundra biome. [4]
- (b) Explain how a community of carnivores contributes to the stability of the whole ecosystem. [7]
- (c) To what extent is an anthropocentric value system more appropriate than other value systems in addressing issues of sustainability? [9]
5. (a) Outline **four** ways in which atmospheric nitrogen and nitrogen oxides may influence natural ecosystems. [4]
- (b) Describe methods that could be used to assess the impact of an industrial effluent on the biotic index of a river. [7]
- (c) With reference to named examples, evaluate the role of ecotourism as part of the conservation strategy for species and habitats. [9]
6. (a) Outline **four** disadvantages of wind as a renewable source of energy. [4]
- (b) Evaluate **two** strategies for preventing overfishing. [7]
- (c) To what extent can technology address the impacts of overpopulation? [9]
7. (a) Outline the similarities and differences between *crude birth rate* and *doubling time*. [4]
- (b) Evaluate the use of reservoirs and drought-resistant crops as a means of sustainably managing water supply. [7]
- (c) Feedback is a concept relevant to many systems. Justify its usefulness in understanding the sustainability of named systems. [9]



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References:

- Figure 1** Graphic with permission from Rob Pettit (NewSeas), based on underlying 2019 production and value data from FAO FishStat.
- Figure 2(a)** Langematz, U. Stratospheric ozone: down and up through the anthropocene. *ChemTexts* 5, 8 (2019). <https://doi.org/10.1007/s40828-019-0082-7>. Open access article distributed under the terms of the Creative Commons CC BY 4.0 license <http://creativecommons.org/licenses/by/4.0/>. Source adapted (redrawn and simplified).
- Figure 2(b)** Health Effects Institute. 2020. *State of Global Air 2020. Special Report*. Boston, MA: Health Effects Institute.
- Figure 3** Saleemdeen, R., Saint, R., Pomponi, F., Pratt, K. & Lenaghan, M., 2022. Beyond recycling: An LCA-based decision-support tool to accelerate Scotland's transition to a circular economy. *Resources, Conservation & Recycling Advances*. <https://www.sciencedirect.com/science/article/pii/S2667378922000074>. Licensed under CC BY 4.0 <https://creativecommons.org/licenses/by/4.0/>. Source adapted.

