

MARK SCHEME for the October/November 2013 series

8291 ENVIRONMENTAL MANAGEMENT

8291/21

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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Section A

- 1 (a) (i)** Overall increase; different rates of increase 1870 to 1930 and 1943 to 2009. **[2]**
- (ii)** The effects of Global warming; increasing temperatures; thermal expansion of water; melting of ice caps/glaciers. **[4]**
- (iii)** Up to 2010 sea level rises are recorded and beyond this date they are predicted; increase is dependent upon a number of factors which can vary; with time, the estimates become less precise thus the range increases. **[3]**
- (b) (i)** The delta is mostly at or near to sea level, thus a major rise would inundate the land/snow melt results in annual river floods. **[1]**
- (ii)** Description and explanation of both ecological and socio economic effects are required. For example: inundations of salt water into tidal swamps; a loss of freshwater biodiversity; the delta region is no longer habitable for people; loss of fertile, agricultural land and other resources; migration into drier areas; increasing population density; population exceeding the carrying capacity, resulting in poverty.
- 8 to 10 marks answers show a clear understanding of the likely effects of permanent flooding of the delta with clear references to social, economic and ecological factors.
- 4 to 7 marks answers show a modest understanding of the possible effects of permanent flooding of the delta.
- 1 to 3 marks answers show a poor understanding of the effects of flooding. **[10]**
- [Total: 20]**
- 2 (a) (i)** The less diverse pioneer/early stage community with a low biomass, containing plants which are short lived and simple in morphology and physiology; are replaced in time by a climax/late stage community, increased biomass, more diverse and complex plants. **[2]**
- (ii)** In the early stages of a succession there is less biomass/limited plant litter to decompose; whereas in the latter stages e.g. woodland, the litter and humus layers are larger. **[2]**
- (iii)** In the primary stage the plants consume nutrients rapidly, due to increasing growth; more diverse climax communities are maintaining, rather than increasing biomass and more nutrients are available. **[2]**
- (iv)** Low stability in the pioneer/early stage community as plants are short lived and biomass and diversity are low; the ecosystem is less resistant to change. High stability in the climax/late stage, when plants are long lived, with a high biomass and diversity; the ecosystem is resistant to changes in factors affecting the ecosystem. Ecosystem stability, involves flows that maintain the high biodiversity and biomass, by active nutrient cycling and complex plant morphology and physiology. **[4]**

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- (b) (i) It is in a primary/early stage of succession; a pioneer community with coarse grasses growing in loose wind blown sand; the sand is porous with rapid infiltration; nutrients are easily lost; the grasses reintroduce few nutrients; this is a harsh environment with strong onshore winds, wave action and stormy weather which suffers erosion. **[4]**
- (ii) Site designation to emphasise the need for conservation. For example, a SSSI or nature reserve; visitor car parks detached from the area; visitor centre offering advice on access and biodiversity; walkways through the dunes to protect the dunes from erosion; observation points or bird hides.

Award 1 mark for the identification and 1 mark for the justification for each of three management strategies. **[6]**

[Total: 20]

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Section B

- 3 (a)** The lake water level is an interaction of the precipitation, the water table, surface flow and extraction. Candidates should point out the effects of loss and gains to these flows/stores.

8 to 10 marks answers will refer to all flows and stores in Fig 3.1 and relate how they affect rises and falls in the lake level.

4 to 7 marks answers may omit some of flows and stores and infer changes to the lake level.

1 to 3 marks answers may be very general and lack linkages between flows/stores and the lake level. **[10]**

- (b)** The requirements of the question are:

- to select appropriate areas
- to understand the demands on the water supply and issues with quality and quantity
- assess the difficulties in maintaining a sustainable supply

Indicative content:

Issues frequently relate to: supply and demand, water pollution, natural problems e.g. periodic or long term drought, maintenance of supply routes.

Sustainable supply provided through water storage in reservoirs and lakes, water treatment plants, groundwater extraction, desalinisation. Each has its own difficulties such as; limited sites for water storage, river and ground water pollution, low levels of ground water, cost.

Band 1 answers must contain the requirements of the question. For the selected areas water supply issues and the difficulties encountered in overcoming them will be of a very good quality. [25–30]

Band 3 answers will contain the three requirements but the answer will be modest in detail. Expect some very general or superficial responses. [13–18]

Band 4 answers may be poorly balanced and poor in both analysis and assessments. Many answers at this level will be very brief. [6–12]

[30]

[Total: 40]

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4 (a) E. Boserup: optimistic model; population growth is exponential but food supply (or resources) are always ahead of demand; this is due to constant improvements in agriculture and technology.

T. Malthus: pessimistic model: population growth is exponential but resources are linear; therefore, there is a point of crisis where demand for resources exceeds supply.

8 to 10 marks answers will be well balanced and accurately explain the contrasts between the two models.

4 to 7 marks answers may be balanced with adequate explanations.

1 to 3 marks answers may be incomplete and brief in detail. **[10]**

(b) The question requirements are:

- to express an understanding of the concept and describe how nations become overpopulated
- assess the measures aimed at reducing the problem of overpopulation
- select and use suitable examples from LEDCs and MEDCs

Indicative content:

Overpopulation: the size of the population exceeds the carrying capacity of the country.

Carrying capacity can be: food, energy, employment, land; resources that serve the needs of the population. It manifests itself in the form of: poverty; malnourishment or undernourishment; congestion including people, traffic, buildings and lack of space. For this reason Mali, one of the world's poorest nations and the Netherlands can be regarded as overpopulated.

The causes of overpopulation include for example: falling death rates and high birth rates; lack of family planning; poor economy; limited land area but high socio-economic growth; drought.

Whilst reducing the issue can involve controlling the rate of population growth, it can also mean increasing the available resources for the population. Therefore, contraceptives and family planning are as important, as increasing employment, improving the standard of living and utilising resources.

Band 1 answers will show a thorough understanding of overpopulation and the complexities of the resource/population issue. Good use will be made of exemplar material. The quality of the answer will be very good. [25–30]

Band 3 answers may show a modest understanding of overpopulation, managing population growth and increasing resources. Weaker answers within this band might try to use the Netherlands and Mali without much knowledge of the two countries. [13–24]

Band 4 answers will display a weak understanding of overpopulation without clear reference to examples. The coverage of how to cope with the issue, will be weak and probably focus on demographic matters. Most answers will be brief. [6–12]

[30]

[Total: 40]

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- 5 (a) The transitions are very similar; with differences due to latitude and temperature. In both latitudes rainfall is the prime factor that produces the transition with:

Rainforest and temperate forest require high rainfall to sustain their ecosystems; where rainfall is less, forest gives way to dry grassland (in hot climates = savanna and cooler climates temperate grassland = prairies). Dry grassland eventually gives way to deserts.

8 to 10 marks answers will clearly develop the transition and include very good detail on the role of rainfall.

4 to 7 marks answers are likely to be descriptive with weak references to moisture.

1 to 3 marks answers will be poor in detail with brief and vague reference to the information in Fig. 5.1. **[10]**

- (b) The question requirements are:

- to select examples
- consider the need for conservation
- assess the role of National Parks

Indicative content:

Regions are designated as National Parks when there is a need for conservation in order to protect the landscape beauty, the geology or the ecology of an area due to conflicts of interest and the pressures from nearby urban land, visitors and economic development (for example from quarrying).

The role of conservation is to preserve, protect and manage the countryside and its ecology. This is achieved by: controlled access, car parks, visitor information centres, ecotourism, research and education, recognising the needs of stakeholders (farmers, forestry) and the creation of honeypots. Although most of these management roles are effective and successful there are examples of where there are issues with, for example poaching (Serengeti), tourist pressures (Galapagos or Yosemite).

Band 1 answers will develop the three requirements with very good analysis and assessments. The need for and the role of National Parks will be fully developed with effective development of exemplar material. **[25–30]**

Band 3 answers will give modest consideration to the need for conservation. The roles of National Parks will be brief and the exemplar material loosely developed. **[13–18]**

Band 4 answers likely to be brief and poorly balanced. The analysis and assessment will be of poor quality. **[6–12]**

[30]

[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 marshals 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 	

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Band 3	The candidate demonstrates the following abilities where appropriate to:	13–18
A	<ul style="list-style-type: none"> select and use a limited range of 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 and use some 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	<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 	