Cambridge International Examinations
Cambridge International Advanced Subsidiary Level

CANDIDATE
NAME

CENTRE
NUMBER

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ENVIRONMENTAL MANAGEMENT **8291/22**

Paper 2 Hydrosphere and Biosphere **May/June 2018**

1 hour 30 minutes

Additional Materials: Answer Booklet/Paper

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

Section A
Answer **all** questions in this section.
Write your answers in the spaces provided on the question paper.

Section B
Answer **one** question from this section.
Write your answers on the separate answer paper provided.

At the end of the examination,
1.   fasten all separate answer paper securely to the question paper;
2.   enter the question number from Section B in the grid.

	For Examiner's Use
Section A	
1	
2	
Section B	
Total	

This document consists of **12** printed pages and **4** blank pages.

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International Examinations

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Section A

Answer **all** questions in this section.

Write your answers in the spaces provided.

1 (a) Table 1.1 shows the approximate residence time for some major water stores. Residence time is the time water spends in a particular water store.

Table 1.1

water store	approximate residence time
glaciers	10 to 10 000 years
deep groundwater	10 000 years
shallow groundwater	100 to 200 years
lakes	10 to 100 years
living organisms	1 week
oceans	4000 years
rivers	2 weeks to 6 months
soil moisture	2 weeks to 1 year

(i) State the water store with the lowest approximate residence time in Table 1.1.

....[1]

(ii) With reference to Table 1.1, suggest why the residence times given in Table 1.1 are approximate.

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....[2]

(b) Fig. 1.1 is a newspaper extract about an incident of river pollution in Brazil.

November 2015

River and sea threatened by industrial sludge

Dams holding 50 million cubic metres of iron-mine waste collapsed and discharged a flood of thick, red, toxic sludge. The sludge covered a small town and made its way into the River Doce. A 650 km stretch of the river was affected. The sludge greatly increased the concentration of suspended particles in the water and drastically reduced the oxygen levels. People living in the area are now dependent on supplies of bottled water. Two weeks later the water in the estuary (where the river joins the sea) turned brown. The pollution then spread out along the coast, affecting a nature reserve containing nesting sites of the endangered leatherback turtle.

Fig. 1.1

(i) State the source of the river pollution referred to in Fig. 1.1.

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....[1]

(ii) With reference to Fig. 1.1, describe how the river became polluted.

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....[1]

(iii) Suggest the effects of the pollution on the quality of the river water. Refer to Fig. 1.1 in your answer.

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....[4]

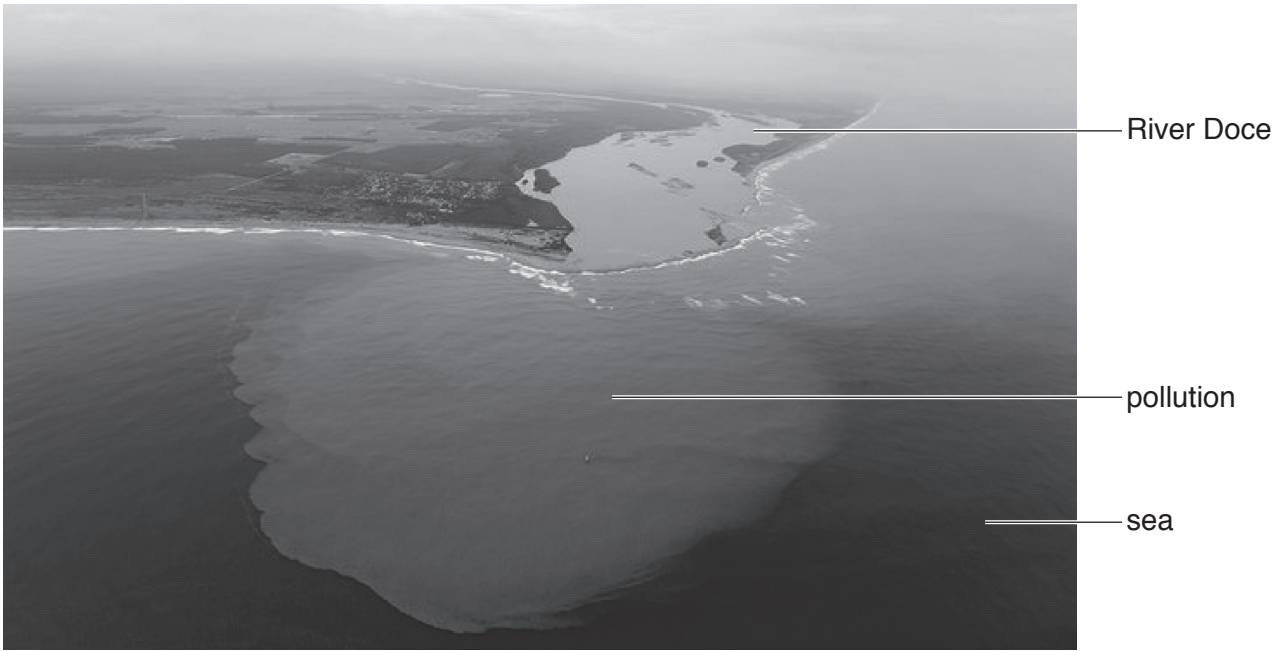**(iv)** Fig. 1.2 shows the distribution of the pollution where the River Doce flows into the sea.

Fig. 1.2

Explain the distribution of the pollution in the sea shown in Fig. 1.2.

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....[2]

(v) Describe the possible effects of industrial pollution on coastal and marine environments. Refer to **Fig. 1.1** in your answer.

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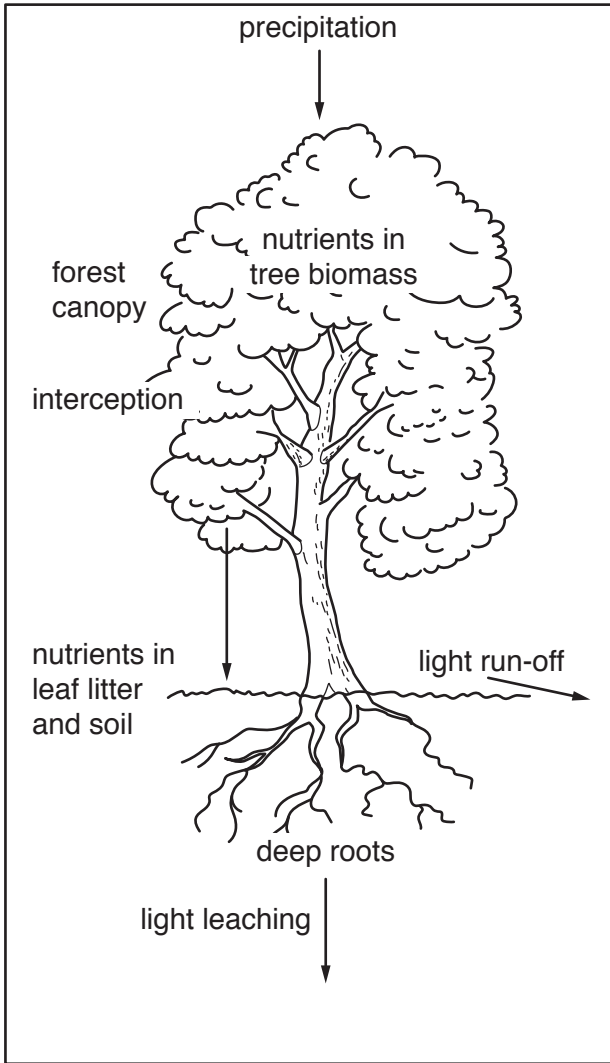
(c) Briefly describe strategies that can be used to manage river pollution.

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[Total: 20]

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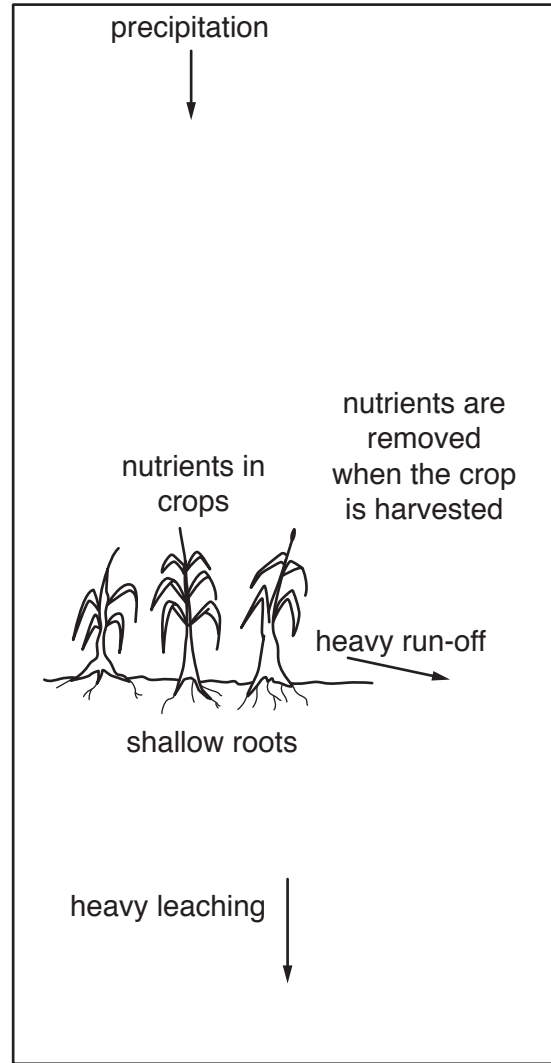**2 (a)** Fig. 2.1 shows part of a natural forest ecosystem before deforestation. Fig. 2.2 shows agriculture on the same land after deforestation.

Before deforestation

Fig. 2.1

Agriculture after deforestation

Fig. 2.2

(i) State **one** abiotic and **one** biotic component in a natural forest ecosystem.

abiotic ....

biotic ....

[2]

(ii) With reference to Fig. 2.1, describe how the biotic and abiotic components of a natural forest ecosystem interact.

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....[4]

(iii) With reference to Fig. 2.1 and Fig. 2.2, explain the environmental effects of deforestation **and** then using the land for agriculture.

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....[4]

(b) Fig. 2.3 shows agroforestry. This is one way of changing the agricultural system to be more sustainable. In agroforestry, crops are grown as part of a forest ecosystem.

coffee crops

Fig. 2.3

Describe and explain how agroforestry can help restore and conserve forest ecosystems. Refer to Fig. 2.1, Fig. 2.2 and Fig. 2.3 in your answer.

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....[5]

(c) Another strategy for conserving a forest ecosystem sustainably is to encourage ecotourism.

Outline the benefits of ecotourism in the sustainable development of ecosystems.

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....[5]

[Total: 20]

Section B

Answer **one** question from this section.

Write your answers on the separate answer paper provided.

3   Table 3.1 shows the area of agricultural land that was irrigated in 1973 and 2013 and the percentage of cultivated land that was irrigated by region in 2013.

Table 3.1

region	area of irrigated land in 1973 / million ha	area of irrigated land in 2013 / million ha	percentage of cultivated land irrigated in 2013
Africa	8.7	15.6	5.8
Asia	132.8	232.7	40.9
Europe	18.6	21.4	7.3
North America	27.1	34.3	14.9
Oceania	1.6	3.3	6.8
South America	6.3	16.0	10.5

(a) With reference to Table 3.1, compare the changes in the area of irrigated land from 1973 to 2013. Suggest reasons for the regional differences in the percentage of cultivated land irrigated in 2013.   [10]

(b) Describe the impact of agricultural use on water resources. Describe management strategies aimed at protecting natural supplies of fresh water.   [30]

[Total: 40]

4 Fig. 4.1 shows the total global population between 1800 and 2015.
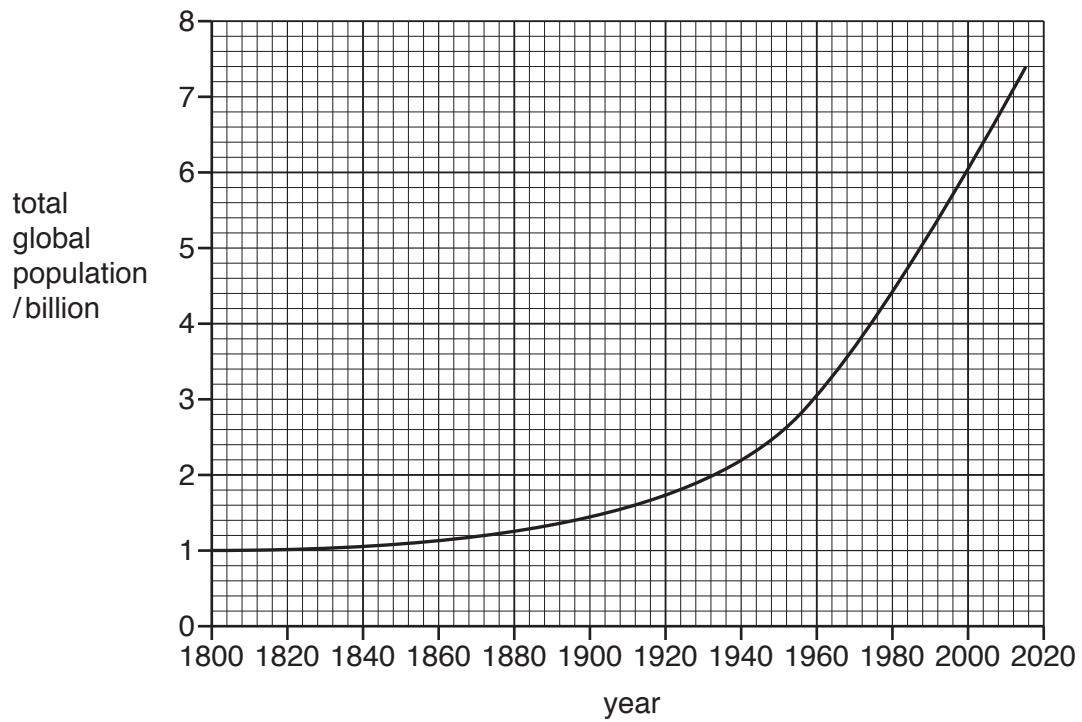
Fig. 4.1

(a) In the year 1800, the total global population was about one billion.

Use Fig. 4.1 to describe and explain the trends in the time taken to increase the global population by each additional one billion. [10]

(b) Describe the effectiveness of policies used to manage human population size in achieving an optimum population. Refer to examples in your answer. [30]

[Total: 40]

5 Fig. 5.1 shows a diagram of a cross-section through an island of Tuvalu in the Pacific Ocean.
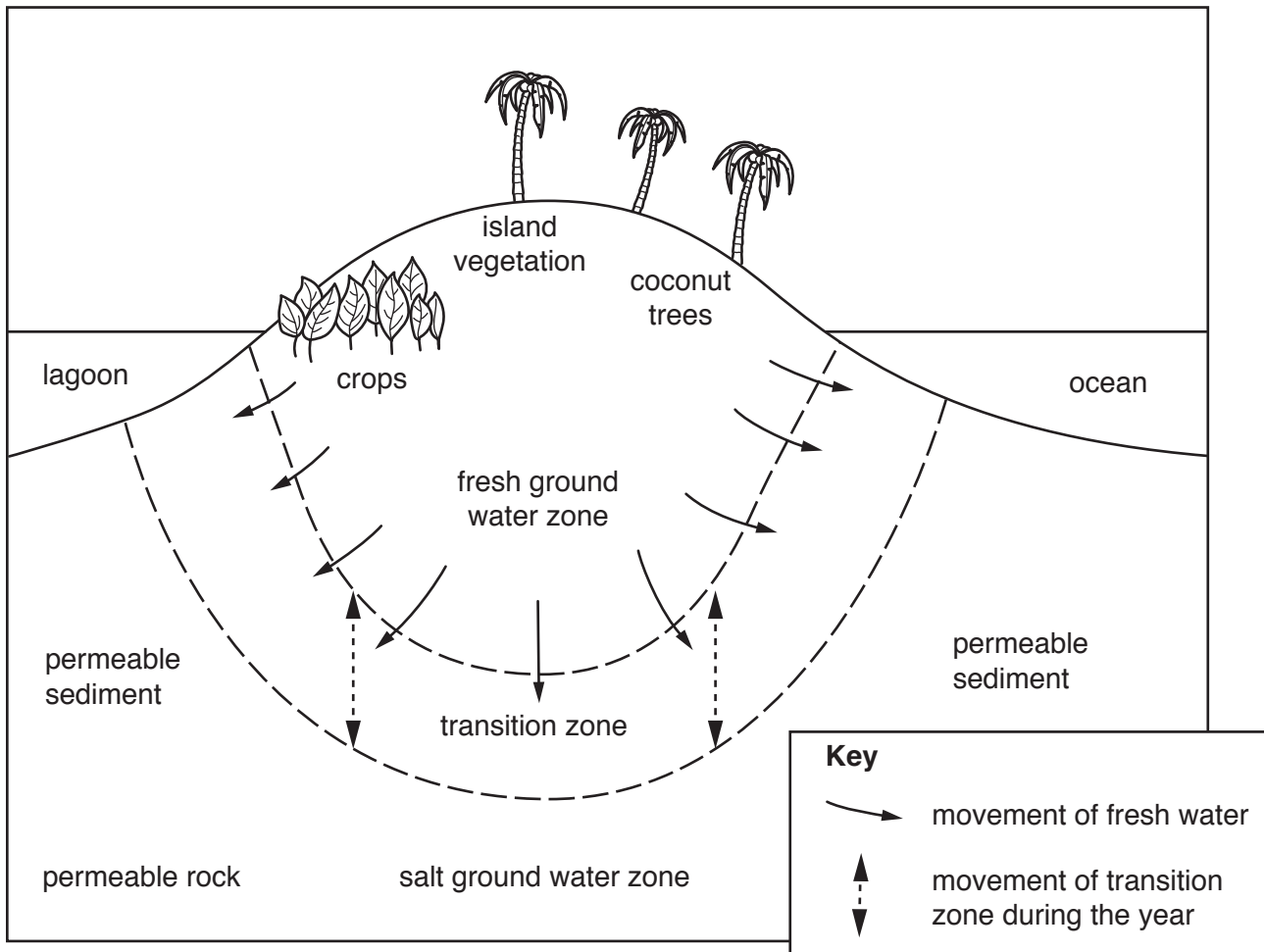
Fig. 5.1

(a) Describe and explain the impact of rising sea levels on islands such as the one shown in Fig. 5.1. [10]

(b) Describe the impact of global warming on global water stores. Using examples, discuss how successfully countries can manage changing water stores. [30]

[Total: 40]

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