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Diploma Programme
Programme du diplôme
Programa del Diploma

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

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]**.

23 pages

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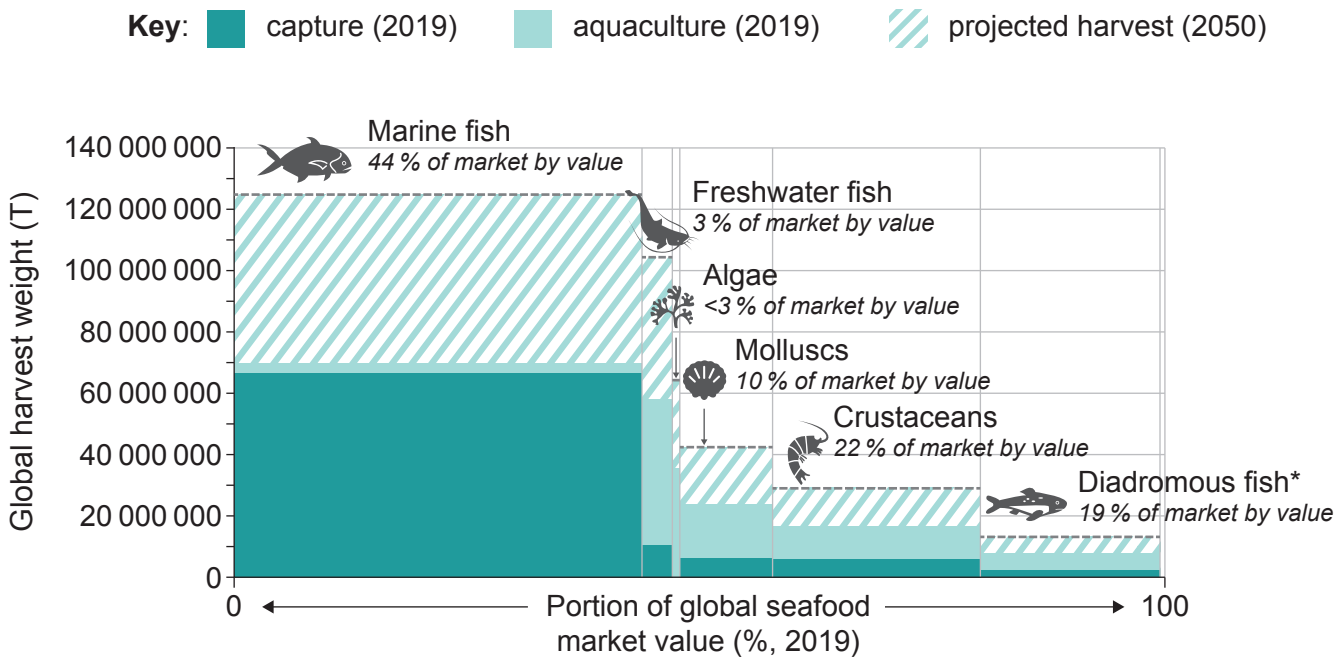
Section A

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

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



*fish which migrate between marine and freshwater

1. (a) Identify the category with the lowest proportion of seafood market value in **Figure 1**. [1]

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(b) (i) Using **Figure 1**, calculate the projected increase in the harvest of molluscs 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 between the marine fish capture harvest and aquaculture harvest 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

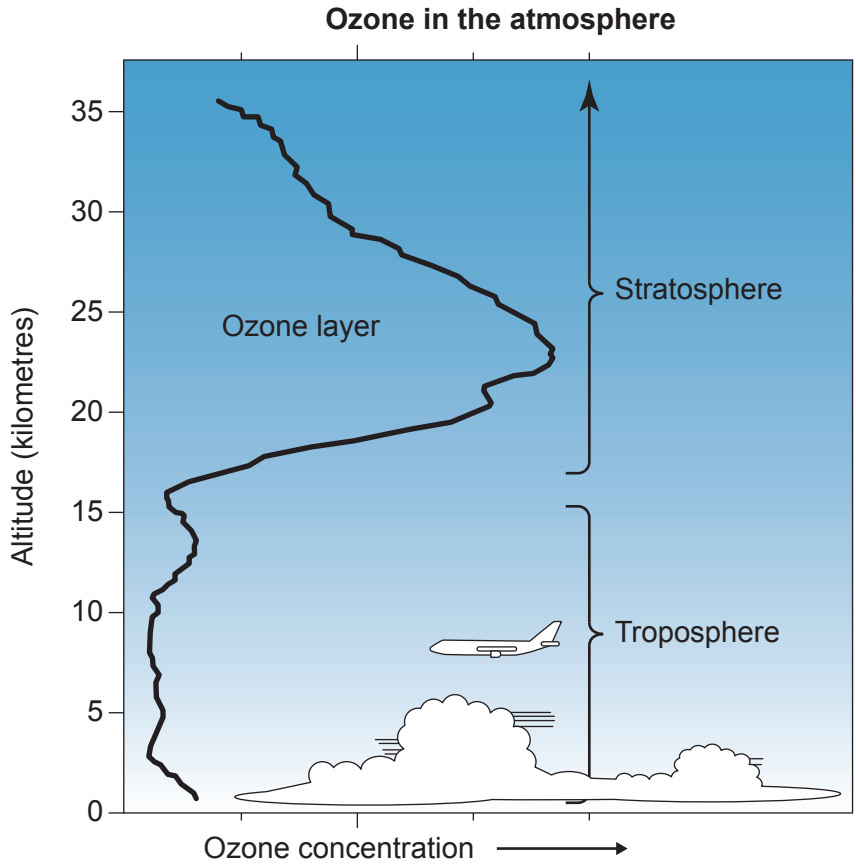
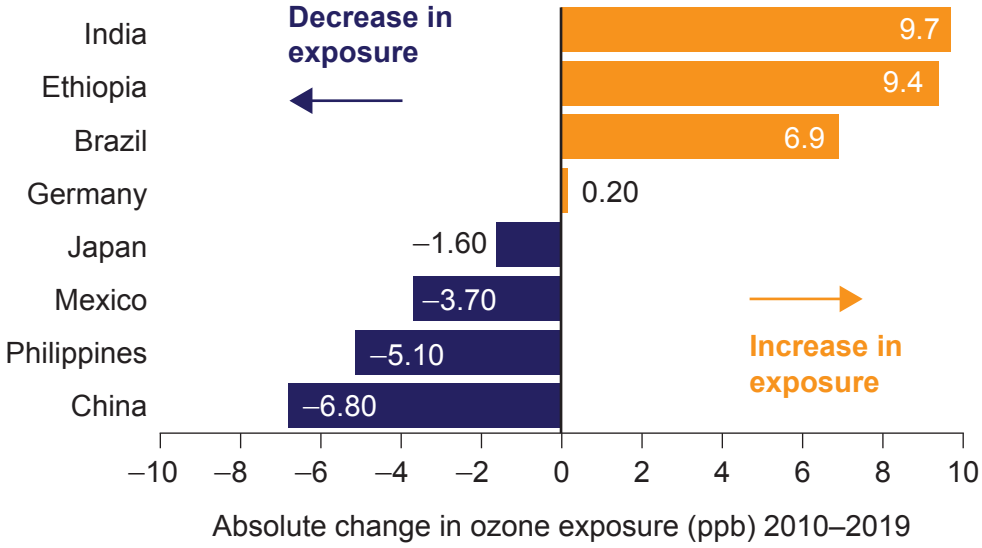


Figure 2(b): Percentage change in tropospheric ozone exposure 2010–2019



[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 how a decreased concentration of ozone between 20 and 30 kilometres can impact living organisms. [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 Ethiopia 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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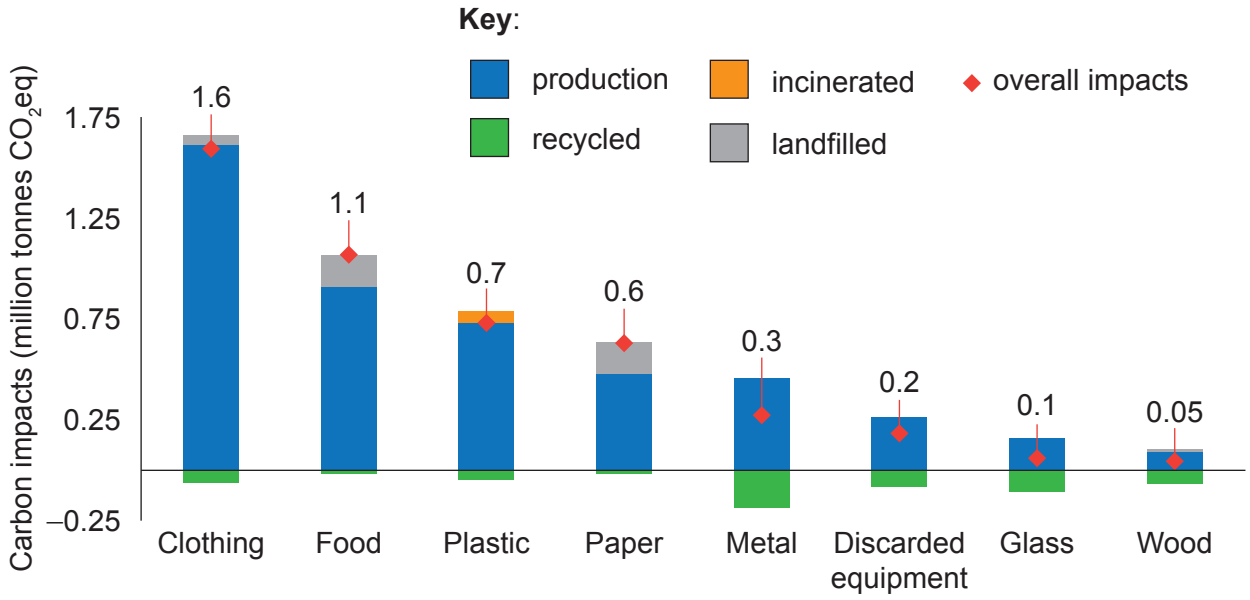
Figure 3: Total carbon impacts of Scotland's 2018 household waste



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

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

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

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(d) Outline **two** disadvantages of recycling plastic waste 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 clothing 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** differences between a climax community and a pioneer community. [4]

(b) Explain how a community of herbivores contributes to the stability of the whole ecosystem. [7]

(c) To what extent is an ecocentric value system more appropriate than other value systems in addressing issues of sustainability? [9]

5. (a) Outline **four** transfers of carbon that will influence its atmospheric storage. [4]

(b) Describe methods that could be used to measure a change in species diversity of invertebrates along a river. [7]

(c) With reference to named examples, to what extent is local involvement in conservation more valuable than international involvement? [9]

6. (a) Outline the similarities and differences between the terms *crude birth rate* and *total fertility rate*. [4]

(b) Evaluate **two** strategies for preventing the formation of photochemical smog. [7]

(c) To what extent are natural limiting factors likely to stabilise human population growth? [9]

7. (a) Outline **four** disadvantages of hydropower as a source of renewable energy. [4]

(b) Evaluate rainwater harvesting and desalination as a means of sustainably managing water supply. [7]

(c) A cycle 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 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 Salemdeeb, 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.