Cambridge Assessment International Education

Cambridge International AS Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

ENVIRONMENTAL MANAGEMENT **8291/22**

Paper 2 Management in Context **October/November 2025**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **24** pages. Any blank pages are indicated.

[Turn over

1 Bangladesh is a country in Asia.

Bangladesh is classified as a country with a lower middle-income economy.

(a) (i) Bangladesh has an area of 147 630 km^2. In 2022, the population was 172 940 000.

Calculate the population density for Bangladesh in 2022.

Give your answer as a whole number.

..... people / km^2 [2]

(ii) Describe how environmental factors influence population density.

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..... [4]

(b) Fig. 1.1 shows part of the population pyramid for Bangladesh.

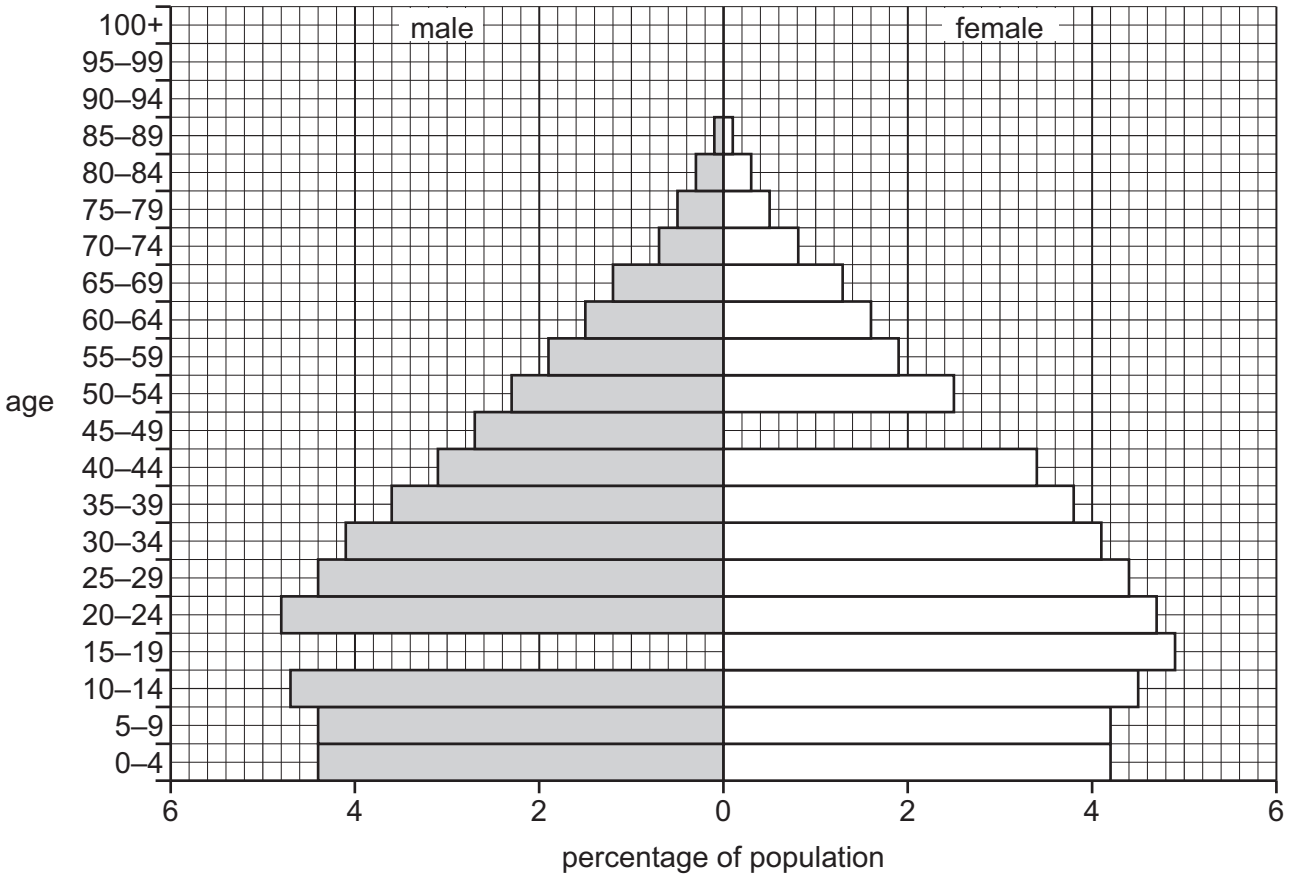

Fig. 1.1

Complete Fig. 1.1 using the data in Table 1.1.

Table 1.1

	percentage of population	
age	**male**	**female**
15−19	5	
45−49		3

[2]

(c) Fig. 1.2 shows the past and predicted trend in population for Bangladesh.

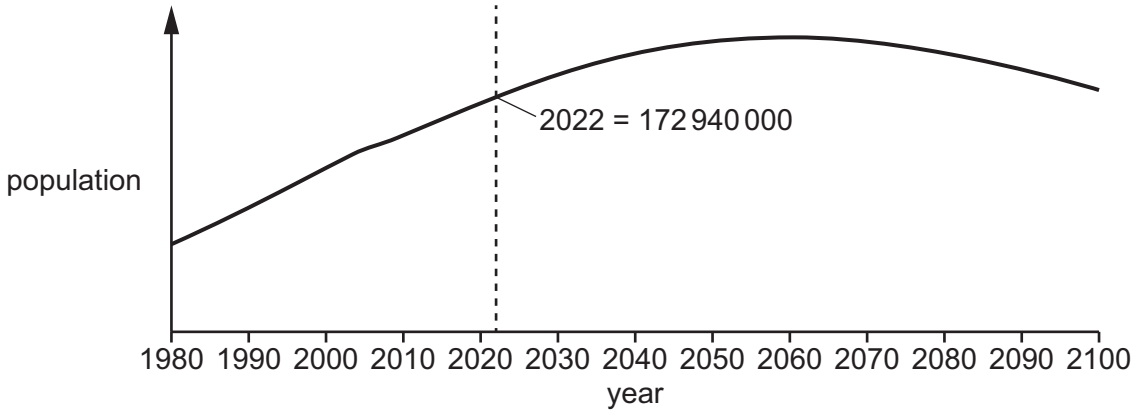

Fig. 1.2

Suggest reasons for the trend in the predicted population for Bangladesh.

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..... [4]

(d) The vulnerability of a country to climate change and its readiness to adapt to climate change is estimated in a report.

Countries are given a score and a rank out of 182 countries. The highest score has a high rank of 1. A high rank shows a country is less vulnerable and more ready to adapt to climate change.

Table 1.2 shows this data for three countries in 2020.

Table 1.2

country	score	rank
Norway	75.4	1
Bangladesh	36.9	164
Chad	26.7	182

(i) The report stated that it will take more than 100 years for current low-ranking countries to reach the scores of current high-ranking countries.

Suggest why this statement is a concern for Bangladesh.

.....

.....

.....

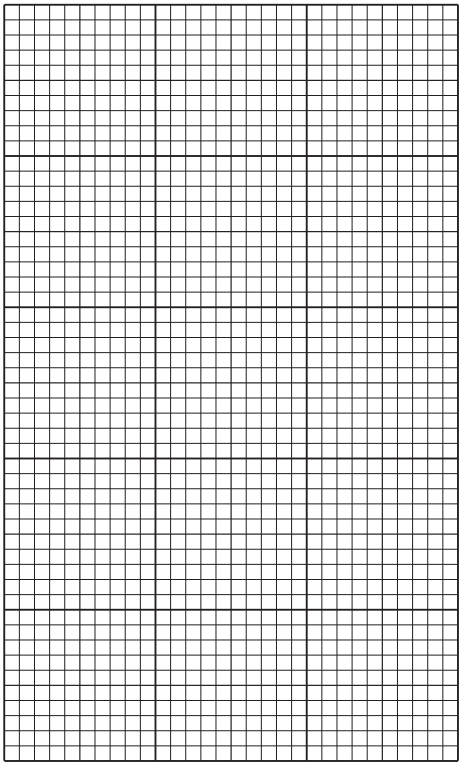
..... [2]

(ii) Table 1.3 shows the scores for Bangladesh from 2000 to 2020.

Table 1.3

year	2000	2005	2010	2015	2020
score	37.1	37.4	44.0	34.8	36.9

Plot a bar chart of the data.



[4]

[Total: 18]

2 Albatross are birds. Many of the 22 species of albatross are listed by the International Union for Conservation of Nature (IUCN) Red List.

(a) Describe how the IUCN Red List helps conserve biodiversity.

.....

.....

.....

..... [2]

(b) Albatrosses make mud nests on the ground to lay their eggs.

Fig. 2.1 shows albatrosses on the mud nests.

Fig. 2.1

Suggest **two** reasons why these mud nests are at risk from climate change.

1 .....

.....

2 .....

.....

[2]

(c) Fig. 2.2 shows a food web for albatrosses.

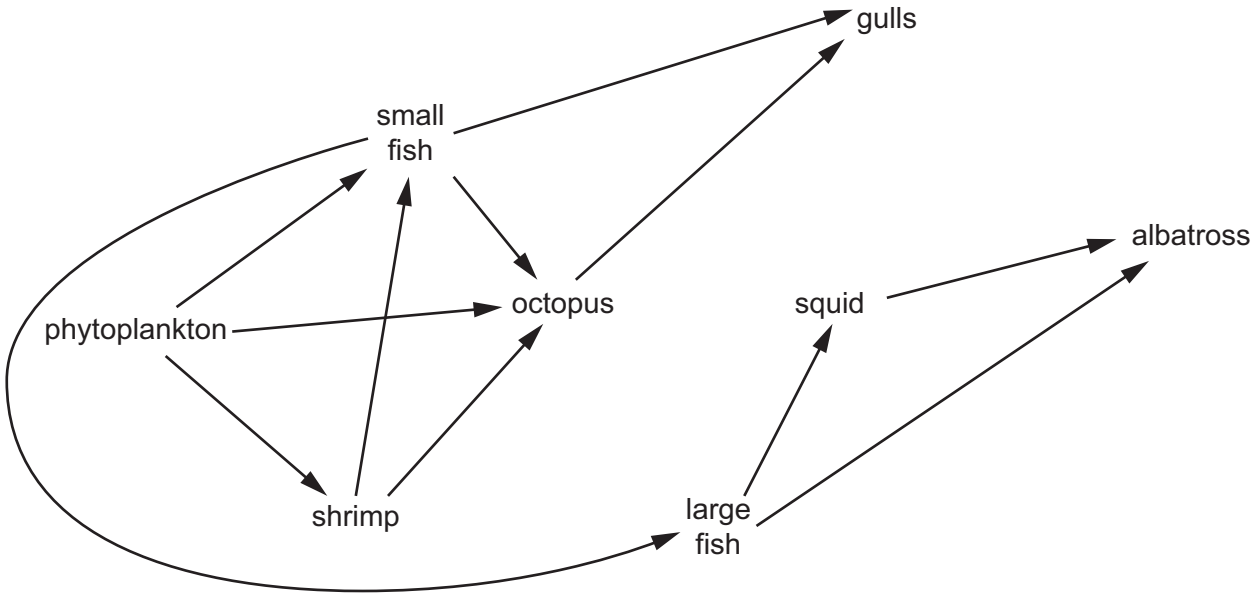


Fig. 2.2

Write a food chain for the albatross.
Start the food chain with a producer and include a total of **four** trophic levels.

..... [2]

(d) Mercury is a toxic metal.

The concentration of mercury in organisms in the food web in Fig. 2.2 is investigated.

For albatrosses, their feathers are analysed.
For the other organisms in the food web, their flesh is analysed.

(i) Suggest **two** reasons why only the feathers are analysed for albatrosses.

1 .....

.....

2 .....

.....

[2]

(ii) The mean level of mercury in the prey of the albatross was 0.0005 μg per g.

Circle the predicted mean level of mercury in albatrosses.
Explain your answer.

0.0001 μg per g **0.0005 μg per g** **3.88 μg per g**

.....

.....

[2]

(e) Albatrosses can travel over 1500 km a day to find food.

Suggest how radio tracking is used to record the distances albatrosses travel to find food.

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..... [2]

(f) Satellite images from space are used to determine albatross population near Antarctica.

Fig. 2.3 shows a satellite image of some nesting albatrosses.

Key

- albatross

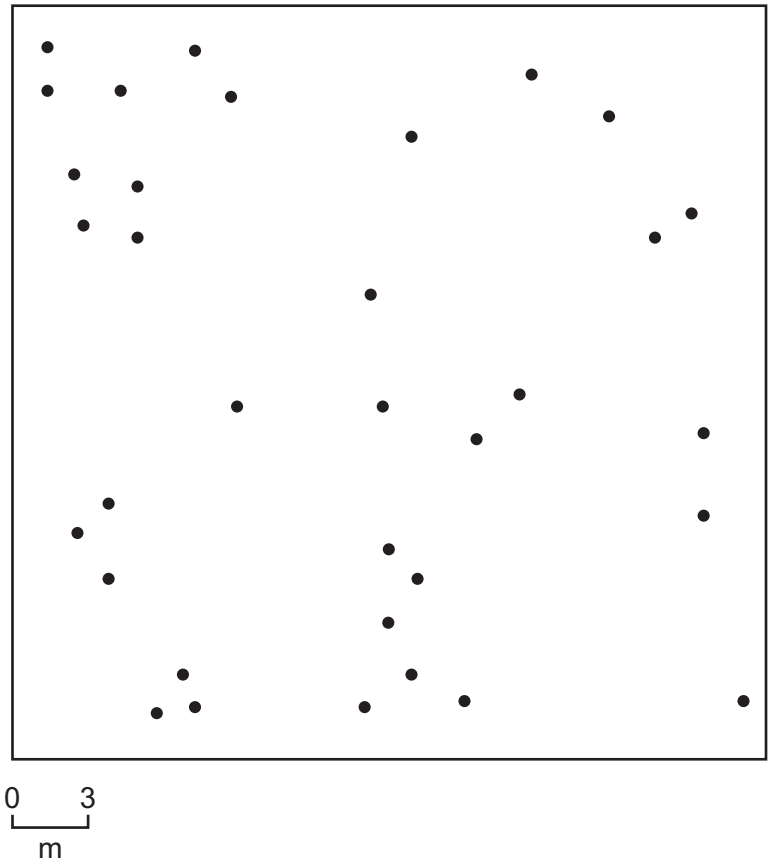

Fig. 2.3

(i) Record the number of albatrosses shown in Fig. 2.3 as a tally.

number of albatrosses	

[1]

(ii) Crowd sourcing is used to count the number of albatrosses on each satellite image.

Describe what is meant by crowd sourcing.

.....

..... [1]

(iii) Suggest the benefits and limitations of using satellite images to determine the population of albatrosses.

benefits .....

.....

.....

.....

limitations .....

.....

.....

.....

[4]

(g) Different species of albatross build nests in the same area.

A scientist uses Simpson's index of diversity to investigate the different species of albatross in an area.

$$D = 1 - \left(\sum\left(\frac{n}{N}\right)^2\right)$$

State what each of the letters represent in this formula.

$\sum$ .....

n .....

N .....

[3]

[Total: 21]

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3 Fig. 3.1 shows part of a sand dune. The dune is a hill of sand made by the wind near the sea.

Fig. 3.1

A scientist investigates four species of insect, **A**, **B**, **C** and **D**, at the sand dune using pitfall traps.

(a) Describe how to build and use a pitfall trap to collect insects.

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..... [4]

(b) Fig. 3.2 shows the location of the pitfall trap sampling points, which are at 6 distances from the sea, P1 to P6.

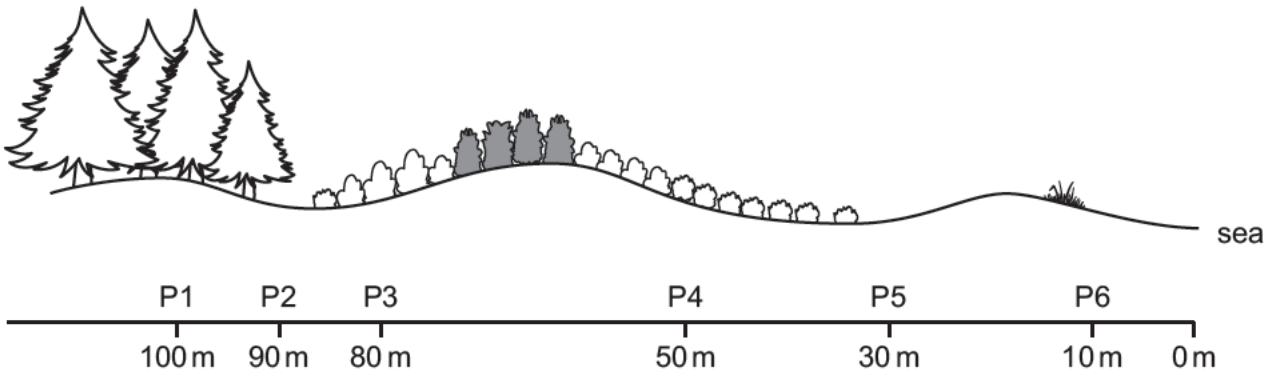

Fig. 3.2

Primary succession happens at sand dunes.

Add label lines to Fig. 3.2 with the terms in the box.

pioneer species	**climax community**	**intermediate species**

[2]

(c) Fig. 3.3 shows the location of the pitfall trap sampling points.

Key

- pitfall trap sampling point

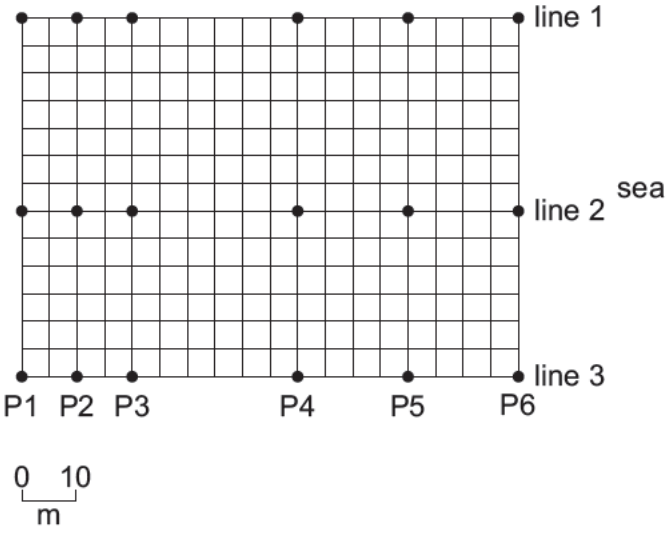

Fig. 3.3

The pitfall trap sampling points are on three different lines, lines 1, 2 and 3, and at six different distances from the sea, P1 to P6.

Suggest why more than one line is used for the sampling points.

.....

..... [1]

(d) Fig. 3.4 shows the results of the mean number of insects found at the sampling points at distances P1 to P6.

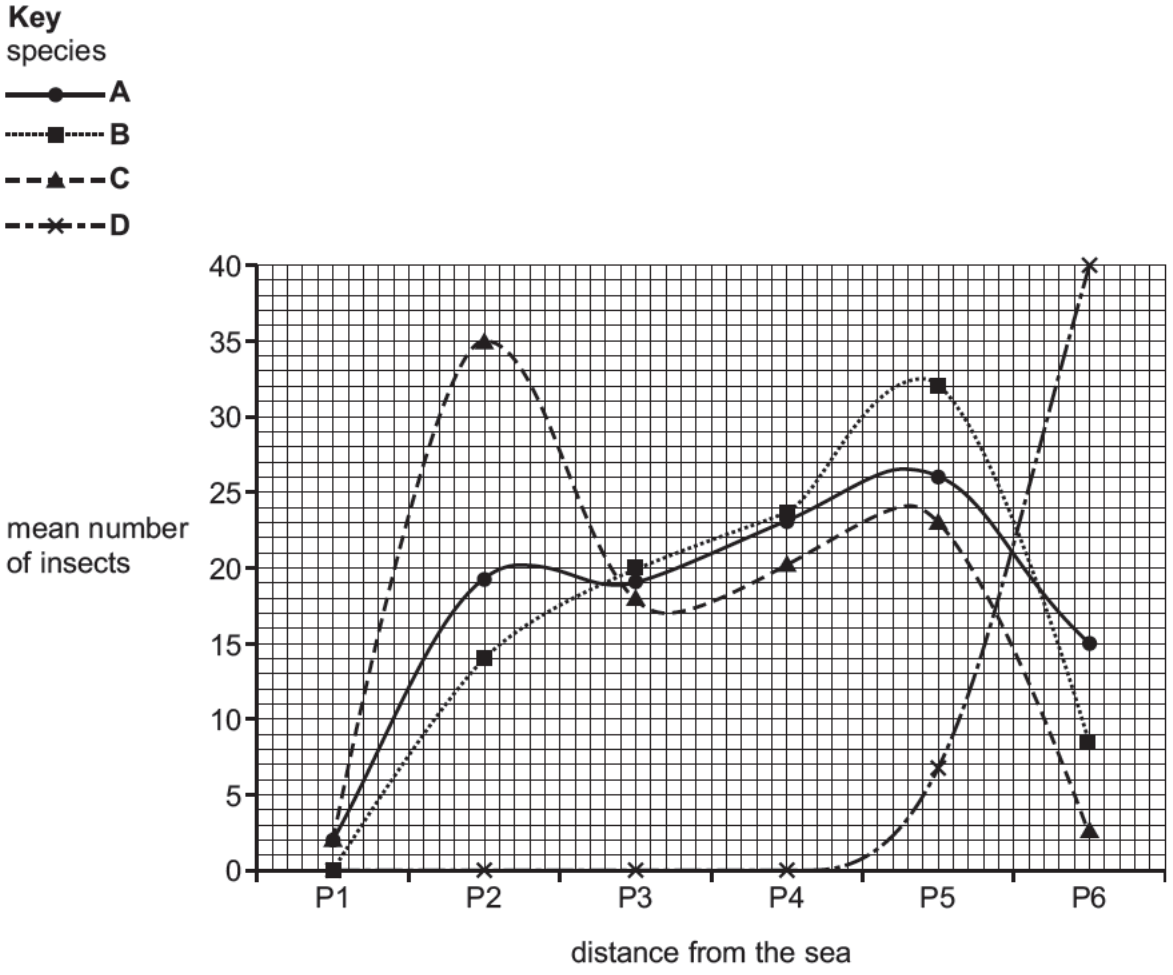

Fig. 3.4

(i) State which insect species, **A**, **B**, **C** or **D**, has the largest mean number of insects at one distance from the sea.

..... [1]

(ii) Use Fig. 3.4 to write a conclusion about how distance from the sea affects the distribution of species **D**.

.....

..... [1]

(iii) Calculate the range for the mean values at P5.

..... [1]

(iv) Calculate the percentage change for species **C** from P1 to P2.

..... % [1]

[Total: 11]

4 **(a)** Fig. 4.1 shows a map of drought risk.

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Fig. 4.1

(i) Describe the distribution of countries with high drought risk.

.....

.....

.....

.....

..... [3]

(ii) A lack of drinking water is an impact of drought. This can cause deaths.

State **three** other impacts of drought.

1 .....

2 .....

3 .....

[3]

(b) Fig. 4.2 shows climate data from a weather station in the Northern Territory, Australia.

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Fig. 4.2

(i) State the highest mean temperature.

..... °C [1]

(ii) State which **three** months had the greatest mean rainfall.

..... and ..... and ..... [1]

(iii) Suggest why the rate of primary productivity decreases during June to August near the location of this weather station.
Use Fig. 4.2 to support your answer.

.....

.....

.....

..... [2]

(c) Some areas of the Northern Territory have a grassland biome.

Describe the soil type in a grassland biome.

.....

.....

.....

..... [2]

(d) Cane toads are an invasive species in the Northern Territory.

Explain the impacts of invasive species on biodiversity.

.....

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..... [3]

[Total: 15]

5 Fig. 5.1 shows the annual volume of fresh water extracted for agriculture, industry and domestic uses in Germany from 1992 to 2017.

Germany is a country with a high-income economy.

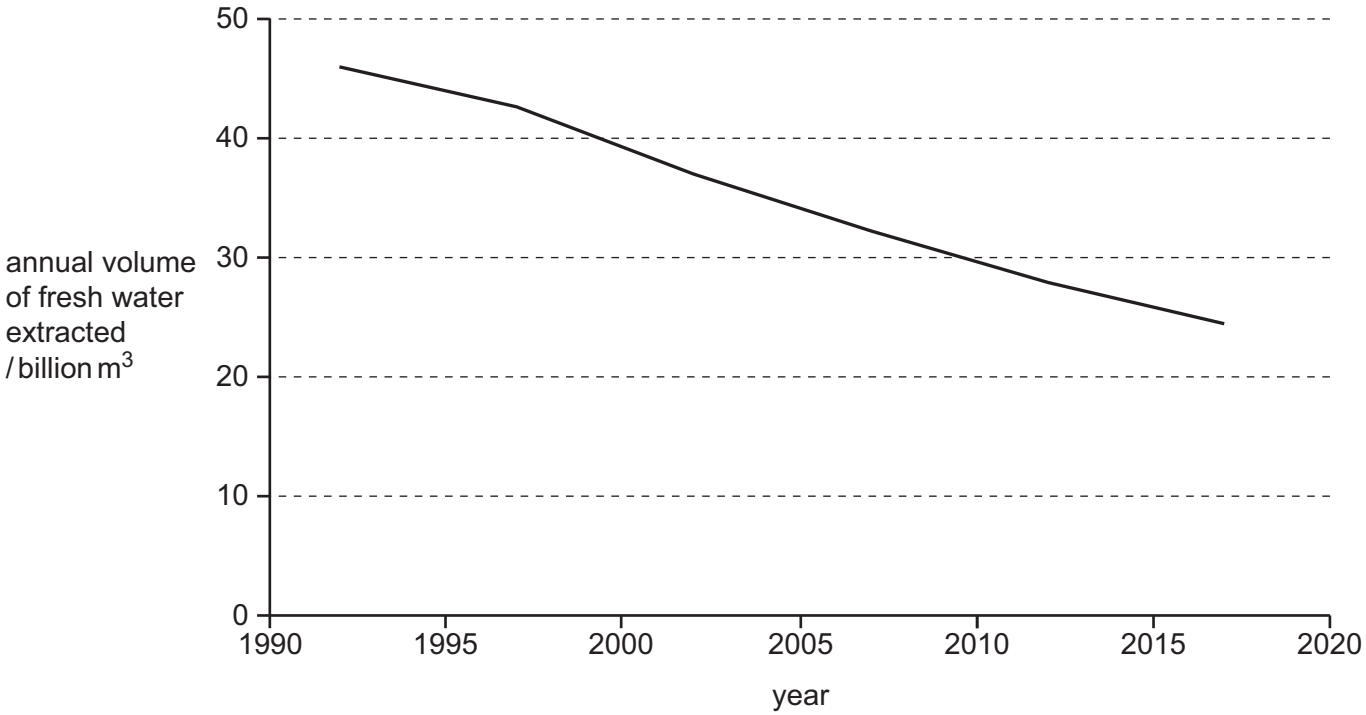

Fig. 5.1

(a) Suggest **two** limitations of using this data to predict the annual volume of fresh water extracted globally for 2030.

1 .....

.....

2 .....

.....

[2]

(b) Tick (✓) **all** the sources of surface fresh water.

glaciers ☐

ground water ☐

permafrost ☐

swamps ☐

[1]

(c) Describe how an artesian well is used to supply safe drinking water to a village.

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.....

.....

.....

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.....

.....

..... [4]

(d) Sustainable water extraction and improved sanitation are strategies for managing water security.

State **three** other strategies for managing water security.

1 .....

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2 .....

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3 .....

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[3]

(e) Fig. 5.2 shows the J-OP sewage waste treatment system.

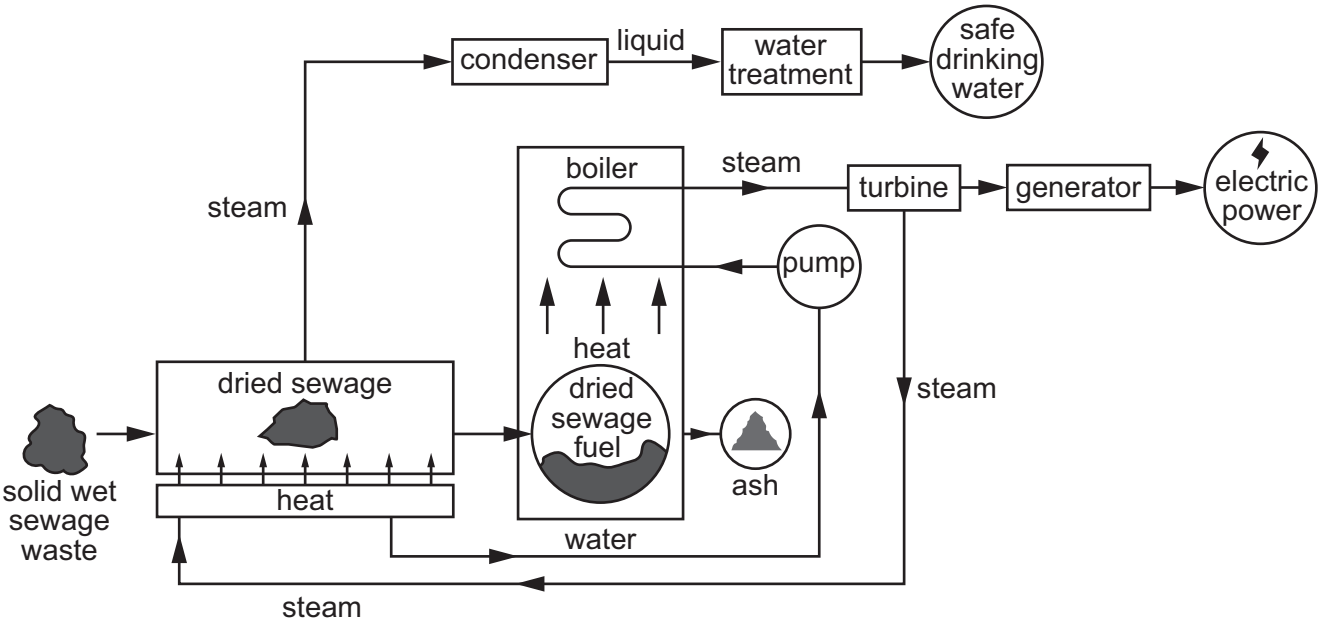

Fig. 5.2

There are three main stages to this system.

1. Solid wet sewage waste is dried.
2. Some of the water that is removed from the solid wet sewage waste is treated.
3. The dried sewage is combusted in a boiler and the heat is used to generate steam.

(i) Suggest **two** benefits of generating steam in the J-OP system.

1 .....

.....

2 .....

..... [2]

(ii) Suggest why the sewage waste must be heated to very high temperatures.

.....

..... [1]

(iii) A volume of 7000 dm^3 of fresh water per day is produced from 30 tonnes of sewage waste in the J-OP.

The mean volume of fresh water used per person per day is 3800 dm^3.

Calculate the mass of sewage waste needed to produce 3800 dm^3 of water.

..... tonnes [2]

[Total: 15]

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