Diploma Programme
Programme du diplôme
Programa del Diploma

Environmental systems and societies
Standard level
Paper 2

Monday 5 November 2018 (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]**.

8818–6303

24 pages

Section A

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

1. **Figures 1(a)** and **1(b)** show the availability of renewable freshwater per capita in 2013 and its predicted availability in 2040.

Figure 1(a): Water stress by country in 2013

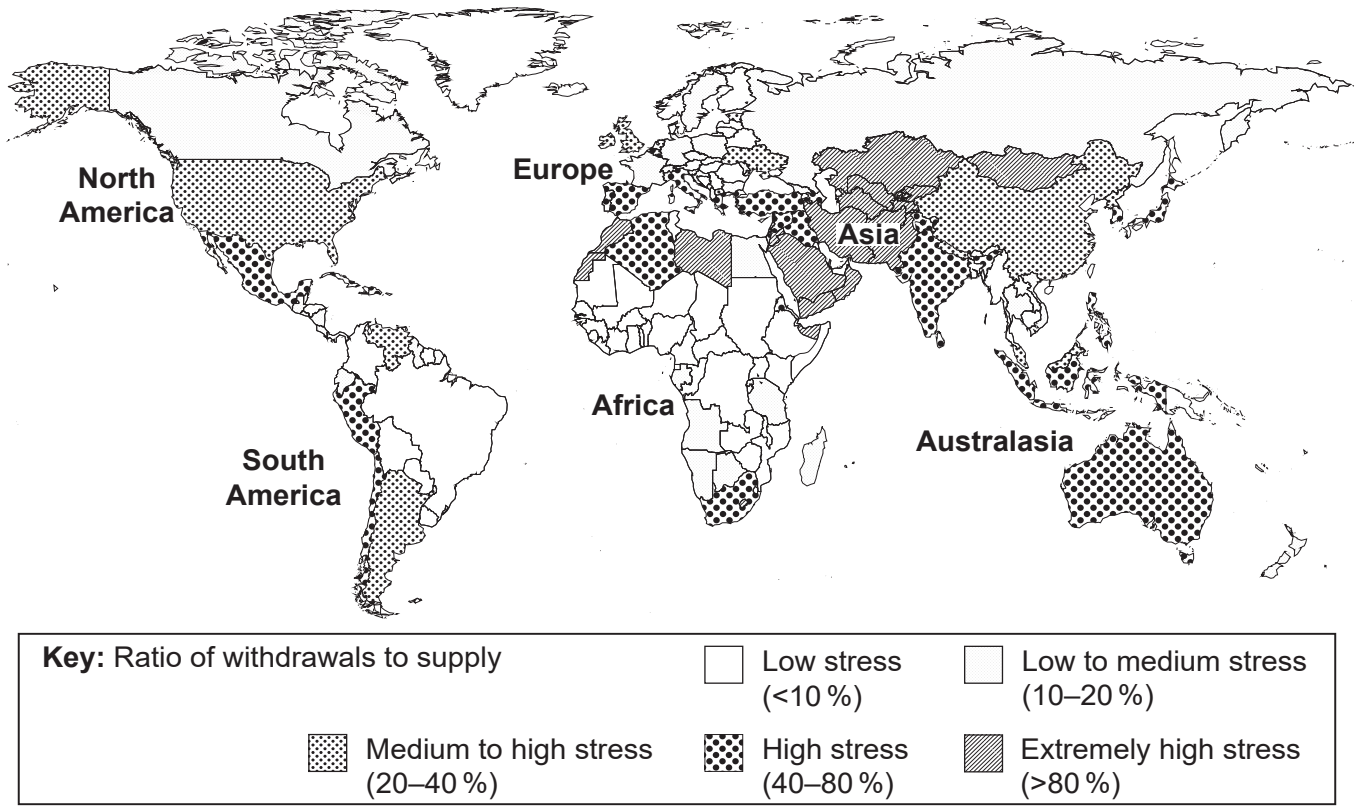
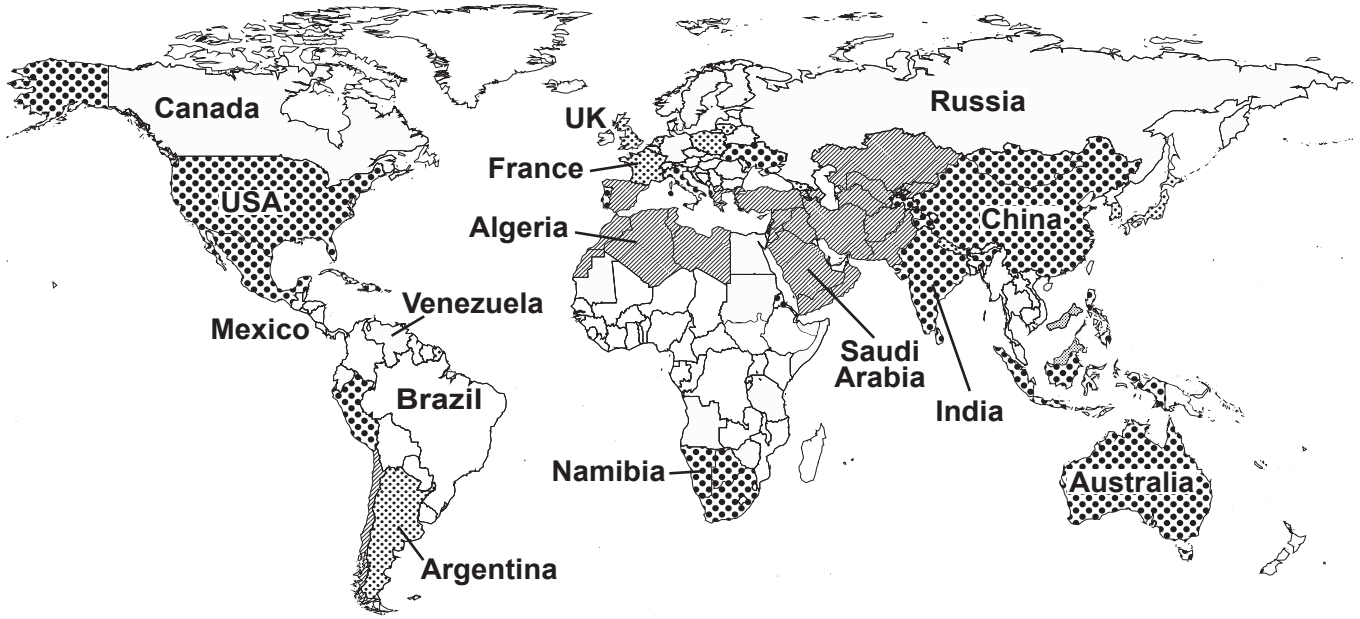


Figure 1(b): Predicted water stress by country in 2040



[Source: Maps adapted from www.wri.org. File licensed under CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/)]

(This question continues on the following page)

(Question 1 continued)

(a) Using **Figures 1(a)** and **1(b)**:

(i) State **one** country with no expected change in water stress between 2013 and the 2040 prediction. [1]

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(ii) State **one** difference in water scarcity between 2013 and the 2040 prediction. [1]

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(b) Outline how climate change may affect the availability of freshwater resources. [2]

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(c) Describe **two** water management strategies that can reduce water scarcity. [2]

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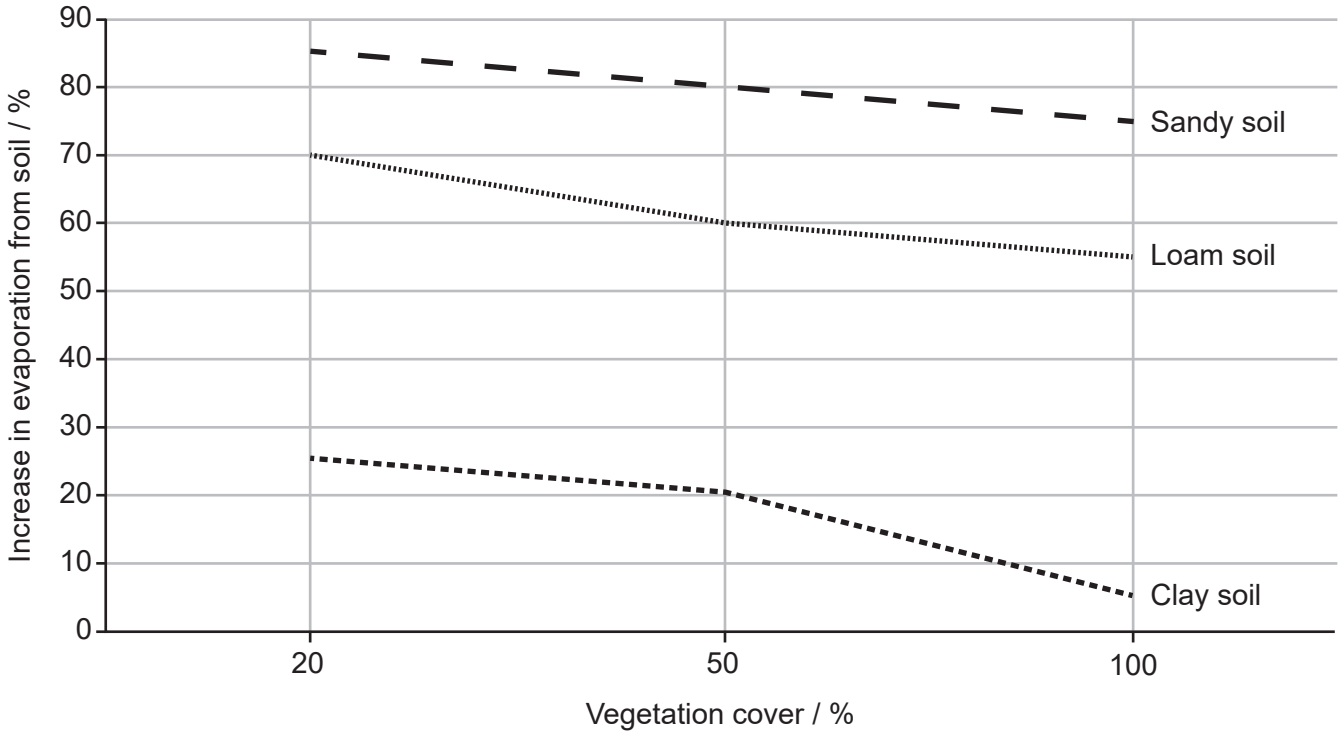
Please **do not** write on this page.

Answers written on this page
will not be marked.

(Question 1 continued)

Figure 2: Relationship between vegetation cover and evaporation from different soil types



(d) (i) Describe the overall trend for sandy soil shown in **Figure 2**. [1]

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(ii) Calculate the change in evaporation from clay soil when the vegetation cover changes from 50 % to 100 %. [1]

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(e) Outline **two** reasons why loam soils are the most productive for plant growth. [2]

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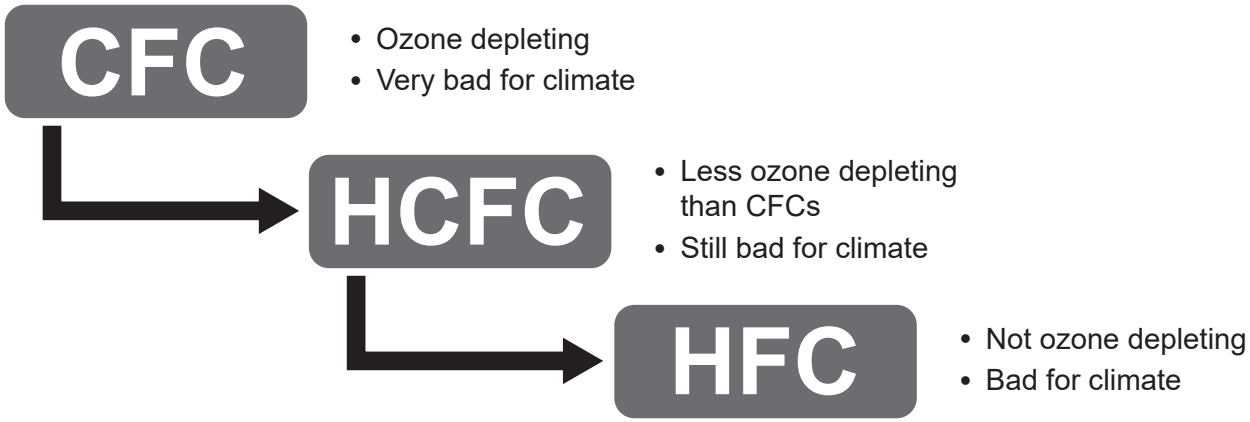
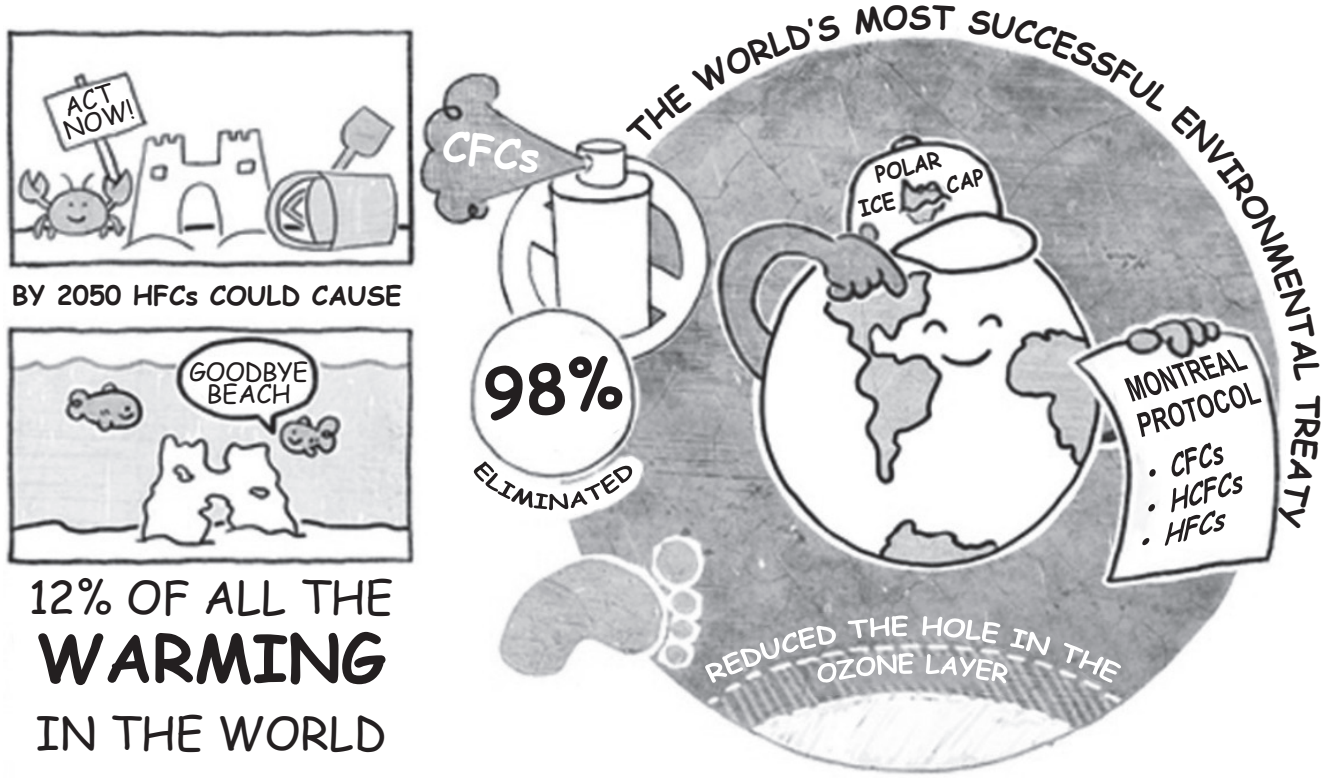
2. The hole in the ozone layer over Antarctica, discovered in the 1980s, was caused by chlorofluorocarbons (CFCs). The Montreal Protocol requires the use of hydrochlorofluorocarbons (HCFCs) or hydrofluorocarbons (HFCs) instead of CFCs (**Figure 3**). However, these two gases are also linked to environmental problems (**Figure 4**).

Figure 3: Comparison of the effects of CFCs, HCFCs and HFCs



[Source: Avipsa Mahapatra, Climate Lead, Environmental Investigation Agency, Washington D.C.]

Figure 4: HCFCs and HFCs cause less damage than CFCs but still affect the environment



[Source: © 2016 Cognitive www.wearecognitive.com / Children's Investment Fund Foundation (CIFF) www.ciff.org]

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(Question 2 continued)

(a) Identify **two** possible consequences for life on Earth resulting from the depletion of stratospheric ozone. [2]

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(b) Outline why the Montreal Protocol may be considered the world's most successful environmental treaty. [2]

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(c) Outline why governments agreed to phase out the use of HFCs from 2019 in the Kigali Amendment to the Montreal Protocol. [2]

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(d) (i) Identify **one** advantage of staggered dates for the phasing out of HFCs for countries at different levels of economic development. [1]

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(ii) Identify **one** disadvantage of staggered dates for the phasing out of HFCs for countries at different levels of economic development. [1]

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3. Many countries produce large amounts of solid domestic waste. Pacific Ocean currents concentrate and trap solid domestic waste from the Pacific Rim countries and have created the Great Pacific Garbage Patch (GPGP) in the North Pacific Gyre (**Figure 5**).

Figure 5: Pacific Ocean currents responsible for the North Pacific Gyre

Figure 5 removed for copyright reasons

Figure 6: Consumption and disposal of plastic waste for India and selected Pacific Rim countries

Country	Plastic consumption (kg per capita)	Plastic waste deposited in ocean (kg per capita)*
China	62	20
India	13	2.5
Japan	90	2.5
USA	132	3

* estimated for 2017 based on 10 % growth

[Source: http://timesofindia.indiatimes.com, http://jbdrgarbagepatch.blogspot.co.uk and http://www.pardos-marketing.com]

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(Question 3 continued)

(a) Identify **one** reason why most plastics may be considered more serious pollutants than other forms of solid domestic waste. [1]

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(b) Describe a strategy for the removal of plastics from the Great Pacific Garbage Patch. [2]

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(c) Explain why the data in **Figure 6** show no correlation between plastic consumption and plastic waste deposited in ocean for the countries listed. [4]

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Section B

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

4. (a) Outline **two** ecosystem services in a named biome. [4]

(b) Explain the causes, and the possible consequences, of the loss of a named critically endangered species. [7]

(c) Using examples, discuss whether habitat conservation is more successful than a species-based approach to protecting threatened species. [9]

5. (a) Outline the factors that lead to different environmental value systems in contrasting cultures. [4]

(b) Explain why the harvesting of a named aquatic species may be controversial. [7]

(c) Discuss strategies that can be used to improve the sustainability of food production systems. [9]

6. (a) Outline how feedback loops are involved in alternate stable states and the tipping points between them. [4]

(b) In 2016, the Earth's atmospheric levels of carbon dioxide reached 400 ppm. Suggest the potential impacts of high levels of greenhouse gases on human societies in different locations. [7]

(c) Discuss the consequences of changing global per capita meat consumption on the conservation of ecosystems and biodiversity. [9]

7. (a) Outline how demographic tools can be used to study a human population. [4]

(b) Urban air pollution can become a problem as human populations develop. Evaluate urban air pollution management strategies at the three levels of intervention. [7]

(c) Examine the driving factors behind the changing energy choices of different countries using named examples. [9]