

**MARK SCHEME for the May/June 2012 question paper
for the guidance of teachers**

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 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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General notes

Symbols used in Environmental Management mark schemes.

- / separates alternatives for a marking point – other valid ways of expressing the same idea are also credited
- ; separates points for the award of a mark
- [3]** indicates the number of marks available
- [max 3]** the number shows the maximum number of marks available for the question where there are more marking points than total marks available
- [max 3] when part of the marks of a question must come from part of the mark scheme, this is indicated by non-bold marks showing the internal maxima for different parts of the question
these non-bold marks are also used to show marks for bands where banded mark schemes are used
- italic* indicates that this is information about the marking points and is not required to gain credit
italic text is also used for comments about alternatives that should be accepted, ignored or rejected
- ora or reverse argument – shows that an argument from an alternative viewpoint will be credited
- AW alternative wording, sometimes called 'or words to that effect' –
AW is used when there are many different ways of expressing the same idea
- () the word / phrase in brackets is not required to gain marks but sets the context of the response for credit
e.g. (nuclear) waste – nuclear is not needed but if it was described as a domestic waste then no mark is awarded
- volcanic underlined words – the answer must contain exactly this word
- ecf error carried forward – if an incorrect answer is given to part of a question, and this answer is subsequently used by a candidate in later parts of the question, this indicates that the candidate's incorrect answer will be used as a starting point for marking the later parts of the question

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Section A

Answer all questions in this section

- 1 (a) (i) sun or solar energy [1]
- (ii) green pigment in plants (chlorophyll) (1) captures light energy (1), converts it into food energy (1), by manufacturing carbohydrates (1), using elements such as oxygen, carbon and hydrogen (1) [4]
- (iii) award 4 marks for good development of at least 3 of the factors
as light intensity increases the rate of photosynthesis increases (1) which could relate to temperature or carbon dioxide (1)
an increase in carbon dioxide has a greater effect (1)
water acts a solvent for all chemical reactions and is a source of hydrogen (1) [4]
- (b) temperate forests occur in regions of higher rainfall (1) with warm to mild temperatures (1)
savannas although warm to hot suffer from very low rainfall (1) which occurs during the summer (1)
ref. contrasts in vegetation (1) [3]
- (c) the question requires candidates to understand that ecosystems occur within biomes on a number of scales; Fig.1.2 contains for instance: a river, moss on boulders, lower canopy trees, distant middle canopy and emergent's, the whole scene is an interactive ecosystem
credit 3 marks for each ecosystem and 2 marks for the interaction, detrivors, and humus
abiotic include: water, temperature, humidity, solar energy
ref. elements of interaction between biotic and abiotic factors e.g. water and heat encourage photosynthesis and affect rates of energy cycling and decomposition [8]
- [Total: 20]**
- 2 (a) (i) *Europe and Africa 11%*
Asia and Africa 67% [2]
- (ii) Europe has a higher level of development (accept richer) with better sanitation and water purification; higher rainfall and more sources of water
African nations with lower technology and wealth have poorer sanitation and for the most part, little water purification; greater aridity reduces supply
Asia has a much higher population with extensive underdeveloped regions; therefore a lower percentage provision
Africa has a lower population distributed in the more favourable areas of an arid continent [4]

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- (b) there are 6 marks available and these should divide evenly
award a maximum of four if there is no linkage between point and non-point
candidates should refer to:
point sources such as seepage, factory sources and runoff from agricultural land (2)
non-point derived from air pollution, ground water seepage, ultimately the river itself. (2)
the linkage being transference from point sources to different locations because of wind and water transportation (2) **[6]**
- (c) (i) award two marks for a well developed reason and one for a brief statement
the two sources are linked common factors; the exponential growth in population (1)
leads to increased domestic demand and the need for food (1)
agriculture requires water from irrigation, groundwater extraction for arable farming and pastoral farming; gross demand for domestic consumption is less
domestic demand has necessitated measures that mean towards 2025 the amount extracted increasingly exceeds the amount consumed
wastage is a relevant factor in domestic use **[4]**
- (ii) credit should be given for actual reasons rather than citing inaccuracies in the data.
the justification is in the data e.g. by 2000 for agriculture the difference is 800 cu km and domestic 750 cu km (1)
reasons might include:
water conservation
global disparities. MEDCs masking LEDC issues
there is a vast untapped global potential supply e.g. rivers, glaciers
improving technology for water storage
politics **[4]**

[Total: 20]

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Section B

Answer one question from this section

- 3 (a)** rainfall events usually rise to a peak then fall and precede any response by a river time is needed for leaf drip, infiltration and surface runoff; therefore the lag time as the water table rises and the river receives water from various sources discharge increases producing a rising limb ultimately peak discharge for this rainfall event is reached the end of the rainfall means there is a reducing amount of water reaching the river, producing the falling limb

it is equally relevant for candidates to refer to a flood hydrograph

8 to 10 mark answers should clearly link the rainfall event to the three changes to discharge with a clear understanding of the lag between the rainfall event and the peak discharge

4 to 7 mark answers may be lacking in the linkage between to storm and discharge and in particular ignore the dynamic aspects of the model

1 to 3 mark answers may attempt to describe the graph but lack coherence and explanation

[10]

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(b) the question requires:

- selecting appropriate examples
- discussing the inevitability of rivers flooding
- assessing the extent to which human activity is a contributory factor

suggested annotations: i = inevitability, h = human activity, a = assessment

this title picks up the dichotomy between the inevitability of floods, the need for protecting land and people, with the role of flood plains and the problems associated with interfering with natural processes

discussions will relate to the scale of the flood events, the rivers chosen and the factors that contribute to flooding

flood prevention schemes could include: dams, levees, straightening, afforestation, channel diversion

inevitability refers to climate, the rivers flood history particularly periodicity of floods

the question of need debates; cost, possibilities of habitat relocation, knock-on effects e.g. straightening or levees leading to downstream flooding vs the needs of the population, economic and social need, historic sites of settlement

Band 1 answers will take up the debate in the question by mentioning both sides of the debate. Examples will be effectively used. In particular there should be reference to the problems of interfering with natural processes. Good assessment [25–30]

Band 3 answers may lack balance by developing one side of the discussion. There may be a lack of understanding of the physical processes operating within a river, its floodplain. Moderate assessment [13–18]

Band 4 answers are likely to be weak in detail and discussion. Some answers may dwell on the effects of flooding rather than causes. Poor assessment [6–12]

[Total: 40]

4 (a) the question expects a description of the information
the best answers may recognise that the same areas are affected and within this point out the different degrees of illegal activities
other answers will treat each map separately

the affected areas are: the northern border region: some central pockets and the south coast

north: high for hunting medium for logging and low for mining

middle: small areas with logging medium to high, mining low, hunting low

south: logging high, mining medium, hunting low

references to the overall low level of illegal activity is also valid

8 to 10 mark answers should consider the three activities and point out specific variations

4 to 7 mark answers will lack detail be poorly expressed; some confusion over locations

1 to 3 mark answers will be vague about locations and be generalised [10]

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(b) the question requires:

- the use of appropriate example
- a description of conservation policies
- an assessment of success and failure

suggested annotations: e.g., cp = conservation policy, as = assessment of success

policies include:

- designated areas such as National Parks, World Heritage Sites, sites of special scientific interest, locally protected areas
- legislation on usage e.g. prohibitive access
- controls on illegal activities
- education
- ecotourism; small scale up to safari parks
- international agreements / protocols

examples should be developed and linked to a policy

assessment is an important feature of the question and should relate to the degree of success of the policies

Band 1 answers should clearly satisfy the three requirements of the question. Good use should be made of chosen examples and policies clearly assessed [25–30]

Band 3 answers may lack detail on actual policies which may be dislocated from the example. There will be some assessment but it will be brief, possibly confined to simple success / failure statements [13–18]

Band 4 answers will be weak in detail. Examples will have brief coverage and relevant policies superficially covered. There will be very little assessment, if at all [6–12]

[Total: 40]

5 (a) as the question requires references to becoming more sustainable, weight the marks 4 for unsustainable and 6 for sustainable

the left side shows water stores adversely affected by waste water discharges (desalination plant, water treatment plant serving an urban area), into the sea or river
thus there are water losses to the urban system as well as pollution

the right side shows water being recycled between the treatment plant and the urban area
purified, more sustainable farming
this reduces water losses and enables the aquifer to be recharged

8 to 10 mark answers must recognise the causes of water loss and possible pollution on the unsustainable side and the reasons and how a clean supply is achieved on the sustainable side

4 to 7 mark answers may be unclear about sustainability and make generalisations about the causes of losses and gains

1 to 3 mark answers will be brief and make little direct reference to the content of Fig. 5.1

[10]

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- (b) the question requires:
selecting an example
describing the measures being used to manage river pollution
assessing the measures

suggested annotations: e.g. mi = measures industrial, md = measures domestic, a = assessment

answers should:

begin with a survey of the pollution in the city
refer to the point and non-point sources of pollution in the selected city
provide examples of how the river comes polluted
make reference to the scale of pollution and its effect

describe how river pollution is being managed
through treatment and reduction at the source
through municipal monitoring and legislation
by cleaning physical and chemical waste from the river
introducing public awareness schemes

make appropriate positive and negative assessments

Band 1 answers will focus on the examples and provide a detailed analysis of the causes of pollution and how it is being managed. Assessments will be well constructed and refer to both negatives and positives [25–30]

Band 3 answers may make general references to the causes of river pollution which might not be linked to the example. Assessments will be brief but made [13–18]

Band 4 answers will either be very brief or broadly relevant but superficial. An example might be selected but if so, poorly used. There will be very little, if any assessment [6–12]

[Total: 40]

Band 3	The candidate demonstrates the following abilities where appropriate to:	
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"> When producing written communication: 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 	