Diploma Programme
Programme du diplôme
Programa del Diploma

# Environmental systems and societies
# Higher level
# Paper 2

4 May 2026

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

Session number

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

2 hours 30 minutes

## Instructions to students

- 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 **[80 marks]**.

2226 – 4624

31 pages

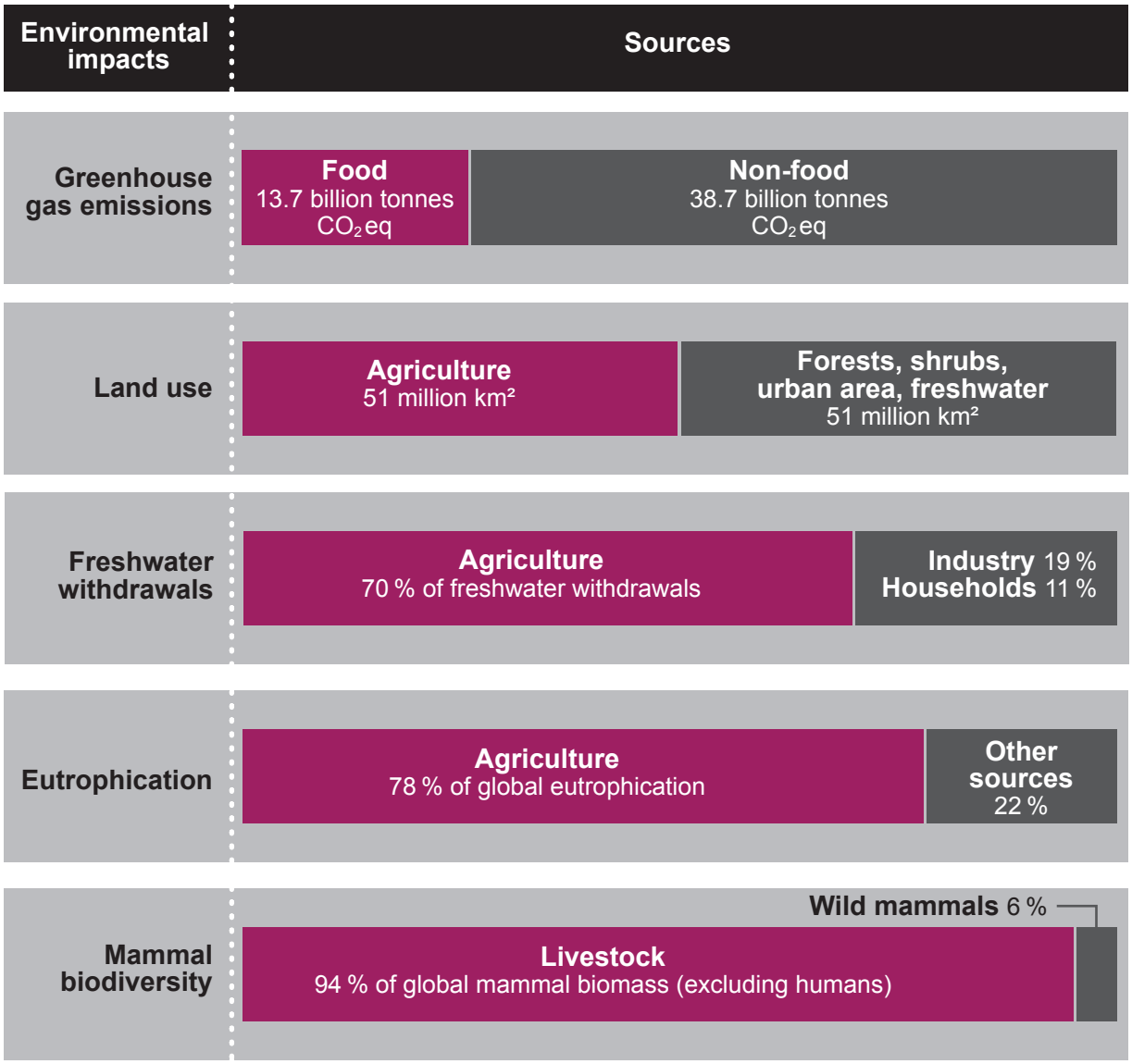
Please **do not** write on this page.

Answers written on this page
will not be marked.

## Section A

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

**Figure 1: Environmental impacts of agriculture**



**1.** (a) (i) Identify the environmental impact whose source is 78 % from agriculture. [1]

. . . . . .

. . . . . .

(ii) State **one** pollutant responsible for the environmental impact named in (a)(i). [1]

. . . . . .

. . . . . .

(iii) Describe **two** ways ecological services may be affected by the environmental impact of land use, shown in **Figure 1**. [2]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

(b) Calculate the percentage of greenhouse gas emissions that originate from food, shown in **Figure 1**. [1]

. . . . . .

. . . . . .

(c) Outline **two** actions that households can take to reduce the percentage of greenhouse gas emissions that originate from food. [2]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

**(This question continues on the following page)**

**(Question 1 continued)**

(d) Describe possible reasons for the difference between the biomass of livestock and wild mammals, shown in **Figure 1**. [2]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

(e) Discuss how a rights-based ethical approach to the environmental impacts associated with agriculture in **Figure 1** may be controversial within society. [3]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Citizen scientists play an increasingly important role in biodiversity monitoring.

A group of citizen scientists were asked to rate the importance of various motivating factors to collect data (**Figure 2(a)**). They were then asked what data they record during planned searches (**Figure 2(b)**) and about the locations of their planned searches (**Figure 2(c)**).

Their responses in **Figures 2(a)**, **2(b)** and **2(c)** are ordered by how important they were rated.

**Figure 2(a): Motivation for species data collection**

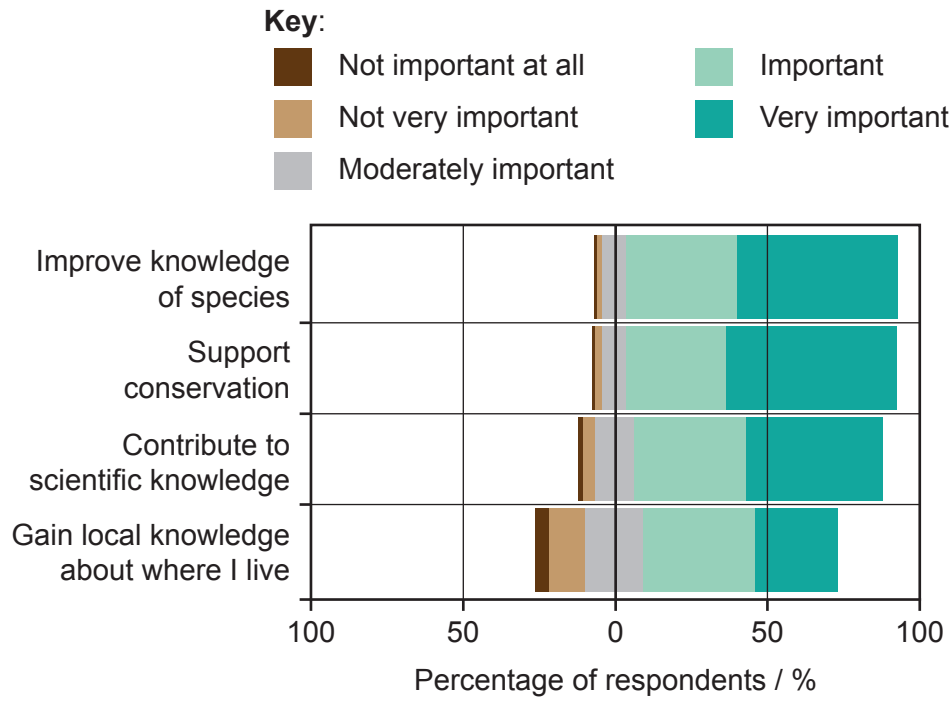


**Figure 2(b): Species recorded in searches**

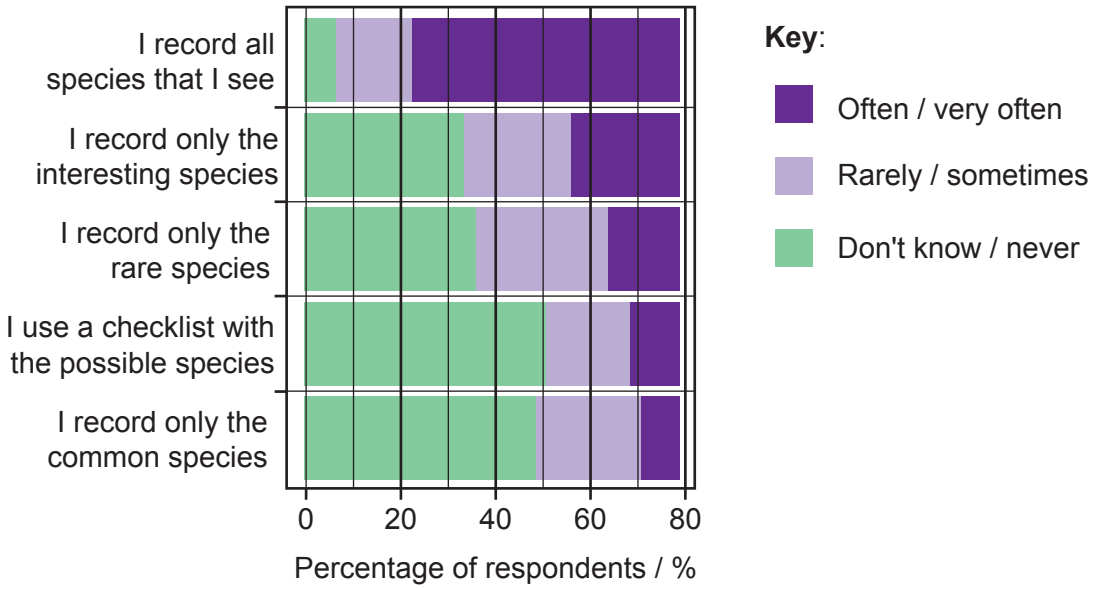
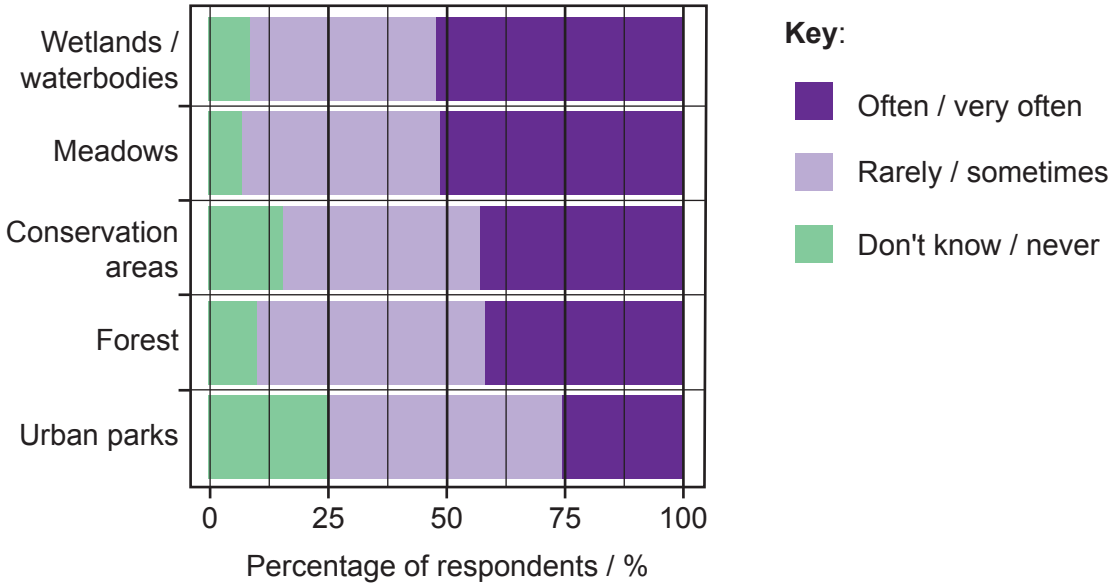



**Figure 2(c): Locations of searches**



**2.** (a) State the motivational factor with the highest percentage of "very important" responses, as shown in **Figure 2(a)**. [1]

. . . . . .
. . . . . .

(b) Identify the approximate percentage of citizen scientists who stated they record all species they see "often/very often", as shown in **Figure 2(b)**. [1]

. . . . . .
. . . . . .

(c) Outline possible reasons for the differences between citizen scientist responses to "Wetlands / waterbodies" and "Urban parks", as shown in **Figure 2(c)**. [2]

. . . . . .
. . . . . .
. . . . . .
. . . . . .

(d) Outline **one** method by which citizen scientists can collect data from the locations shown in **Figure 2(c)**. [1]

. . . . . .
. . . . . .

**(This question continues on the following page)**

**(Question 2 continued)**

(e) With reference to **Figure 2(a)**, **Figure 2(b)** and **Figure 2(c)**, evaluate the use of citizen science in collecting, monitoring and managing biodiversity data. [4]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

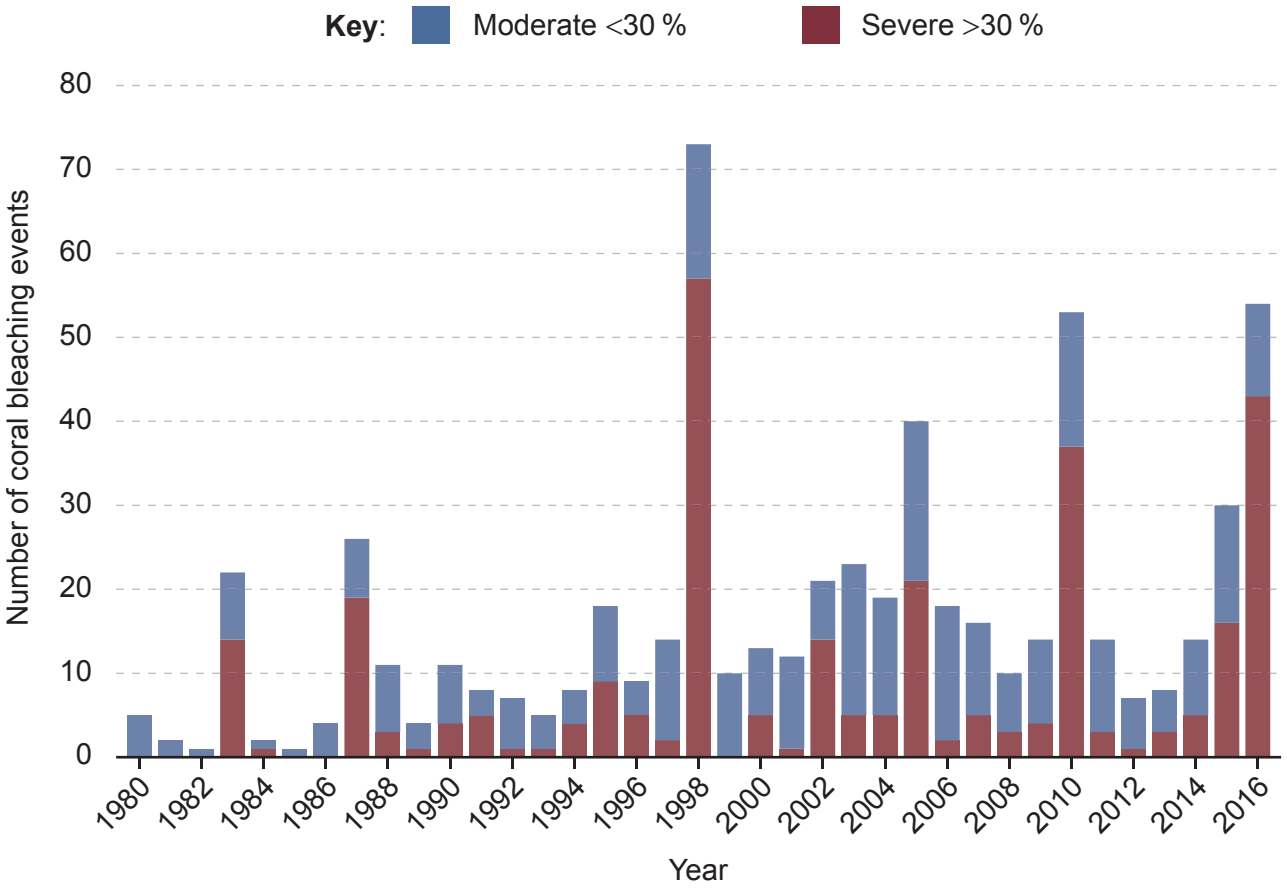
. . . . . .

. . . . . .

. . . . . .

2226–4624

**Figure 3: Number of coral bleaching events around the world, 1980–2016**



**3.** (a) Calculate the change in the number of severe coral bleaching events from 2015 to 2016 shown in **Figure 3**. [1]

. . . . . .

. . . . . .

(b) Outline **two** possible reasons for the coral bleaching events shown in **Figure 3**. [2]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

(c) Describe how coral bleaching events may impact the economies of coastal societies. [2]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

(d) Outline **two** limitations of environmental laws in addressing coral bleaching events. [2]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

(e) Describe how the concept of eco-economic decoupling might help reduce the potential for future coral bleaching events. [2]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

2226–4624

**Figure 4(a): Flash drought* frequency (1981–2000)**

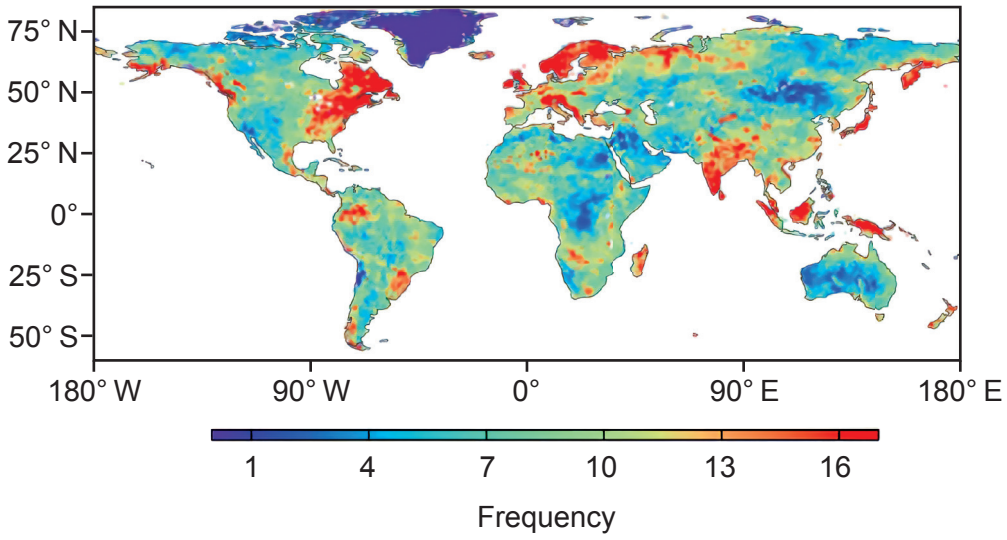



**Figure 4(b): Flash drought frequency (2001–2020)**

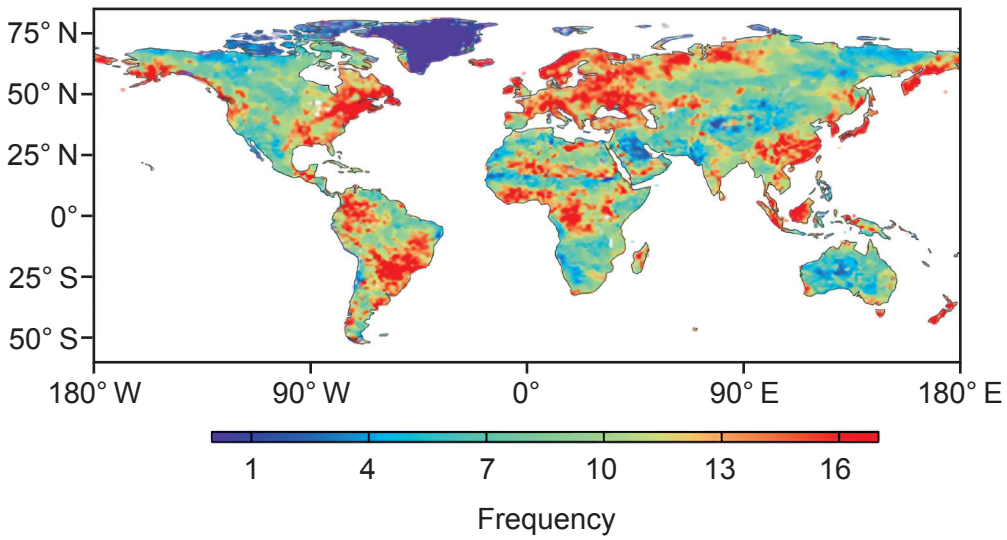
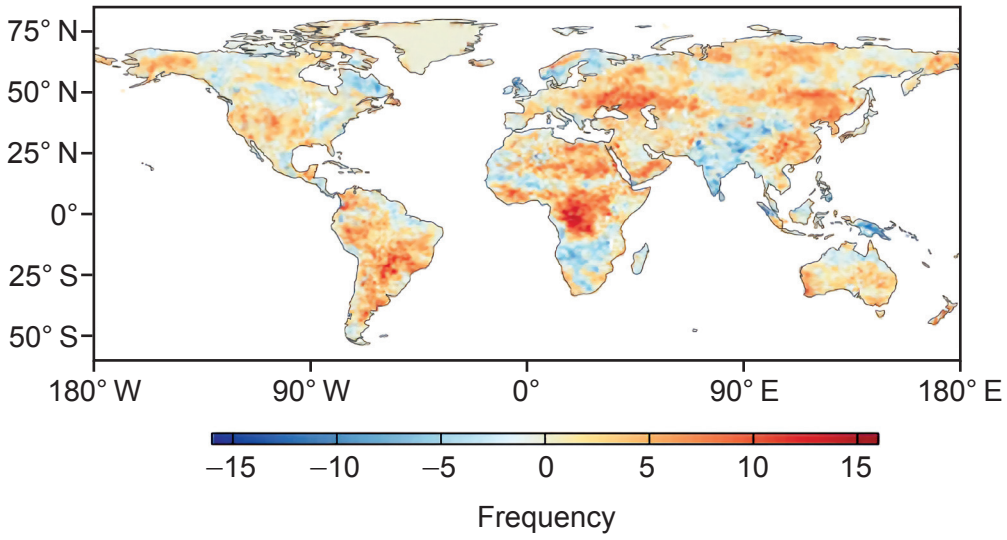


**Figure 4(c): Net flash drought frequency (2001–2020 minus 1981–2000)**




---

* flash drought: a type of intense drought with rapid onset, leaving farmers and other stakeholders little time for preparation. Thereby, flash droughts have greater impact on the agricultural and ecological sectors.

**4.** (a) Describe the overall trend of flash droughts between 1981–2000 and 2001–2020 in Asia, as shown in **Figure 4(a)** and **Figure 4(b)**. [2]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

(b) Outline **two** possible human causes for the change in frequency of flash droughts between 1981–2000 and 2001–2020, as shown in **Figure 4(a)** and **Figure 4(b)**. [2]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

(c) Identify the continent with the highest net flash drought frequency, as shown in **Figure 4(c)**. [1]

. . . . . .

. . . . . .

(d) Outline **two** ways in which governance can mitigate the impacts of flash droughts. [2]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

**(This question continues on the following page)**

**(Question 4 continued)**

(e) Explain how the changes in net frequency of flash droughts shown in **Figure 4(c)** can influence environmental migration and political stability. [3]

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

## Section B

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

**5.** (a) Outline why the hydrological cycle is considered a closed system. [4]

(b) Explain how the chemical and physical properties of water help to support and maintain living organisms. [7]

(c) To what extent could mitigation strategies be successful in bringing freshwater use back within the planetary boundary? [9]

**6.** (a) Outline the difference between carrying capacity and biocapacity, and the factors that influence both. [4]

(b) Discuss how government policies can increase or decrease human population growth. [7]

(c) To what extent is a technocentric approach the most effective way of increasing the biocapacity of a given area? [9]

**7.** (a) Identify **four** possible impacts of urban sprawl on the surrounding terrestrial ecosystems. [4]

(b) Using named examples for both, explain how the reintroduction of apex predators and keystone species can impact biodiversity. [7]

(c) To what extent do *ex situ* strategies play a more successful role in conserving biodiversity compared to *in situ* strategies? [9]

**Disclaimer:**

Content used in IB assessments is often taken from authentic, third-party sources. The views expressed within them belong to their individual authors and/or publishers and do not necessarily reflect the views of the IB. Sometimes fictitious companies, products or individuals are included in assessments; any similarities with actual entities are purely coincidental. Any trademarks™ or registered® trademarks included are used for illustrative purposes only, and use does not imply any affiliation with or endorsement by the International Baccalaureate.

**References:**


**Figure 1:** Hannah Ritchie, Pablo Rosado, and Max Roser (2022) - "Environmental Impacts of Food Production" Published online at OurWorldinData.org. Retrieved from: 'https://ourworldindata.org/environmental-impacts-of-food' [Online Resource]. Data source: Poore and Nemecek, 2018; UN FAO; UN AQUASTAT; Bar-on et al.,. Licensed under CC BY 4.0 https://creativecommons.org/licenses/by/4.0/. Source adapted.

**Figure 2:** (a): [Motivation for species data collection] Bowler, D.E., Bhandari, N., Repke, L. et al. Decision-making of citizen scientists when recording species observations. *Sci Rep* **12**, 11069 (2022). https://doi.org/10.1038/s41598-022-15218-2. Open access article licensed under CC BY 4.0 https://creativecommons.org/licenses/by/4.0/. Source adapted.

(b): [Species recorded in search] Bowler, D.E., Bhandari, N., Repke, L. et al. Decision-making of citizen scientists when recording species observations. *Sci Rep* **12**, 11069 (2022). https://doi.org/10.1038/s41598-022-15218-2. Open access article licensed under CC BY 4.0 https://creativecommons.org/licenses/by/4.0/. Source adapted.

(c): [Locations of searches] Bowler, D.E., Bhandari, N., Repke, L. et al. Decision-making of citizen scientists when recording species observations. *Sci Rep* **12**, 11069 (2022). https://doi.org/10.1038/s41598-022-15218-2. Open access article licensed under CC BY 4.0 https://creativecommons.org/licenses/by/4.0/. Source adapted.

**Figure 3:** Hannah Ritchie, Fiona Spooner, and Max Roser (2022) – "Biodiversity" Published online at OurWorldinData.org. Retrieved from: 'https://ourworldindata.org/biodiversity' [Online Resource]. Data source: Hughes, T. P., et al. (2018). Spatial and temporal patterns of mass bleaching of corals in the Anthropocene. *Science*. Licensed under CC BY 4.0 https://creativecommons.org/licenses/by/4.0/. Source adapted.

**Figure 4:** (a) [Flash drought frequency (1981–2000)] Zeng, Z., Wu, W., Peñuelas, J. et al. Increased risk of flash droughts with raised concurrent hot and dry extremes under global warming. *npj Clim Atmos Sci* **6**, 134 (2023). https://doi.org/10.1038/s41612-023-00468-2 Open access article licensed under CC BY 4.0 https://creativecommons.org/licenses/by/4.0/. Source adapted.

(b) [Flash drought frequency (2001–2020)] Zeng, Z., Wu, W., Peñuelas, J. et al. Increased risk of flash droughts with raised concurrent hot and dry extremes under global warming. *npj Clim Atmos Sci* **6**, 134 (2023). https://doi.org/10.1038/s41612-023-00468-2 Open access article licensed under CC BY 4.0 https://creativecommons.org/licenses/by/4.0/. Source adapted.

(c) [Net flash drought frequency (2001–2020 minus 1981–2000)] Zeng, Z., Wu, W., Peñuelas, J. et al. Increased risk of flash droughts with raised concurrent hot and dry extremes under global warming. *npj Clim Atmos Sci* **6**, 134 (2023). https://doi.org/10.1038/s41612-023-00468-2 Open access article licensed under CC BY 4.0 https://creativecommons.org/licenses/by/4.0/. Source adapted.