CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level

MARK SCHEME for the May/June 2014 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 May/June 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

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

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

<u>volcanic</u> 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

Section A

1 (a) (i) Climatic factors / climate; rainfall; temperature; drought;
edaphic factors / soils; mineral / nutrient; pH; water; salinity;
altitude.
IGNORE: climate change, global warming; short-term weather changes; pollution. **[2]**

(ii) Availability of food; food preference; predators; cover / shelter provided by vegetation; disease;
competition (intra); competition (inter); introduction of a non-native species.
IGNORE: human activity, e.g. deforestation. **[2]**

(iii) Deforestation / cutting down trees; to provide cropland / firewood / timber extraction / housing;
burning / accidental burning; illegal charcoal fires; mining activity; destruction of forest for roads / access; pollution which is qualified with an appropriate example.

For each of two human activities: one mark for the activity and one mark for a developed point. **[4]**

(iv) Ecological reasons: the forest provides a unique habitat for both plants and animals; food chains / food webs; endemic species; prevents extinction of species.
Environmental reasons: the trees help to bind soils; preventing erosion; act as a barrier preventing flooding.
Scientific reasons: may provide scientific data; important developments in e.g. medicine; the forests ameliorate the climate and generate a microclimate effect;
Economic reasons; ecotourism; the forest is still a source of materials for the surrounding villages.

For each of two reasons: one mark for the reason and one mark for a developed point. Maximum of two marks for a list of reasons without any exemplification. **[4]**

(b) The plan separates different land uses; shows a core / buffer / transition zone model / AW; reference to the biodiversity zone; ecotourism zones; access tracks; subsistence farming / plantations; intervention / villages around perimeter.

The biodiversity zone will protect species;
the ecotourism zone could generate income that could be used to compensate villagers that have lost access to land or species and pay for warden; educate and raise awareness;
the village zones have been set away from the key biodiversity zones and this will hopefully allow it to remain undisturbed and reduce encroachment;
subsistence zones will reduce the destruction of land for commercial agriculture and allow sustainable rotation farming;
plantations allow the growth of the species which are of economic value to the villagers which will reduce their exploitation of pristine areas;
the widespread use of footpaths and the restricted nature of motor routes will help to minimise damage e.g. by emissions or trampling. Access paths around the biodiversity zone may allow relatively easier monitoring.

Please use level descriptors 1

[8]

[Total: 20]

2 (a) A narrow gorge; steep-sided gorge; easier to build dam;
provides a plentiful water supply year-round which can be reliably estimated;
river flow; volume of water.

Four single points or two developed points. **[4]**

(b) Displaced people have lost their homes and livelihoods; mass migration; loss social cohesion;
the no-negotiation approach adopted by the government generated riots;
loss of traditional farming areas / practises;
there has been huge destruction of habitat, loss of biodiversity and disruption of key food webs the consequences of which have been little studied;
loss of river industries / trade / fishing / mills;
loss of sacred / religious / cultural sites;
silting of the dam;
effect on the micro climate.

Award three marks for each of two disadvantages.
Award one mark for identification of a disadvantage and two marks for its elaboration (one for a brief statement and two for good detail). **[6]**

(c) Generation of hydroelectric power; electricity in a way which, after initial construction has a relatively low carbon footprint;
the provision of huge amounts of electricity that can be used to power useful infrastructure, e.g. heating, lighting;
the dam allows much greater control of the river, e.g. by reducing flooding / preventing flooding; hence reducing destruction of property and crops;
control of the water supply for irrigation.

One mark for the identification of a benefit, two marks for the elaboration of the benefit.
(One mark for a brief statement and two for good detail, including data from Fig. 2.1.)
Credit an example or use of example and information from Fig. 2.1.

Please use level descriptors 1

[10]

[Total: 20]

Section B

3 (a) Trophic levels with examples from Fig. 3.1 of producers, herbivore / primary consumers, carnivores / secondary consumers, tertiary consumers / top predators;
identification and description of food chains from Fig. 3.1;
solar energy for photosynthesis / primary productivity;
energy flow;
food web interactions e.g. competition.

Please use level descriptors 1

[10]

(b) *The question requirements are:*

- *to describe the threats from human activity*
- *to describe conservation measures*
- *to evaluate the conservation measures*
- *to select and describe a biome*

Indicative content:

For the biome and related ecosystems chosen, there should be a description of the characteristics of the biotic and abiotic factors important to sustaining it.
The nature of the influence of human activity which has resulted from mining, forestry, agriculture or urbanisation should be considered together with the effects of the disruption, upon both biotic and abiotic factors as a consequence of the human activity, e.g. for the rain forest this could include: a loss of biodiversity, climatic change, soil erosion.

Please use level descriptors 2

[30]

[Total: 40]

4 (a) The pumping of wells can have a great deal of influence on water levels below ground, especially in the vicinity of the well, as this diagram shows.
Extraction of water from the well is pulling groundwater and water from the stream towards it; resulting in a lowering of the stream water level and the water table;
The stream is replenished by surface runoff / groundwater and groundwater is replenished by infiltration
If water is withdrawn from the ground at a faster rate that it is replenished; withdrawal > recharge;
water table can become lower, resulting in a "cone of depression" around the well.
The level of the water table can naturally change over time due to changes in weather cycles and precipitation patterns, stream-flow and geologic changes, and even human-induced changes, such as the increase in impervious surfaces on the landscape.
Depending on geologic and hydrologic conditions of the aquifer, the impact on the level of the water table can be short-lived or last for decades, and it can fall a small amount or many hundreds of feet. Excessive pumping can lower the water table so much that the wells no longer supply water / they can "go dry".

Please use level descriptors 1

[10]

(b) *The question requirements are:*

- *to define and consider ways of achieving a sustainable use of water*
- *to assess positive effects and negative effects of water management on human activity and for the environment*
- *to select examples*

Indicative content:

Worldwide demand for water is increasing as a result of population increase, industrial expansion, urbanisation and increased agricultural use;
There are potential water crises in both LEDCs and MEDCs.
Sustainable use may be extremely difficult when demand increases but local supply decreases.
Rivers cross international boundaries and the changing activities of one can very easily have dramatic effects on the water supply in neighbouring states.
Supply of water may be through, e.g. dams, use of aquifers, controls of usage.
Positive effects to include: maintenance of water supply needs for the present and the future, benefits to people, farmers and industry, economic and recreational benefits such as lakes / reservoirs.
Negative impacts include: socio-economic issues, environmental impacts such as salinisation, loss of water elsewhere, local climatic change.

Please use level descriptors 2

[30]

[Total: 40]

5 (a) The fast development of the shrimp sector required the conversion of flat, coastal lands to shrimp ponds.
The rate of conversion of mangroves into shrimp ponds increased in the period 1997 to 1999, suggesting that shrimp pond construction started in crop lands but then encroached onto mangroves in the absence of other suitable land.
Effects: reduction in agricultural land; reduction of salt pan; increase in shrimp ponds; reduction in the sparse mangrove; change in the dense mangrove; change in freshwater / brackish water interface; change in water level; salinisation; rise in sea level / inundation. Human activity; shrimp farming; increased extraction of water; pollution of water due to agriculture / shrimp farming.

Please use level descriptors 1

[10]

(b) *The question requirements are:*
- *to describe the pressures / threats to the ecosystem*
- *to describe conservation measures*
- *to evaluate the conservation measures*
- *to select an ecosystem*

Indicative content:

Threats to an ecosystem might result from: population increase, pressure from urban growth, deforestation, agriculture, tourism and pollution.
Measures might include / combine: urban planning, sustainable forestry, sustainable agriculture, designated conservation sites, ecotourism.

Please use level descriptors 2

[30]

[Total: 40]

Section A and Section B, part (a) descriptor levels:

Descriptor	Award Mark
Consistently meets the level criteria	Mark at top of level
Meets the criteria, but with some inconsistency	Middle, mark to just below top mark
Meets most of level criteria, but not all convincingly	Just below middle, mark to just above bottom mark
On the borderline of this level and the one below	Mark at bottom of level

Level descriptors 1

6–8 marks / 8–10 marks
The response:
- contains few errors
- shows a very good understanding of the question
- shows a good use of data or the information provided, where appropriate
- provides a balanced answer

3–5 marks / 5–7 marks
The response:
- may contain some errors
- shows an adequate understanding of the question
- shows some use of data or the information provided, where appropriate
- may lack balance

1–2 marks / 1–4 marks
The response:
- may contain errors
- shows limited understanding of the question
- shows little or no use of the data or information, where appropriate
- lacks balance

Section B:

Level descriptors 2

Responses:

Level one, 25–30 marks
- fulfil all the requirements of the question
- contain a very good understanding of the content required
- contain a very good balance of content
- contain substantial critical and supportive evaluations
- make accurate use of relevant vocabulary

Level two, 19–24 marks
- fulfil most of the requirements of the question
- contain a good understanding of the content required
- contain a good balance of content
- contain some critical and supportive evaluations
- make good use of relevant vocabulary

Level three, 13–18 marks
- fulfil some requirements of the question
- contain some understanding of the content required
- may contain some limited balance of content
- may contain brief evaluations
- make some use of relevant vocabulary

Level four, 6–12 marks
- fulfil limited requirements of the question
- contain limited understanding of the content required
- may contain poorly balanced of content
- may not contain evaluations
- make limited use of relevant vocabulary

Level five, 1–5 marks

- fulfil a few of the requirements of the question
- contain a very limited understanding of the content required
- are likely to be unbalanced and undeveloped
- evaluative statements are likely to be missing
- make no use of relevant vocabulary