UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

0443006337

ENVIRONMENTAL MANAGEMENT **0680/04**

Alternative to Coursework **October/November 2009**

1 hour 30 minutes

Candidates answer on the Question Paper

Additional Materials: Ruler

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 a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Study the appropriate Source materials before you start to write your answers.
Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.
You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use

This document consists of **17** printed pages and **3** blank pages.

Fig, 1 Map of the World

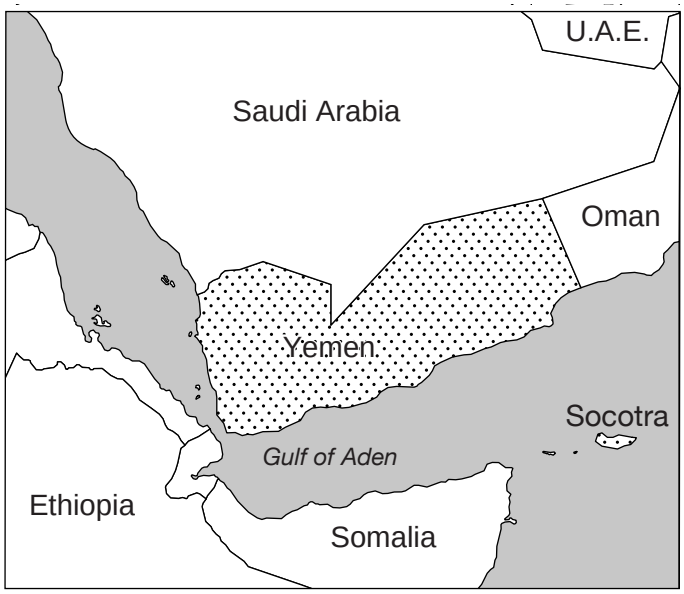


Fig. 2 Map showing Yemen

× airport
• town
—— road
- - - - road under construction

Fig. 3 Map of Socotra (part of Yemen)

Area of Yemen: 527 970 sq km
Population: 22 240 000
Children per woman: 6.49
Life expectancy at birth: 62.52 years
Currency: Yemeni Rial (200 Rials = 1 US Dollar)
Language: Arabic
Climate: mostly desert; hot and humid along west coast; temperate in western mountains with seasonal monsoon
Terrain: narrow coastal plain, mountains in the central interior
Main exports: crude oil, coffee, dried and salted fish

Yemen is one of the poorest countries in the Middle East; oil revenues are important but the country still relies on foreign aid to finance development projects and finance its budget deficits. Agriculture produces grain, fruits, vegetables, pulses, coffee, cotton, livestock (goats, sheep, cattle, camels), poultry and fish. Industry includes petroleum refining, food processing, cement manufacture and commercial ship repair.

Month	Average temperature °C	Average precipitation mm	Average number of wet days
January	23	5	0.6
February	23	5	0.9
March	25	3	0.6
April	26	3	0.3
May	28	3	0.2
June	30	0	0.1
July	30	3	0.4
August	30	5	0.5
September	29	13	1.0
October	28	13	1.0
November	26	18	0.8
December	24	23	2.0

1 Socotra is a large island that was very isolated from the mainland until 1999. The government has proposed a new road to encourage development on the island. Many of the 40 000 residents as well as some scientists are worried about the impact of the new road that will follow the coastline for 190 kilometres. The road is to serve the interests of tourism, the military and local people. Scientists think the road will threaten more than 300 rare species, including some plants only found in Socotra (i.e. endemic species).

Scientists are worried that when roads are built they cause a reduction in the plant biodiversity for many metres on both sides of the road. They carried out two surveys, one on a small section of new road and the other on the old road.

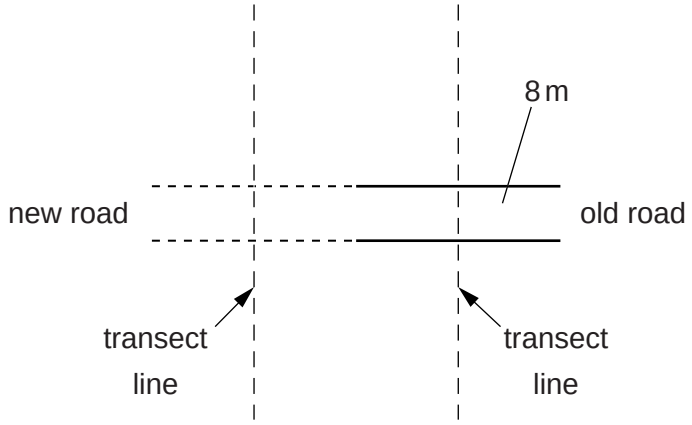


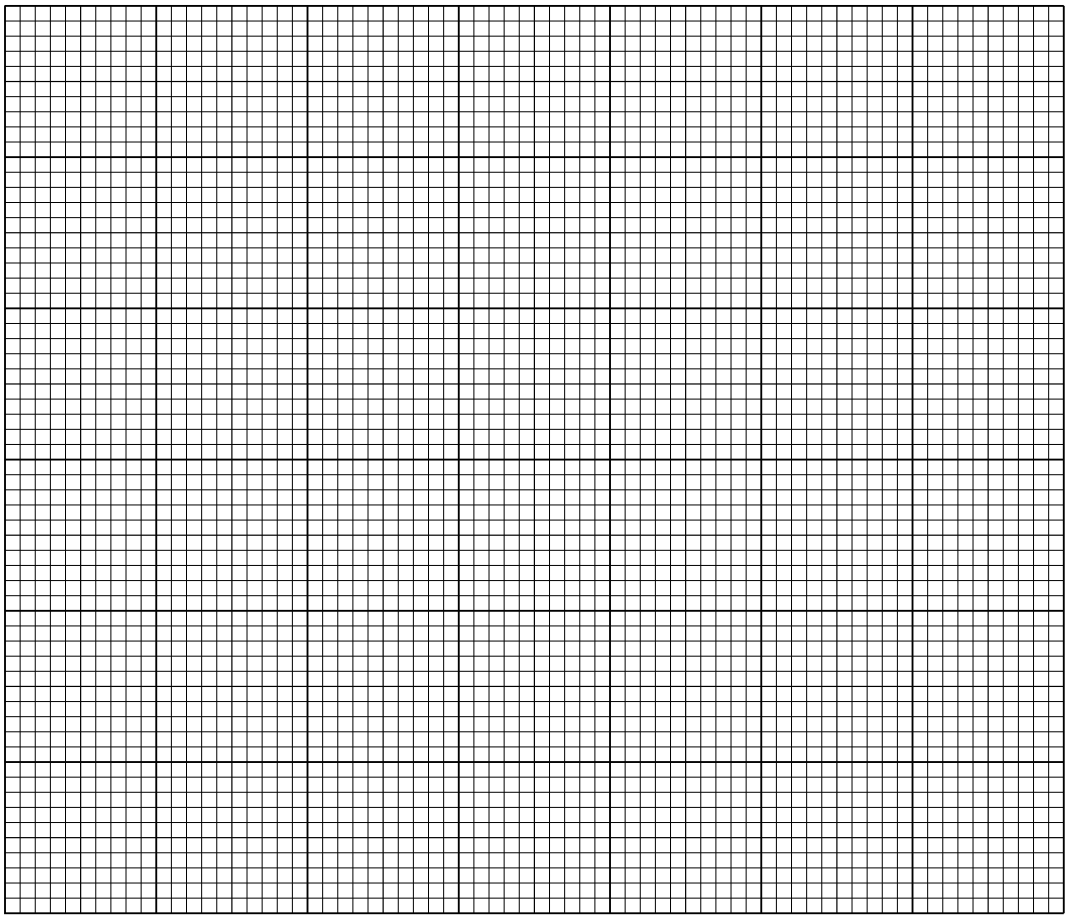
Fig. 4

Number of plant species in 1.0 m^2 quadrats at different distances from the roads.

Distance from road (m)	4	8	12	16	20	24	28
Old road	4	4	6	7	11	10	10
New road	7	8	8	9	10	10	10

Fig. 5

(a) **(i)** Plot this data on a graph. [4]



(ii) Describe the trend in the number of plant species found for the old road and the new road.

.....

.....

..... [2]

(iii) Is there any evidence from this survey that roads reduce plant biodiversity?

.....

.....

..... [2]

(iv) Suggest how this survey could have been carried out to make the findings reliable.

.....

..... [1]

(v) The scientists also found that the average number of species in seven one metre squared quadrats, selected at random from an undisturbed piece of land, was 10.4 species per m^2. This was 200 m away from the new road.

Why did the scientists decide to collect this data?

.....

..... [1]

(vi) Describe a method the scientist could have used to collect this data at **random**.

.....

.....

..... [2]

(b) The road planners cannot decide if the road should be very close to the seashore or at least 200 m inland. The road builders are paid for every kilometre of road they build.

The proposed plan for building the new road is shown in Fig. 6.

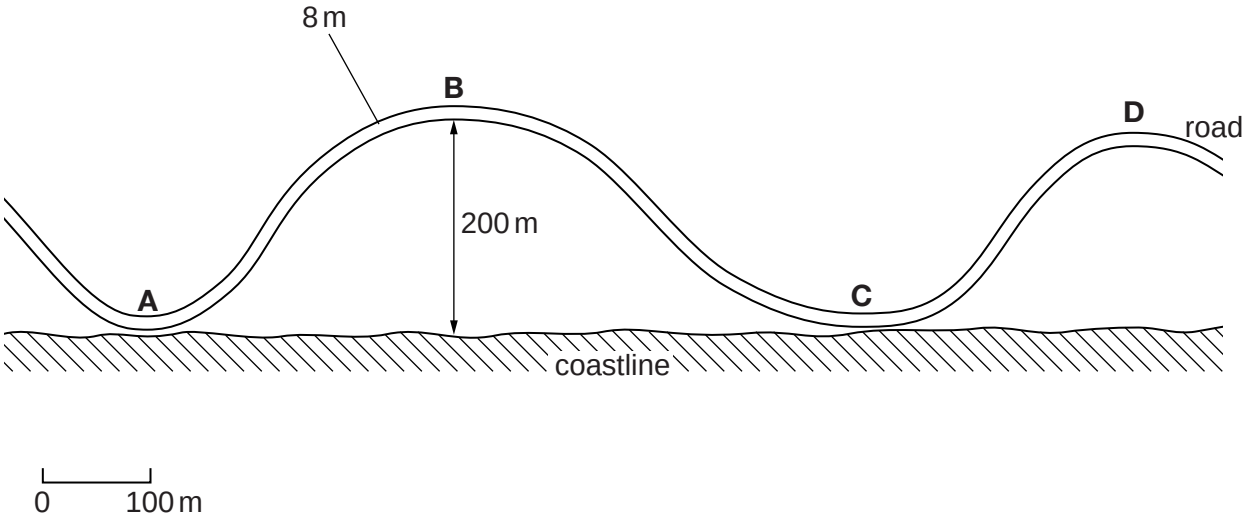


Fig. 6

(i) What is the advantage of this plan to the road builders?

.....

..... [1]

(ii) Explain why more plants are likely to be damaged at points **B** and **D** compar... **A** and **C**.

.....

.....

..... [2]

(iii) Explain why the scientists were worried about the road being very close to the sea at points **A** and **C**.

.....

.....

.....

..... [2]

2 **(a)** The island has many small villages which are not linked by paved roads. Food from a variety of farming activities. Most of the trees have already been cut down firewood. Sheep and goats are kept for their milk, meat and hair. The native plants a adapted to the hot, dry conditions and are slow growing.

Some of the villagers are concerned that their animals might be overgrazing the pasture around the village.

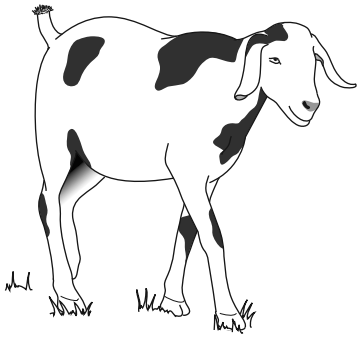


Fig. 7

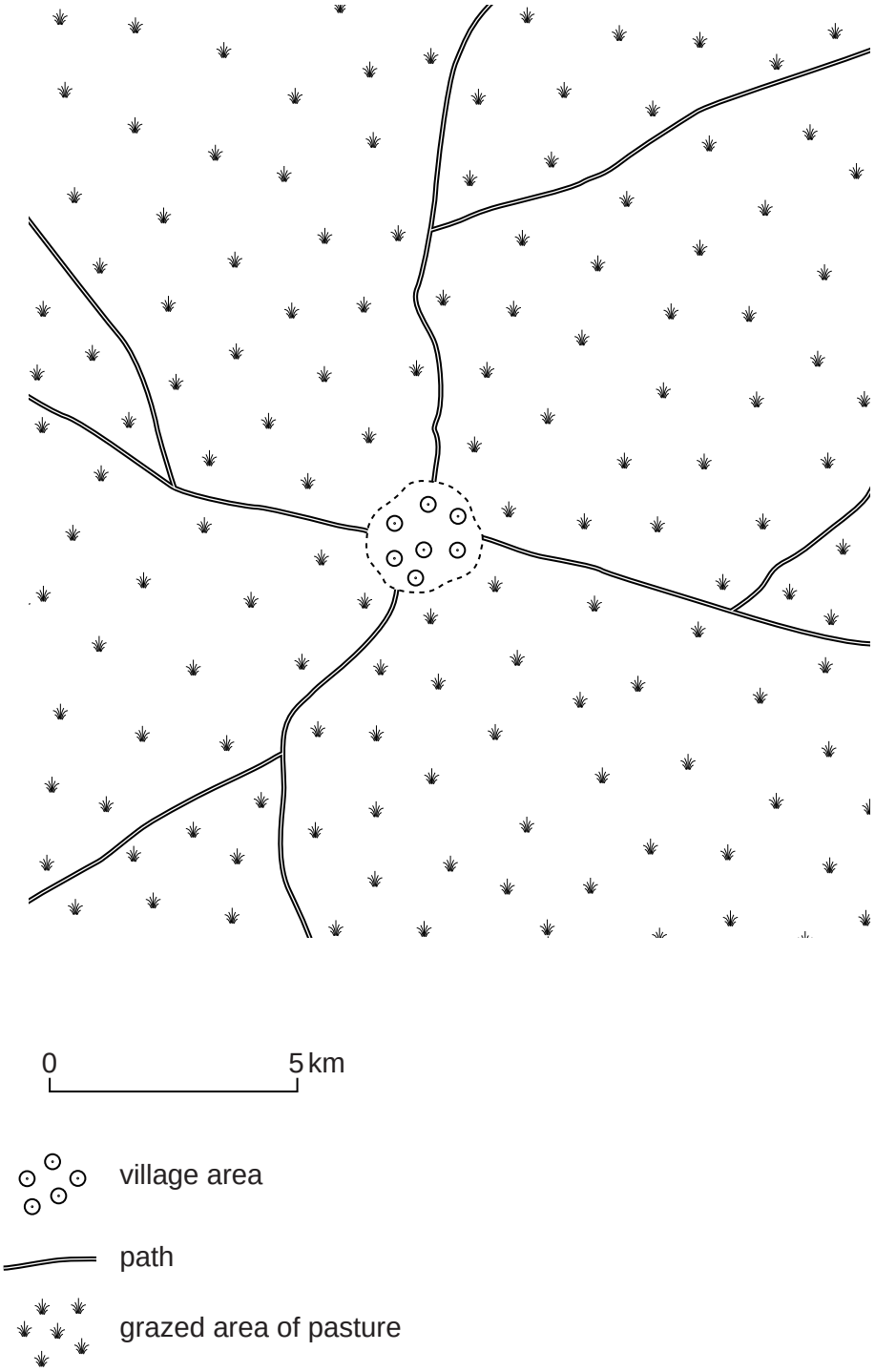


Fig. 8

Small herds of 10–30 goats are kept by many households. Women and children d... of the work. The goats must be well fed so they can survive the dry season.

(i) A goat has an average weight of 28 kg and needs to eat 10% of its body weight in fresh food each day. Calculate how much food a goat must eat

each day, ...

in a year. ..... [2]

(ii) You have been asked to help the village maintain its way of life. Explain why overgrazing would be hard to identify in the dry season.

.....

..... [1]

(iii) A quick method of finding out how goat keeping has changed over the years is to use a questionnaire. Complete the questionnaire by writing four more questions.

1. How many goats do you have this year?

0 – 5 ☐ 6 – 10 ☐ 11 – 20 ☐ 21 – 30 ☐ 31 + ☐

2. How many years have you been keeping goats?

less than 2 years ☐ 2 – 5 years ☐ 6 – 10 years ☐ 11 + years ☐

3. .....

.....

4. .....

.....

5. .....

.....

6. .....

..... [5]

(b) **(i)** Describe how you could use your questionnaire to collect reliable informati the village.

.....

.....

..... [2]

(ii) Suggest why your questionnaire should also be used to collect information from other villages that keep goats.

.....

..... [1]

(c) A scientist suggested that the best way to find out if overgrazing is actually happening is to set up permanent quadrats around the village. The plants can be measured once a year in March.

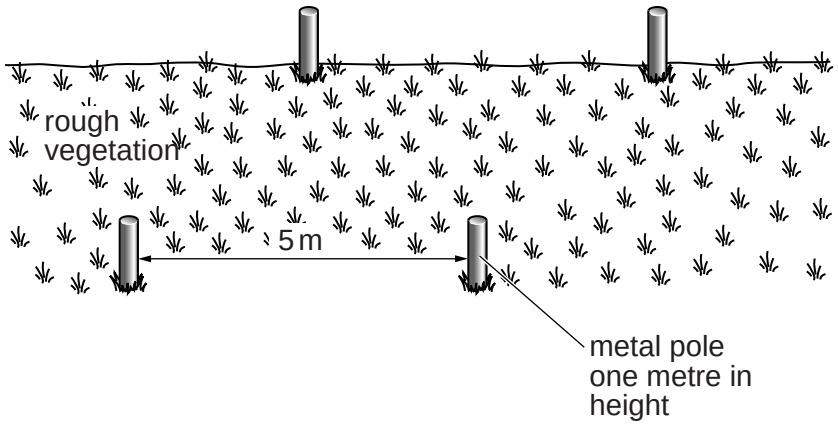


Fig. 9

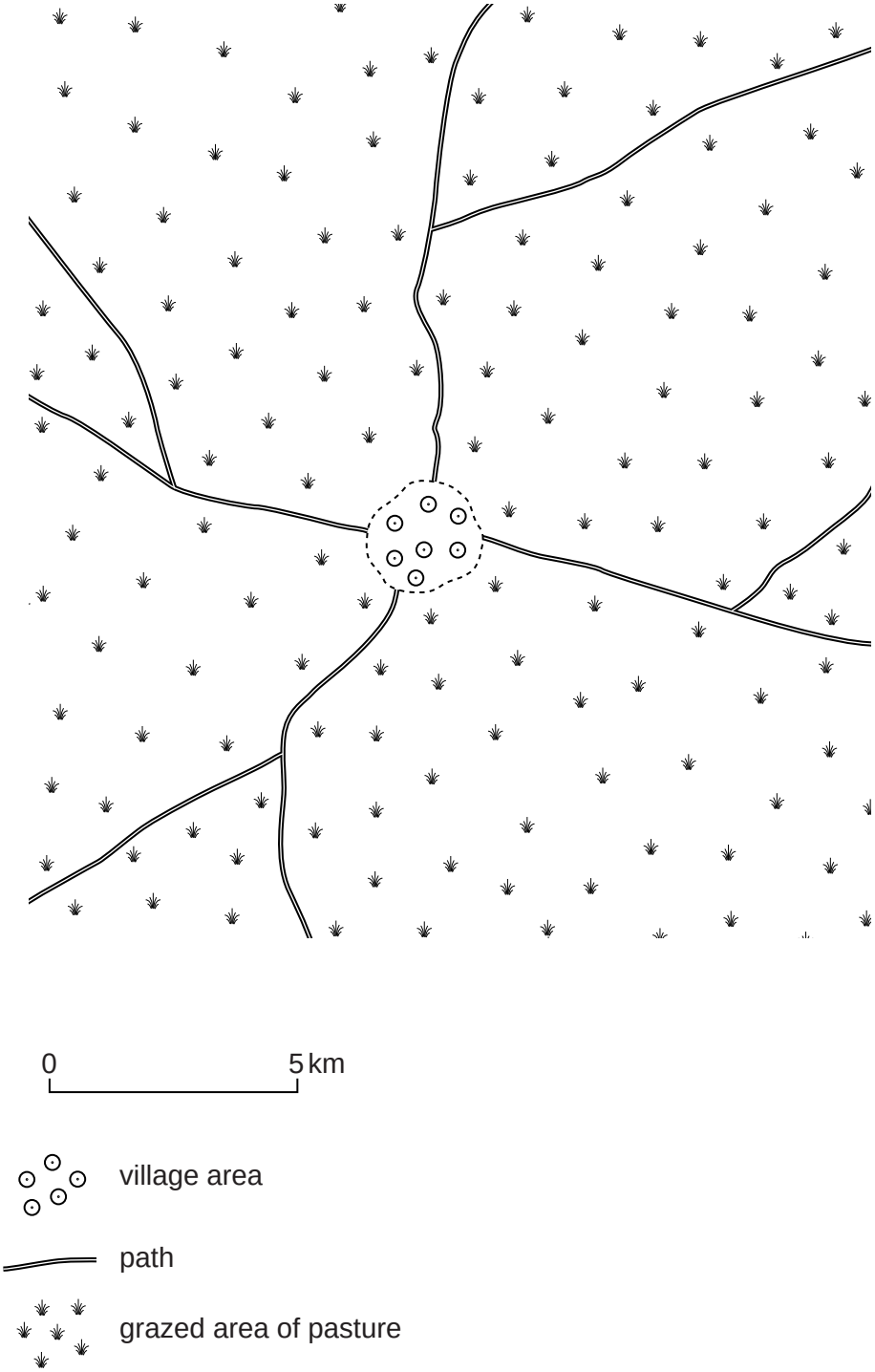


Fig. 10

(i) How many quadrats would you set up? .....

Draw on Fig. 10 suitable positions for your quadrats. [2]

(ii) Describe how the plants could be measured and recorded in exactly the same way each March.

.....

.....

..... [2]

(iii) Explain how overgrazing can lead to desertification.

.....

.....

.....

..... [3]

3 The villages on the coast use small fishing boats and nets to supply enough fo… themselves. Any surplus is traded for goat products with the villagers living inland. This … of life has been going on for hundreds of years.

(a) Suggest **three** reasons why this is an example of sustainable living.

1.....

.....

2.....

.....

3.....

..... [3]

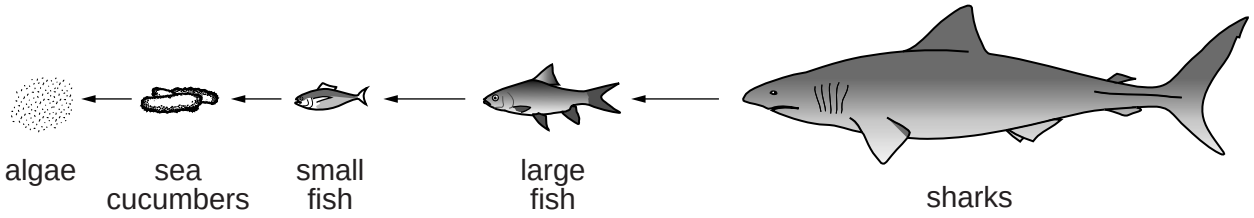


Fig. 11

(b) There is an increasing market for sea cucumbers and sharks; both can be caught in the waters around Socotra. Some local fishermen have started catching these species for export. They claim they can earn more money for their families. Other local fishermen think they will all earn less money in the future. Explain why the new fishing is unlikely to last more than a few years for

(i) sea cucumbers, ...

.....

.....

(ii) sharks. .....

.....

..... [4]

(c) All the villages have formed a Conservation Council with the help of the gover... Each village has Elders who control the fishing activity.

Explain how each of the following might help preserve fish stocks for the future.

(i) setting a quota for each village

.....

.....

(ii) setting the size and shape of nets

.....

.....

(iii) controlling the number of boats

.....

..... [4]

(d) The Conservation Council have asked the government for help because boats from the mainland and other countries are now fishing for sharks and sea cucumbers.

Describe how the government could help control this activity.

.....

.....

..... [2]

4 The Conservation Council have agreed with the government that they want develop... Socotra to be based on ecotourism.

The government also agreed with the villagers' request to declare 500 m of coastal plain a development-free zone, with the exception of the construction of the new road. At present the island has:

- a few unpaved tracks
- a ring road under construction
- one small airport with two flights a week to the mainland
- four hotels and a limited supply of drinking water
- one major harbour
- no sewage treatment works
- coastal waters good for diving and snorkelling
- a dry season (April–October) in which temperatures reach 38 °C with winds up to 110 km/h

(a) (i) Explain why the villagers requested a development-free zone.

.....

.....

..... [2]

(ii) In 2008 three thousand ecotourists visited Socotra.

What is an ecotourist?

.....

..... [1]

(iii) Suggest why nearly all the ecotourists visit Socotra between November and March.

.....

..... [1]

(b) You have been asked to provide a development plan that will allow ten thousand ecotourists to visit each year by 2015. Using any information given and your scientific knowledge, suggest the developments you would allow and any important restrictions the islanders should enforce.

Allowed developments .....

.....

.....

.....

.....

Important restrictions .....

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.....

.....

..... [8]

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