

Cambridge  
**O Level**

**Cambridge International Examinations**  
Cambridge Ordinary Level

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**ENVIRONMENTAL MANAGEMENT**

**5014/22**

Alternative to Coursework

**May/June 2014**

**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 an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

Electronic calculators may be used.

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

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.

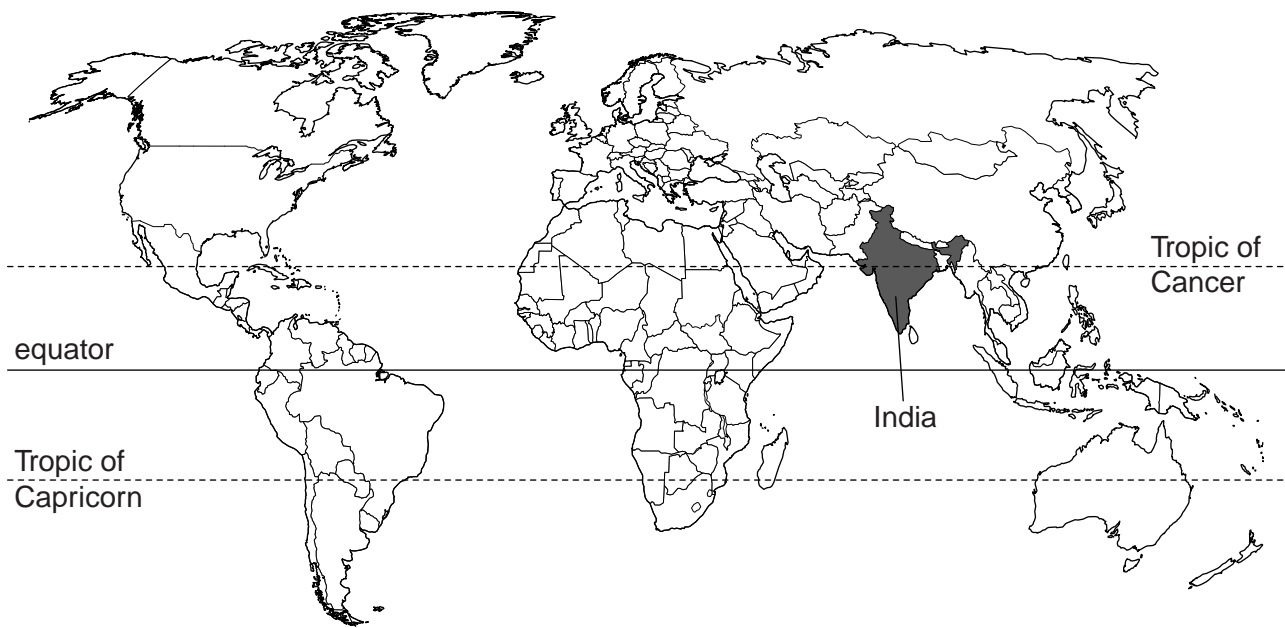
You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.

At the end of the examination, fasten all your work securely together.

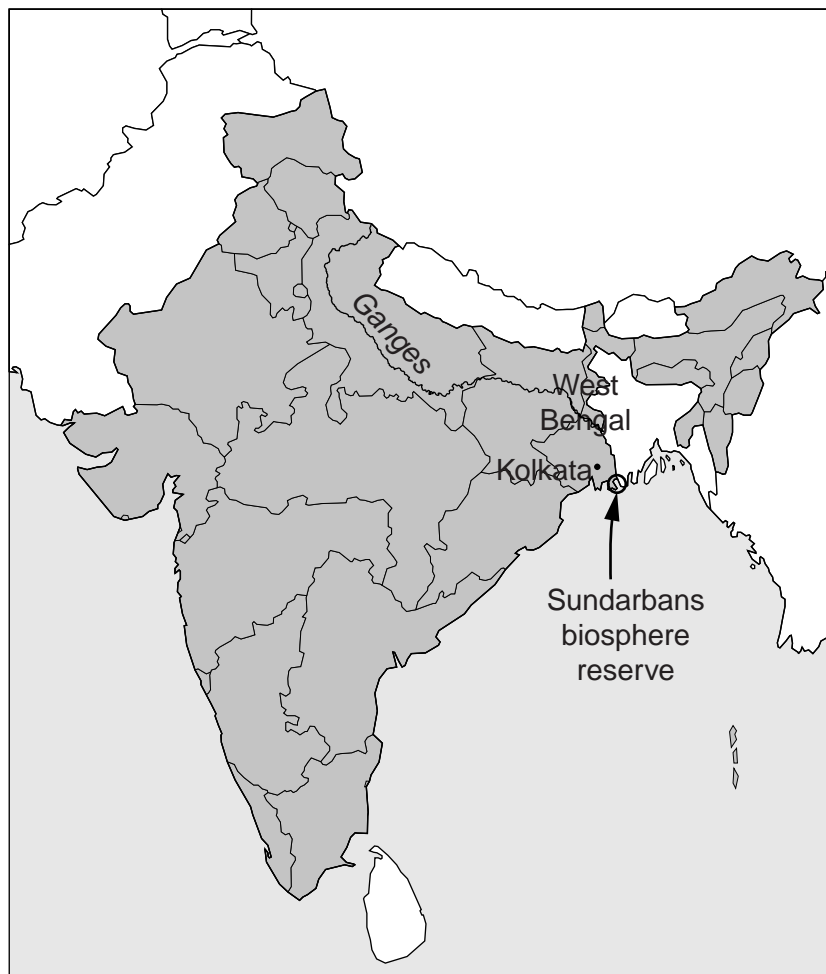
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **16** printed pages.

## world map



## map of India



**Area of India:** 3.3 million sq km

**Population:** about 1210 million

**Children per woman:** 2.58

**Life expectancy:** 67 years

**Currency:** Rupee (45Rs =1US\$)

**Languages:** Hindi, English and many other languages

**Climate:** tropical monsoon, colder in the northern mountains

**Main exports:** petroleum products, precious stones, machinery, iron and steel, chemicals, vehicles, clothes and computer software.

India has a wide range of modern industries and services. Half the workforce is employed in agriculture. The economy recovered quickly from the global financial crisis. However, poverty is still widespread and rural to urban migration continues to cause problems.

- 1 (a) (i) Describe how rural to urban migration can cause problems.

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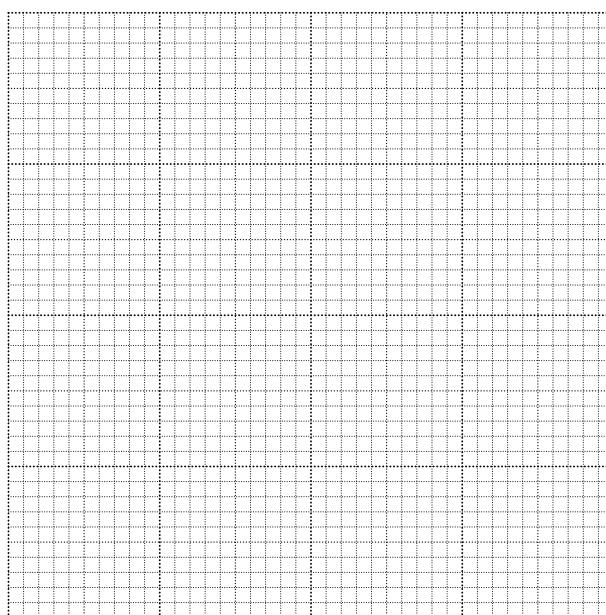
.....

..... [2]

India is the world's largest producer of jute, a fibre used to make sacks. Most jute is produced by farmers in the state of West Bengal. The Indian government sets a Minimum Support Price (MSP) for jute each year.

year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
MSP / Rs per 100 kg	860	890	910	1000	1055	1250	1375	1575	1675	2 200

- (ii) Plot a line graph to display the data on the grid below.



[4]

- (iii) Between which two years was there the smallest increase in MSP?

smallest increase ..... to .....

[1]

- (iv) Between which two years was there the largest increase in MSP?

largest increase ..... to .....

[1]

- (v) Suggest a reason for the large increase in MSP in 1 (a) (iv).

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

- (vi) Suggest the advantages for farmers and the government of setting an MSP.

for farmers .....  
.....  
.....  
for the government .....  
.....  
..... [3]

(b) Look at the picture, which shows a jute crop.



Farmers carry out the following steps to grow and process jute:

- prepare soil
- plant seeds
- thin out the plants at 15-20 cm height
- apply fertiliser
- harvest 100-120 days after planting
- soak stems in slow running water for 20 days
- separate fibres from soft tissue

Suggest what happens to jute stems when they are left in water for 20 days.

.....

.....

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..... [2]

- (c) A student visited a small jute farm and interviewed the farmer. The student found out the following facts:

fact 1 jute seeds are sold to farms at a low, subsidised price

fact 2 the jute leaves are left to decompose on the field

fact 3 only a small amount of fertiliser needs to be added to each jute crop

fact 4 the nearest jute mill is 50 km from the farm

fact 5 the farmer is not paid until the crop is delivered to the jute mill

- (i) Which fact reduces the farmer's profits the most? Explain your answer.

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.....

..... [2]

- (ii) Choose one fact which may help to increase the profit. Explain your answer.

.....

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..... [2]

- (d) One villager told the student, 'when the farmers put jute stems in the village stream it makes a bad smell and the water cannot be used for any purpose'.

The jute farmer told the student, 'we have to make a living to feed our families. The stream always returns to normal'.

The student decided to observe a stream being used to process jute stems to find out if the claim that the stream returned to normal was true. The student observed the stream downstream of the jute stems. The observations were recorded in the table below.

days from the start of processing	water quality	smell
1	clear	none
3	cloudy	none
7	green/brown colour	bad smell
15	dark brown colour	very bad smell
20	light brown colour	bad smell
30	light brown colour	none
40	very light brown colour	none
50	cloudy	none
60	clear	none

- (i) Explain the biological changes in the stream between days 7 and 30.

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.....

..... [4]

- (ii) The student's observations could have been improved. Suggest three possible improvements to the student's work.

Give a reason for each improvement.

1 .....

.....

2 .....

.....

3 .....

..... [3]



- (iii) Explain whether the student's observations support the claim made by the farmer that the stream always returns to normal.

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

- (e) Some farmers have started using a new method of soaking jute stems. They make pits in the field, lined with black plastic. The jute stems are covered with water inside the pit. The stems are removed after a few days and the water released onto the field. The black plastic is kept for the next harvest.

This process is quicker than the old method of soaking jute.

- (i) Suggest a reason why this method is quicker.

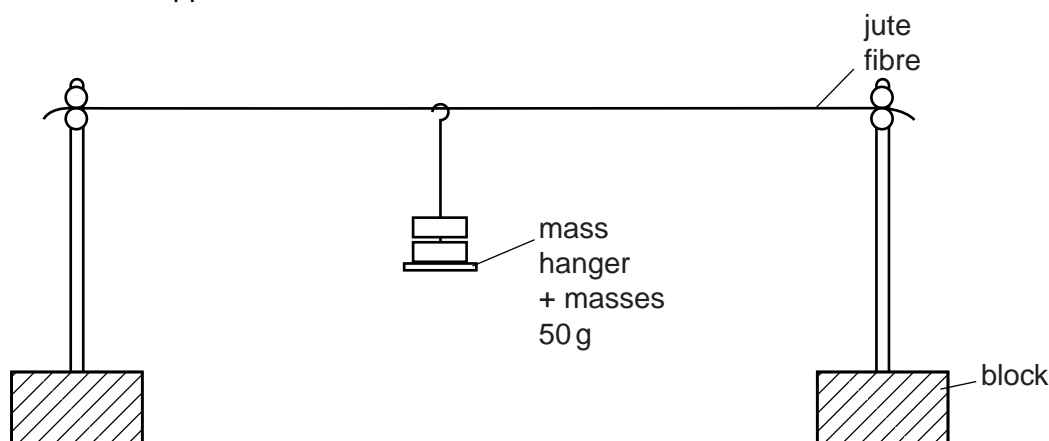
.....  
 ..... [1]

- (ii) Suggest one other advantage for the farmer of the new process.

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

- (f) Another farmer said, 'Jute is very important to me. I am worried that if I use the new soaking method the fibres will be weaker so I will earn less money'.

The student carried out an experiment to find out if the farmer was right. The diagram shows some of the apparatus used.



He used the following method:

- conduct a risk assessment
- collect samples of jute fibres produced by each soaking method
- cut 10 fibres of each to the same length
- hold each end of a fibre in a clamp
- hang a 50g weight from the centre of the fibre
- keep adding 50g weights until the fibre breaks
- record the total weight at which the fibre breaks

- (i) Suggest one safety statement the student should have included in the risk assessment.

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

trial	jute fibre breaking weight / g	
	new soaking method	old soaking method
1	300	250
2	250	300
3	200	400
4	300	250
5	200	300
6	400	450
7	450	250
8	250	300
9	350	400
10	350	350
average	.....	.....

- (ii) Complete the table. [1]

- (iii) Explain which soaking method the student should advise the farmer to use, so that he will not lose money on his jute.  
 Explain your answer.

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

- (iv) Suggest a reason why the results shown in the table are very variable.

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

- (v) Suggest one way the student could improve the method described in (f), on page 9.

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

- (g) The Indian government passed the Jute Packaging Material Act (JPMA) in 1987. This made it compulsory to use jute sacks for all food grains and sugar throughout India. More than 1.2 million tonnes of sacks are needed each year. In West Bengal, 4 million farmers and 2.5 million workers are employed to help meet the demand for jute sacks. Companies making plastic sacks want the JPMA withdrawn so they can start selling plastic sacks for food storage.

Are you in favour of or against keeping the JPMA? Explain your point of view.

.....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 ..... [4]

[Total: 37]

- 2 The Sundarbans are a biosphere reserve covering more than 4000 km<sup>2</sup> of mangrove forest along the coast of West Bengal, with many rare species of plants and animals. People make a subsistence living fishing in the water channels and gathering plants.

Ecotourists come in large numbers to visit the tiger reserve and see other wildlife. There is only a very small chance of seeing a tiger. Boats are used as transport along the many water channels.

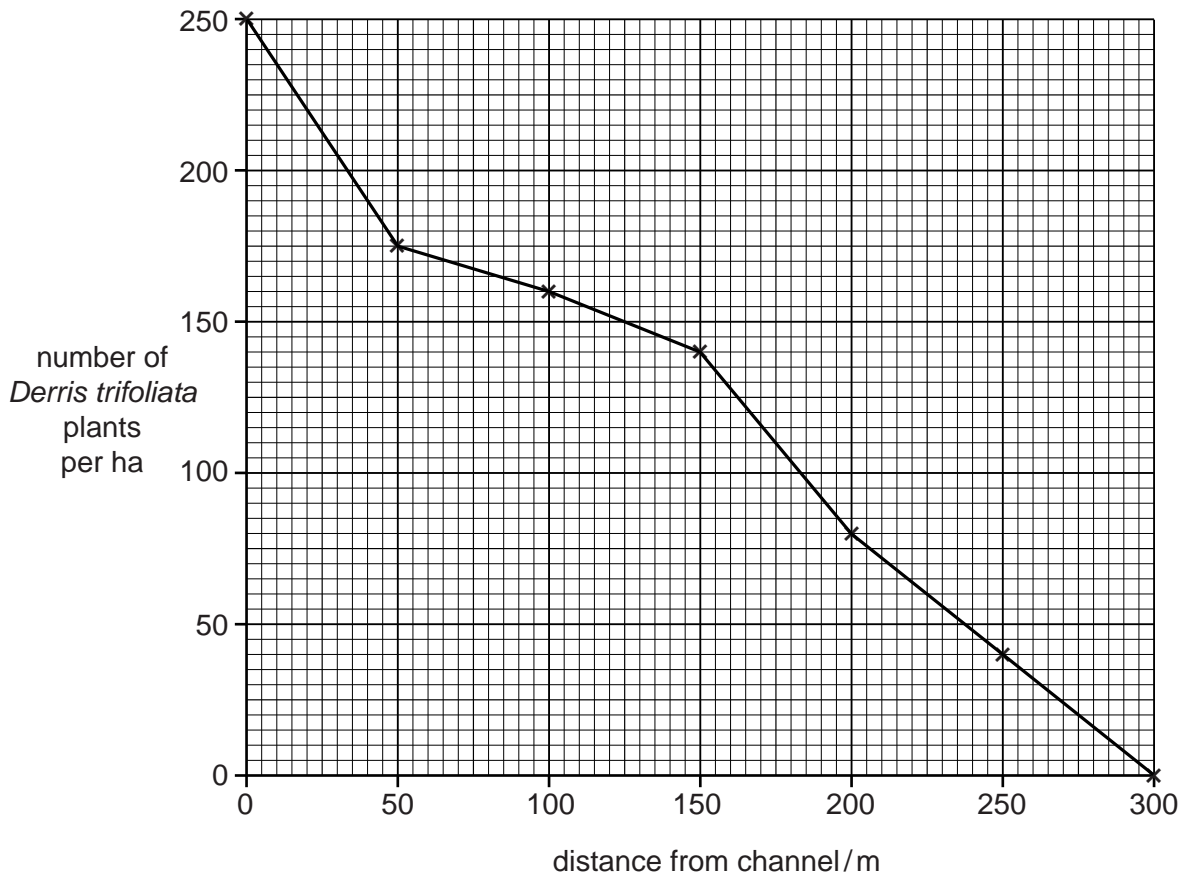
A scientist working in the reserve noticed an invasive species of climbing plant growing beside a channel. It was identified as *Derris trifoliata*. The scientist decided to carry out a survey to find out how widespread it was in the mangrove forest using the following method:



- Step 1 land from a water channel and secure the boat
- Step 2 record this location on a map
- Step 3 layout a 5×5 m quadrat
- Step 4 count the number of *Derris trifoliata* plants inside the quadrat
- Step 5 move inland 50 m
- Step 6 repeat steps 3-5
- Step 7 continue until 300 m is reached
- Step 8 move to the next landing point and repeat steps 1-7

- (a) (i) In the space below, draw a suitable table for recording all the results from one landing point.

- (ii) The scientist repeated the survey at 20 different landing points. The average results are shown in the graph.



Describe the pattern shown in the graph. ....

..... [1]

- (iii) The scientist noticed that *Derris trifoliata* was found more often along water channels regularly used by boats.

Suggest how *Derris trifoliata* might have spread to the mangrove forest.

.....  
 .....  
 .....  
 ..... [2]

- (iv) Suggest why the scientist is worried about finding *Derris trifoliata* in the mangrove forest.

.....  
 .....  
 .....  
 ..... [2]

The scientist reported the findings to the Sundarbans biosphere reserve managers. The managers discussed three different plans of action.

plan A      Train more people so surveys can be carried out each year along water channels.

plan B      Pay local people to cut down *Derris trifoliata* from the trees.

plan C      Pay local people to collect the *Derris trifoliata* leaves so an organic insecticide can be extracted.

**(v)** Suggest why the managers have decided to carry out plan A.

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..... [2]

**(vi)** Suggest the possible disadvantages of carrying out plans B and C.

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..... [2]

**(b)** Ecotourism to the Sundarbans biosphere reserve provides an income for many people. The ecotourists:

- arrive at Kolkata airport
- stay in hotels
- travel by bus, boat and cycle rickshaw
- hire boats
- hire local guides

Suggest why the local people living in the Sundarbans biosphere reserve do not expect ecotourism to make much difference to their standard of living.

.....

.....

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..... [2]

- (c) The Sundarbans are regularly struck by cyclones. The mangrove forest absorbs some of the flooding. One of the worst cyclones, Cyclone Aila, struck in 2009.

Some of the effects of Cyclone Aila were:

- thousands of villages disappeared under water
- many kilometres of water channel embankments collapsed
- more than 300 people were killed
- at least 400 000 people became homeless
- salt water damaged fields and freshwater supplies
- many remote islands could not be reached for days

After the cyclone, there was a long period of recovery. Health workers noticed a large increase in intestinal infections, diarrhoea, skin infections and snake bites. Nearly 400 people contracted cholera and 14 people died.

- (i) Suggest how the health workers controlled the outbreak of cholera.

.....

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..... [2]

- (ii) The health workers decided to carry out a health survey of selected villages from some of the 54 islands in the Sundarbans.

They used a questionnaire, as shown below.

- 1 How old are you?
- 2 Are you male or female?
- 3 Have you been bitten by a snake in the last year?
- 4 Have you suffered from diarrhoea in the last year, once, more than once, or not at all?
- 5 Did you get any treatment for diarrhoea?

Suggest one other question about the villagers' health that could have been asked in the questionnaire.

.....

.....

..... [2]

(iii) How many islands would you have surveyed?

..... [1]

(iv) Describe how people could be selected to answer the questionnaire.

.....  
 .....  
 .....  
 ..... [2]

(d) How can the results of surveys, such as this one, be used to improve health in the future?

.....  
 .....  
 .....  
 ..... [2]

[Total: 23]

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