

MARK SCHEME for the May/June 2008 question paper

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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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

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Section A

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

1 (a) Fig. 1.1 contains information on the African savanna biome.

(i) What is meant by the term *food web*?

A complex series of interconnected food chains (= 1) where organisms can operate at more than one feeding or trophic level (= 1). Whilst the first point is vital, credit other valid points with the second mark. Credit with 1 mark simple but relevant equivalents e.g. the interaction of different levels of animal eating habits within a biome. [2]

(ii) From the food web in Fig. 1.1 identify:

1 mark for each

- **one producer**

acacia, star grass or red oat grass

- **one primary consumer**

harvester ants, grasshoppers, topi, termites or mice, impala, etc. [2]

(iii) Using the climatic chart in Fig. 1.1, describe the climate of the African savanna biome.

Rainfall seasonal peaking at 28mm in August; arid from November to April.

Temperature peaks at 26°C in March with a minimum of 17°C in December. Accept full and accurate description such as hot dry April followed by warm wet summers and cooler dry winters.

Credit one mark for each of a temperature and rainfall reference. [2]

(iv) Using the information in Fig. 1.1:

- **state the identity of the predominant type of vegetation of the savanna biome**

acacia/grass [1]

- **suggest why the behaviour of impala and wildebeest might cause excessive consumption of savanna vegetation.**

Live in large herds (1 mark), large numbers consuming pasture in a marginal climate (1 mark) and are herbivores. [2]

(v) Suggest two explanations of how animals at the highest trophic level have established niches in the savanna biome.

Credit two valid points: solitary hunters with wide territory, agile and quick to catch prey, tree dwellers, pack hunting and a wide range of prey. [2]

(vi) What effect might increasing aridity have upon the food web of savanna areas?

Award 1 mark for each of three stages:

- increasing aridity reduces the number of producers (= 1)

- reduced food and water for the lower consumer levels (= 1)

- herd migration and reduction in number of predators (= 1)

[3]

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- (b) Fig. 1.2 contains data on critically endangered species, by group, in three regions. The numbers of endangered species are shown by the values in the quadrants. Give three reasons for the regional differences in the data shown in Fig. 1.2.

Notionally award two marks for each area or reason:

Europe has lower biodiversity (temperate climate) with arguably greater concerns about conservation and preservation.

Much of Africa is arid thus much lower biodiversity and lower population density. It is experiencing increases in drought plus localised demand of TRF and Savanna areas. TRF exploitation has been devastating.

SE Asia, with high biodiversity, exploited through the demands of a dense population e.g. agriculture and urban expansion plus relevant points about poaching and hunting.

[6]

[Total: 20]

- 2 (a) Table 2.1 contains data about global water stores.

Table 2.1

Store	volume/million km ³	% of total
oceans	1370	97.25
ice caps	29	2.05
deep groundwater	5.3	0.38
shallow groundwater	4.2	0.30
lakes	0.125	0.01
soil moisture	0.065	0.005
atmosphere	0.013	0.001
rivers	0.0017	0.0001
biosphere	0.0006	0.00004

- (i) Explain the term *global water store*.

The specific locations in which water is stored (= 1) in the form of a vapour, liquid or solid (= 1). [2]

- (ii) With reference to Table 2.1, outline the possible impact of a decrease in temperature on the oceans and ice caps.

Cooling would increase the size and volume of the ice caps (= 1) sea levels would fall as the volume of water in the oceans store is reduced (= 1). [2]

- (iii) Name the water store that is most important in supplying water

- for industrial activity,
rivers
- directly to growing crops.
soil moisture

[2]

- (iv) With reference to Table 2.1, describe and explain the possible effects of an increase in temperature upon the groundwater and soil moisture stores.

Award 1/2 marks for the description and 2/1 for the explanation.

The description should include soil moisture and lowering the water table (= 1).

An increase in temperature will: increase evaporation (= 1) causing an upward capillary movement of water in soils (= 1); increase demand for water from the soil moisture store by vegetation (= 1). [3]

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- (v) **To what extent will a slight increase in temperature affect the water stored in the atmosphere and biosphere?**

Award three marks divided 1/2 or 2/1 for atmosphere and biosphere.

Candidates should be credited for stating that it is difficult to make precise judgements as long as the argument is justified.

Atmosphere: increased evaporation and transpiration could increase the water vapour content of the atmosphere and reduce to water content of the biosphere (= 1), plants have increased demand for water, which if not available could reduce the biosphere store locally rather than globally. [3]

- (b) **Describe how a balance between inputs and outputs of water would be maintained in the woodland area shown in Fig. 2.2.**

Candidates are expected to make judgements about the hydrological cycle in an area of woodland. The land is fairly level and there is no evidence of surface run-off. Credit a maximum of two marks for an explanation of gains and a maximum of three for losses. If there is no suggestion of 'balance', award a maximum of two marks.

Gains: precipitation, groundwater

Losses: evaporation, transpiration, infiltration [4]

- (c) **Fig. 2.3 shows the annual soil moisture balance for Cuddalore in southern India. Agriculture is an important all year activity in Cuddalore. Using Fig. 2.3, discuss the effect of a decrease in precipitation upon agricultural activity in this region.**

Decreases in rainfall would reduce the ability of the soil to recharge (= 1) thereby reducing the growing season (= 1) and crop production (= 1), artificial sources of water (well, reservoirs) are needed to maintain agriculture (= 1) [4]

[Total: 20]

Section B

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

- 3 (a) **Some people in SE Asia, Latin America, Europe and Africa do not have access to an adequate, safe water supply. Fig. 3.1 shows how these people are distributed across these regions.**

Using the pie chart in Fig. 3.1, outline three reasons for this distribution. [10]

This should form a quite straightforward interpretation of one pie chart. The water supply information relates aspects of global wealth and poverty.

Valid points include:

Europe has 2% not served with adequate water indicating high investment in both supply and quality.

Asia only has 61% of its population safely supplied with water because of high demand and in many areas, poor development of water conservation schemes and clean water.

A similar pattern occurs in Africa and to a lesser extent parts of Latin America.

7–10 marks Answers should develop three reasons and develop clear comparisons between the regions.

4–6 marks Answers should contain two developed points and comparisons/contrasts may be poorly developed.

1–3 marks Answers may have one developed point or make very brief statements without qualification.

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(b) With reference to examples from either LEDCs or MEDCs describe and evaluate the measures that countries attempt in order to satisfy their increasing demand for water.

[30]

The answer should contain reference to: the nature of supply and demand; water as a scarce commodity; how present supplies are obtained; the impact of future demand and how it might be supplied. The main difference between LEDCs and MEDCs is largely a matter of the scale of the demand and ability of Nations to meet their demand; actual methods are not always unique to one group of nations. As candidates have the option to make a choice of examples the following points should relate to the chosen nations.

- Supply and demand: water is a scarce commodity for LEDCs and MEDCs. There should be reference to population size and the degree to which demand is met; current sources e.g. river, groundwater, recycled, desalinisation, well and less sanitary methods.
- The nature of future demand in terms of: increases in population; urbanisation, climatic change.
- Future supplies that would include expanding current methods and adopting new methods.

Band 1 Answers should express a clear understanding of the issues within the chosen examples with well-balanced essays covering each of the above sections.

Band 3 Answers may have unclear reference to the examples, and although fairly superficial contain the bulleted points. Some developed answers may lack balance and contain omissions.

Band 4 Answers should be relevant but only cover one of the bullet points or simply be brief and very superficial. Case study development will be weak.

[Total: 40]

4 (a) Fig. 4.1 shows an area of forest.

With the exception of human activity, describe three factors that would maintain the ecological stability of the area of forest shown.

[10]

There are notionally a maximum of 3 marks for any single factor and three for the other two. Award 1 mark for identifying the factor and 2/3 for the elaborative points.

Candidates can select from the wide range of ecological factors that contribute to maintaining this area of Temperate Rain Forest.

Biotic include: humus, nutrient cycling, photosynthesis, plant dominance, niche and habitat.

Abiotic includes: temperature, rainfall, soil, some may refer to the absence of natural disasters (credit once only)

7–10 marks Answers should contain up to 3 well-developed factors with a clear reference to the stability of the ecosystem.

4–6 marks Expect one or two factors to be lacking development and a superficial reference to ecological stability.

1–3 marks Answers will contain omissions with the possible development of one factor. The idea of a stable ecological system will not be understood.

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- (b) Describe the effects of human activity upon one natural ecosystem you have studied. Assess the extent to which it has been possible to manage and conserve the important aspects of your chosen ecosystem. [30]**

As candidates should use case studies of their choice, as stated in the syllabus, the mark scheme is generic rather than content based. Answers should contain a balance of:

- the ecosystem with the interaction of climate vegetation and soils;
- the impact of human activity;
- the policies and strategies used to manage the selected ecosystem;
- an evaluation of the management strategies.

Band 1 Answers should be well-structured with each bullet point developed in the context of the chosen ecosystem. Management strategies should be evaluated.

Band 3 Answers should name an ecosystem, but the answer poorly balanced and lacking clear evaluation.

Band 4 Answers should be relevant but will lack evaluations and may only expand one main point; otherwise expect a very superficial coverage.

[Total: 40]

- 5 (a) Choose three of the issues listed below and for each outline one reason why it is seen to exert pressure on the global environment.**

- **Global output of goods has increased by a factor of 6 since 1980.**
- **Use of paper has increased by a factor of 6 since 1980.**
- **Global life expectancy at birth, now 66 years, is projected to reach 73 years by 2025.**
- **Fossil fuel burning has increased by almost a factor of 4 since 1980**
- **80% of natural resources are consumed by 25% of the world's population. [10]**

Answers should contain: an expansion of the issue (= 1); for two explanatory points or one well-developed point award 2 marks (= 2). Allow one additional mark in any section.

- (b) To what extent have meetings between nations been successful in managing the impact of human activity upon the biosphere? [30]**

Essays should be structured to account for the need for international agreements to manage and conserve aspects of the biosphere. This may be via NGO's, relatively informal meetings between nations or through international protocols.

Brundtland commission (1987) combined environment and economy and promoted sustainable development; affects woodland, agricultural land as well as energy. It paved the way for the Rio conference.

Rio de Janeiro (1992) sought to achieve agreement on; global warming, wilderness and habitat preservation, biodiversity and sustainability. Agenda 21 embraced the entire environment. Although many areas of success it took a long time for nations to sign up and many found its recommendations difficult or impossible to implement.

Kyoto (1997) established country-by-country greenhouse gas reductions. It encouraged countries with high emissions to expand their carbon sinks such as forests. Kyoto was not binding and only deals with targets and timing.

NGO's include discussions and treaties on climate, forests, biodiversity, oceans.

Evaluations might counter the recommendations through reference to economic and social pressures that encourage further exploitation of forests, oceans and wetlands, etc.

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- Band 1 Answers should be clear about the need for nations to agree policies via various protocols, more local agreements and the role of NGO's and, through examples, critically evaluate the recommendations.
- Band 3 Answers will probably cover one or two of the agreements quite well but the evaluations may be poorly balanced. Some objectivity may be lost through some emotional responses.
- Band 4 Answers, although relevant, may lack detail and contain a poor balance of evaluative points.

[Total: 40]

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Generic Mark Scheme

This aims to provide a scheme for marking 30 mark answers in Section B. The marks are grouped into bands from which it should be possible to locate a mark. The assessment objectives outlined are developed out of the broad objectives for the examination and guideline for locating marks for essays.

Criterion A demonstrates relevant knowledge and understanding applied to a range of issues and problems.

Criterion B communicates clearly in a concise, logical and relevant way.

Criterion C marshalls evidence, draws conclusions and makes evaluations.

Balance of marks for 30 mark questions; Criterion A = maximum of 15

Criterion B = maximum of 5

Criterion C = maximum of 10

Band	Level Descriptors	Marks
Band 1	The candidate demonstrates the following abilities where appropriate to:	25–30
A	<ul style="list-style-type: none"> select and use a very good range of accurate and appropriate knowledge; integrate knowledge from a wide range of areas; show a good understanding of the concepts involved; make good use of knowledge derived from personal experience and study. 	
B	<ul style="list-style-type: none"> select and use a form and style of writing appropriate to purpose and complex subject matter with facility; communicate complex ideas clearly and accurately, in a concise, logical and relevant way. 	
C	<ul style="list-style-type: none"> analyse issues and problems well and evaluate them appropriately; develop complex, reasoned arguments and draw sound conclusions on the evidence. 	
Band 2	The candidate demonstrates the following abilities where appropriate to:	19–24
A	<ul style="list-style-type: none"> select and use a good range of accurate and appropriate knowledge; integrate knowledge from a wide range of areas; show an understanding of the concepts involved; demonstrate a 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 complex subject matter; communicate complex ideas clearly and accurately, in a concise, logical and relevant way. 	
C	<ul style="list-style-type: none"> analyse issues and problems and evaluate them competently; develop complex, reasoned arguments and draw conclusions on the evidence. 	
Band 3	The candidate demonstrates the following abilities where appropriate to:	13–18
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. 	

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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 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	<p>when producing written communication:</p> <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. 	