

**MARK SCHEME for the October/November 2011 question paper
for the guidance of teachers**

8291 ENVIRONMENTAL MANAGEMENT

8291/02

Paper 2, maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

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Section A

(Answer **all** questions in this section.)

1 (a) Why is a coral reef an example of an ecosystem?

Includes how the abiotic factors such as temperature and sunlight are relevant and encourage biodiversity and species populations in the community (biotic factors).

Credit 1 mark for identifying the reason and 1 mark for its elaboration.

(b) Fig. 1.1 and Fig. 1.2 contain information about the risk of damage to coral reefs.

(i) Describe the pattern of risk for coral reefs from different threat factors as shown in Fig. 1.1. [3]

This should prove to be a straightforward description of the high and medium risk data from Fig. 1.1. Credit 1 mark for each of 4 valid points: there should be some balance between high and medium threats; max 3 marks for either category.

(ii) Describe the pattern of risk for coral reefs according to the different locations as shown in Fig. 1.2. State one reason for this pattern. [3]

Credit 1 mark for the description and 2 marks for the reason.

The main reason is that the areas of greatest loss are close to areas of high population density (1 mark) with therefore the greatest potential for human intervention (type needed) (1 mark). Accept other valid answers that derive from Fig. 1.2.

(iii) Outline one factor that puts coral reefs at risk, other than the factors involved in (i) and (ii). [2]

Award 1 mark for stating the factor and the second for its brief elaboration;
 e.g. hurricane/tsunami damage involves physical erosion of a reef;
 climatic change contributes to bleaching/increased CO₂;
 increased atmospheric CO₂ lowers the pH and increases acidity;
 tourism involving direct damage to reef.

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(c) The Australian Great Barrier Reef is a World Heritage site and like other environments is threatened directly or indirectly by human activity. Fig. 1.3 contains information on the strategies for reef conservation for one section of the Great Barrier Reef.

(i) With reference to Fig. 1.3, describe two different ways in which the coral reefs are being conserved. [4]

The map identifies specific habitat sites and zones. Credit two points for each way. Protecting habitats according to coral type, high diversity coral in areas of high turbidity, low diversity in sand and low diversity on rocky surfaces; an extensive area for general protection; conservation parks are sites of value; national parks are for conservation and allow visitors.

(ii) Describe how the reef conservation strategies also cater for the needs of tourists. [3]

Conservation parks and national parks are designed for visitors in a controlled environment (1 mark) and thereby keeping people away from other habitats (1 mark). This is standard National Park policy of honeypots and unspoilt areas.

(iii) To what extent might these strategies offer a sustainable future for the Great Barrier Reef? [3]

Award 1/2 or 2/1 for points for and against.

For: It should offer a sustainable future in terms of localised influences (1 mark) that could be extended to other areas (1 mark). Legislation is needed to manage human usage (1 mark).

Against: Economic pressures (tourism, industry, agriculture) are difficult to manage (1 mark) and other influences such as bleaching (climatic change) are global rather than local (1 mark); credit other valid reasons.

[Total: 20]

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2 (a) Fig. 2.1 shows part of a water cycle in which human activity is taking place.

(i) State how modifying the vegetation cover for human usage could affect rates of surface runoff and transpiration.

One mark for each: e.g. removal of vegetation cover would increase rates of surface runoff and transpiration rates would decrease.

(ii) Describe one way in which people could benefit from changes to river discharge downstream from the dam. [2]

One point with 1 mark for identifying the benefit and 1 mark for its elaboration; e.g. less flooding, irrigation, domestic water supply.

(iii) Outline three adverse effects of human activity upon the water cycle shown in Fig. 2.1. [6]

Answers should integrate pollution from the land travels by river to the sea i.e. a pollution pathway (2 marks) with;

Three points derived from: agriculture, industry or domestic. These should refer to adverse effects on the water cycle and utilise information from Fig. 2.1 rather than repeat it.

(b) Study Fig. 2.2 which is a model illustrating how the use of water by an increasing global population has linkages with various environmental outcomes, human outcomes and population dynamics.

(i) Why does the model shown in Fig. 2.2 take the form of a cycle? [4]

Award 1 mark for each of three links of the model to show the cyclic nature of the outer ring of arrows. One mark for the alternative pathway of the cross link.

(ii) Describe how the demand for water might influence or be influenced by: population dynamics; human outcomes. [6]

population dynamics

People place demands on the supply of water; population growth either naturally or by migration increases demand; urbanisation places demands on supply and pollutes water supplies; water shortages increase the likelihood of death and illness.

human outcomes

Water use also has direct effects on human outcomes e.g. irrigation water for agriculture affects food supply or HEP schemes can displace people; other effects include war, population displacement and slower economic growth.

Max 3 marks for each category.

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Section B

(Answer **one** question from this section.)

- 3 (a) Use Fig. 3.1 to explain how deforestation might result in a degraded vegetation cover. [10]

There are two strands that interact and lead to a degraded vegetation cover and well balanced answers should refer to both; the best answers should draw out the interactions.

Notionally credit: 1 mark for an expressed understanding of deforestation; 1 mark for the interactions and 4 for each of the strands.

- loss of topsoil — deforestation exposes the soil – no interception, therefore direct raindrop impact – surface runoff – soil erosion and loss of soil nutrients.
- increased drought – deforestation leads to disruptions to the local water cycle; deforestation – lower rates of transpiration and evaporation – drier air – less rainfall.
- interactions between drought and bare surfaces encouraging flash floods and soil erosion.

8–10 mark answers will clearly understand deforestation; develop both strands and point out interactions.

4–7 mark answers will either briefly develop the two strands or there will be a lack of balance.

1–3 mark answers may be brief and poorly balanced or contain some limited strands of understanding.

- (b) With reference to either a MEDC or LEDC you have studied, describe the pressures that have been placed on its reserves of forest. Discuss the difficulties it might face in achieving a sustainable utilisation of its forest resources. [30]

As the choice is up to the candidate the indicative content below is generic.

The question requirements are:

- selection of a MEDC or LEDC
- an outline of its forest reserves: type, area, quantity
- reference to the social and economic pressures placed on the forest reserves
- natural pressures such as climatic change, fires, natural disasters
- based on the example, a discussion of the difficulties in achieving a sustainable utilisation
- an understanding of forests as a long term renewable resource.

Band 1 answers will contain detail from each of the bullet points given above: and should be well developed in pressures and difficulties. There should be effective evaluation.

(25–30 marks)

Band 3 answers will contain reference to a LEDC or MEDC and consider with pressures and difficulties but there may be imbalance. Expect few evaluative points.

(13–18 marks)

Band 4 answers may be unclear about the chosen example with the analysis not tied to the example. The bullet points will be poorly developed and there will be little or no evaluation.

(6–12 marks)

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4 (a) Using the information in Fig. 4.1 give three different reasons why the G... Islands are a designated conservation site.

The detail of Fig. 4.1 suggests three main reasons: landscape beauty, biodiversity and pressure from tourism. Notionally award 3 marks for each reason (1 floating mark); 1 mark for identification of a reason and 2 for its amplification.

- landscape includes coastal beauty, volcanic background
- biodiversity is indicated in the paragraph e.g. ecotourism; sea lions to sea turtles etc
- from tourist numbers; the graph contains details of the rise in resident population and visitors.

8–10 mark answers will give three reasons by clearly identifying a reason amplified through good use of the information in Fig. 4.1.

4–7 mark answers should develop at least one reason and briefly outline the other two. Other answers, to varying degrees, will be relevant but lack detail.

1–3 mark answers although relevant will be under-developed and may only refer to one reason.

(b) With reference to a named area of ecological importance that is under threat from human activity, assess the measures that are being used to enable its conservation. [30]

The requirements of the question are:

- select an area whose ecology is under threat
- recognise the ecological value of the area
- describe and assess the threats posed by human activity
- outline and evaluate relevant conservation measures.

Band 1 answers will have selected an area whose ecology is threatened and give a detailed description of the ecological value. This should be followed by an evaluative coverage of conservation measures. (25–30 marks)

Band 3 answers may make loose reference to a selected area but develop some detail on threats and conservation measures. Other answers will correctly identify an area but lack detail of the ecology, the threats or conservation measures. (13–18 marks)

Band 4 answers will be weak in detail and evaluation. Whilst an area may be identified the description will bear some loose relationship to it. (6–12 marks)

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5 (a) Fig. 5.1 shows natural processes which influence the height of the water table. The height of the water table could also be affected by human activity.

Briefly describe the conditions that would cause changes to the height of the water table. [10]

Water tables are variable in height and may rise and fall (1 mark)
A fall would result from: less rainfall (1) thereby reducing runoff (1), river discharge (1) and localised groundwater flow (1); reductions in the regional groundwater flow would result from less rain at or near to the regional watershed (1).
Credit 2 marks for the reflexive points to a rise in the water table or vice-versa.
Reserve up to 4 marks for the human effects up to a max of 10 for the question e.g. deforestation increasing surface runoff and reducing infiltration.

8–10 mark answers will integrate the features in the diagram with changes in the height of the water table. There will be some reference to human activity.
4–7 mark answers will emphasise either human or natural factors; recognise the variability of the water table but may lack clarity on the interaction of factors shown in the diagram.
1–3 mark answers will give a very superficial coverage of the question; they will lack clarity on the causes of changes to the water table.

(b) With reference to examples you have studied, describe three common causes and characteristics of groundwater pollution. Assess the extent to which it is possible to manage groundwater pollution in order to supply clean water suitable for human consumption. [30]

The question falls into three components: causes, characteristics and management. Notionally these should each receive $\frac{1}{3}$ of the marks.

- The requirements of the question are:
- describe three causes of groundwater pollution
 - describe the characteristics of the groundwater pollution
 - consider the management strategies used and evaluate.

Band 1 answers should contain a good balance of the three question elements with reference to three forms of groundwater pollution. The management or prevention of groundwater pollution must receive evaluation. (25–30 marks)

Band 3 answers should satisfy at least two of the question requirements and may lack an evaluation of management. Where there is a reasonable balance expect superficial or weak references. (13–18 marks)

Band 4 answers although relevant will probably combine weakness in detail with a poor balance of question requirements. (6–12 marks)

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Band 3	The candidate demonstrates the following abilities where appropriate to:	
A	<ul style="list-style-type: none"> select and use some accurate and relevant knowledge. integrate knowledge from a limited range of areas; show an adequate understanding of the concepts involved; demonstrate a limited range of awareness of personally derived and studied knowledge; 	
B	<ul style="list-style-type: none"> select and use a form and style of writing appropriate to purpose and subject matter; communicate the ideas clearly and in a logical way 	
C	<ul style="list-style-type: none"> undertake some analysis of issues and problems and make a superficial evaluation; develop arguments and draw conclusions; 	
Band 4	The candidate demonstrates the following abilities where appropriate to:	6–12
A	<ul style="list-style-type: none"> select a limited range of accurate and relevant knowledge. integrate knowledge from a very limited range of areas; show a modest understanding of the concepts involved; 	
B	<ul style="list-style-type: none"> select and use a limited style of writing, appropriate to purpose and subject matter; communicate ideas with limited clarity; 	
C	<ul style="list-style-type: none"> demonstrate limited analysis of issues and problems with <ul style="list-style-type: none"> – limited evaluation; develop limited arguments and draw limited conclusions; 	
Band 5	The candidate demonstrates the following abilities where appropriate to:	1–5
A	<ul style="list-style-type: none"> select and use some relevant knowledge; integrate knowledge from a very limited area; show a restricted understanding of the concepts involved; 	
B	When producing written communication: <ul style="list-style-type: none"> select and use a very limited style of writing appropriate to purpose and subject matter communicate with limited clarity; 	
C	<ul style="list-style-type: none"> undertake a very limited analysis of issues, problems and evaluation; recognise some arguments and conclusions 	