

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

**5014 ENVIRONMENTAL MANAGEMENT**

**5014/11**

Paper 1, maximum raw mark 120

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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### Notes on application of the mark scheme

- Marking points are separated by semi-colons. Each line usually represents one mark.
- Oblique lines separate ideas which are alternatives.
- Ideas in brackets are not essential to the answer but anything underlined is.
- Reward any equivalent way of expressing the ideas in the mark scheme.
- Reward any valid answer which is not in the mark scheme.

### Section A

- 1 (a) (i) A – sedimentary;  
B – igneous;  
C – metamorphic;
- 2 or 3 correct = 2, 1 correct = 1 [2]
- (ii) sedimentary = 1;
- because heat / pressure would destroy trees / carbon;  
because trees grew in sediments;  
Accept any sensible suggestion = 1 [2]
- (b) e.g.  
limestone – cement / concrete / flux etc.;  
clay – brick making / pottery;  
chalk – cement;  
sand(stone) – glass;
- Interpret 'industrial use' widely e.g. allow construction.  
Names of two valid rocks = 1  
2 uses @ 1 = 2 (can be for one type of rock if well developed) [3]
- (c) Answers such as concerns about:  
visual pollution;  
noise;  
dust;  
damage to roads from heavy lorries;  
damage to scenery;  
destruction of habitats / wildlife scared away; [3]
- Any 3.

**[Total: 10]**

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- 2 (a) (i) 98 (mm); [1]
- (ii) 50 (mm); [1]
- (iii) precipitation was higher than evaporation leaving water to infiltrate; [1]
- (iv) dry soil / insufficient soil moisture / drought;  
crops need artificial watering to survive / crops die without water,  
evaporation greater than precipitation;  
high evaporation continues to evaporate water from the soil.  
rain quickly evaporated;

Mark as a unit and accept points where they come but for max. need one from each group. [3]

- (b) plants take water in through their roots; = 1

transpire moisture through their leaves;  
through pores / stomata;  
leaves intercept rain;  
evaporates;

[4]

Any 3.

**[Total: 10]**

- 3 (a) (i) 6/7/8 (%); [1]
- (ii) increase in commercial and decrease in subsistence;  
Allow use of percentages to make the point. [1]

- (b) (i) 361; [1]
- (ii) ideas such as:  
commercial use (more) fertiliser;  
(more) insecticides / pesticides / herbicides;  
(more advanced) machinery;  
(more) scientific methods / crop rotation or other e.g. of;  
(likely to be on) more fertile soils;  
(more) skilled labour force;  
better seeds / HYVs;  
use of irrigation; [4]

Any 4.

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- (c) answers such as:  
commercial because:  
(more) likely to lead to water / land pollution by overuse of inorganic fertilisers;  
(more) likely to cause air pollution by spraying insecticide / herbicide;  
resulting effect on wildlife of water / air pollution;  
(more likely to) use monoculture damaging the soil;  
effect on nearby crops if use of GM seeds;  
reduction of gene pool;  
irrigation can cause salinisation of soils;

Any 3.

The candidate may choose subsistence farming. If so, give credit for any sensible reason given e.g. lack of knowledge of consequences of ploughing down slopes;  
ploughing down slope leads to soil erosion;  
over-cultivation by shifting cultivators if population pressure; [3]

**[Total: 10]**

- 4 (a) (i) farming in dry areas without irrigation /  
where little/insufficient rain without irrigation; [1]

- (ii) mulch prevents evaporation by shading the soil;  
allows dew to trickle through and be shaded from the sun;  
saves the rain from two years for the crop to use in the second year;

strips of grass help to keep soil from blowing away;  
keep soil from washing away/impede water movement;

Any 3.

Allow a well developed answer to score 2 marks for one method. [3]

- (b) built a wall :  
protection from wind;  
wind cannot dry plant/soil;  
shade from sun reduces water loss; [3]  
3 @ 1 mark each.

- (c) Credit ideas such as:  
soil erosion;  
desertification;  
soil infertility/exhaustion;  
soil structure deteriorates/soil more friable;  
bare/loose/dry soil easily blown away;  
bare/loose/dry soil easily washed away; [3]

Any 3.

**[Total: 10]**

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### Section B

- 5 (a) (i)** at least 80 % of the gently sloping ocean area next to the coast shaded in; [1]
- (ii)** flatter / gently sloping;  
shallow water / less deep;
- One of these or similar. [1]
- (iii)** from magma (from the mantle / inside of the Earth) which reaches the surface;  
associated with constructive plate boundaries;  
some parts built up by volcanoes / lava flows;
- Two points such as these. 2 @ 1 mark. [2]
- (iv)** more light penetrates the water because it is shallow;  
more nutrients to support plant and animal life;  
some carried from the land in river sediments;  
some brought by ocean currents (especially cold currents);  
richest where cold currents upwell from deeps / warm and cold currents meet;  
related example used;  
food chain / web supporting other life in the oceans;
- Points made like these which lead to effective explanation. 4 @ 1 mark each. [4]
- (v)** depth of water – cheaper and easier to exploit resources in shallow waters;  
more difficult to discover deep water resources;  
increased distance from shore to provide equipment and supplies for workers;
- Two factors such as these. 2 @ 1 mark each. [2]
- (b) (i)** 75m tonnes; [1]
- (ii)** growth in demand either from growing world population;  
or the value of fish in the human diet as a source of protein;  
improved technology for discovering fish shoals;  
example of improved / larger scale methods of fishing;
- Two human reasons like these. 2 @ 1 mark. [2]
- (iii)** fish stocks are plentiful when the cold Peruvian current upwells near the coast;  
cold waters rich in plankton on which anchovy feed;  
shoals of anchovy migrate from coast in years when warm equatorial current from the west brings warmer less nutrient-rich water to the coast;  
periodic climatic change which causes stronger winds from the west blowing the warm waters;
- Understood and reasonably complete explanation = 3 marks.  
Outline understanding without complete explanation = 2 marks.  
Some understanding, perhaps misunderstandings and inaccuracies as well = 1 mark. [3]

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- (iv) natural factors – only likely if new fishing grounds in the ocean are being exploited as a result of new technology, and in sustainable quantities;  
limit to the amount of fish that the natural ecosystems can support;  
plentiful evidence of overfishing and formerly rich fishing grounds producing less such as the Grand Banks off North America and the North Sea in Europe;

human factors – improvements in technology for locating big shoals of fish (such as sonar), for catching fish (bigger nets and larger boats) and for preserving and processing fish caught (such as factory ships);

NB some clues in later question information in part (d).

widespread evidence of overfishing strongly suggests human factors are more responsible than physical ones;

Clear conclusion with relevant supporting detail = 2 or 3 marks according to amount and quality of explanation.

Comment but without a clear answer to the question = 1 mark.

Answer to question without relevant support = 0 marks. [3]

- (c) (i) fish stocks with fish of all ages, including young fish which will grow to maturity; so that overall numbers will be maintained / may even increase;

Understood and clear explanation = 2 marks.

Some understanding = 1 mark. [2]

- (ii) 17% over-fished + 8% depleted / exhausted; Working = 1 mark.  
25%; Answer = 2nd mark. [2]

- (iii) from the Atlantic Ocean; [1]

- (iv) mainly near the coast of Africa (rather than Europe);  
largest breeding grounds are towards the eastern side of the Mediterranean (off Libya and Egypt);  
closer detail about the location of one or more of the four breeding grounds marked;

Two general points (along the lines of the first two), or one general and one that is more local = 2 marks.

Only description of separate locations for individual breeding grounds = maximum 1 mark. [2]

- (v) two exhausted breeding grounds off Spain and Italy suggesting overfishing has occurred; [1]

- (vi) accurate plots = 2 marks.  
OR at least 4 correct = 1 mark.  
plots linked by a line = 1 mark. [3]

- (vii) big drop in breeding age tuna between 1970 and 2005 by 130,000 tonnes;  
peak was in 1975 and lowest in 2005 (by 170,000 tonnes / under one quarter);  
a big drop in the 10 years since 1995 strongly suggesting overfishing;  
comment about the significance of these being fish of breeding age;

3 relevant points along these lines without necessarily being the same as these.

3 @ 1 mark, but a maximum 2 marks for answers without the use (as opposed to mere statement / repetition) of values. [3]

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- (d) (i) differences in size and age of the boats;  
local fishermen as opposed to multi-national companies as operators;  
method of fishing trapping with nets compared with large nets and hi-tech equipment;  
further comment about the significance of individual differences;

Stating information from source without adaptation to question need = 0 marks.

Valid difference(s) using information but without comment to question = 1 mark.

Differences adapted to question need and commented on = 2 or 3 marks. [3]

- (ii) Traditional fishermen are going back to coastal ports where catch can be monitored;  
whereas modern boats take the catch to fish farms in the Mediterranean without going  
into ports;  
then loaded straight on to boats for export so that amount is impossible to control fully.

Variations on this line of argument are possible – credit answers according to validity.

Understood and clearly explained = 2 marks.

Some understanding = 1 mark. [2]

- (iii) industrial suggests 'factory' / also commercial business practice;  
'tuna ranches' in the information suggests fish farming on a large scale;  
it is the type of organisation of an industry that would be expected of large companies;

Understood and clearly explained = 2 marks.

Some understanding = 1 mark.

[2]

**[Total: 40]**

- 6 (a) (i) 50 metres/m (allow 46 to 52 metres); [1]

- (ii) around 30 m/metres / between 25 and 35 metres; [1]

- (iii) have buttresses above the surface / on the forest floor;  
shallow root systems below;

2 @ 1 mark each.

[2]

- (iv) high density with four or five different layers;  
plants like lianas / creepers occupy spaces between the trees;  
lack of branches on trees until canopy is reached due to competition for sunlight;  
hot and wet all year creating ideal conditions for plant growth;  
typical temperature around 27°C all year (well above minimum for plant growth);  
high annual rainfall above 1500mm and lack of wet season;

Two marks for 'describe' and two for 'explain', but allow three for strong explanation and weak description. [4]

- (v) niche – fill spaces between the tall trees using the trees for support;  
using the tall forest trees for support allows them to reach the sunlight above the mass of  
forest vegetation while having their roots anchored in the ground;

Full answer = 2 marks.

Part answer = 1 mark.

[2]

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- (b) (i)** likely choices of habitat:  
canopy / middle and higher levels in the forest – in the crowns and among the branches where food supplies include leaves, fruits, nuts and berries – for birds such as toucans and animals like monkeys.

forest floor – ground vegetation such as ferns, less rich food supply from plants directly but fruits, berries etc. that have fallen to forest floor. Some animals are vegetarian like the tapir, many are carnivores eating smaller creatures, such as jaguars and snakes.

Habitats identified and differences between them stated – up to 2 marks.

Related to forest creatures present and the differences between them – up to 3 marks. [4]

- (ii)** producers – fruit, berries, leaves;  
At least two named for 1 mark.  
primary consumers – toucan, tapir, monkey (also frogs, birds, butterflies and insects);  
At least two named for 1 mark.  
secondary consumer – jaguar / snakes / insects and birds (only if specified such as birds of prey);  
One named for 1 mark.

Fourth mark for completeness and accuracy of the food web overall with arrows used to link the different layers from producer to primary consumer to secondary consumer;

4 @ 1 mark each. [4]

- (iii)** consume both plants and animals / wide variety of available food sources;  
Indian tribes hunt, fish and collect and gather forest products;  
humans have the technology / know-how to kill creatures and use all food sources;

Understood and well explained = 2 marks.

One or more points made to show some understanding = 1 mark. [2]

- (iv)** (the) decomposers; [1]

- (c) (i)** plate tectonics / continental drift; [1]

- (ii)** at the destructive margin where the Indian plate meets another plate (Eurasian Plate);  
sediments folded up / rocks melted in the subduction zone cause volcanic activity;  
led to formation of the Himalaya (if 'where' is answered from knowledge);

Two points along these lines. 2 @ 1 mark each. [2]



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- (d) (i) diversity of species found nowhere else on Earth;  
seen as part of the great natural biodiversity that exists on the Earth's surface;  
explanation of the importance of this biodiversity to people – plants as a genetic pool for crops, for medicines etc.;  
comment about the long term advantages of keeping the natural forest and species as opposed to the short term financial advantages from mining and logging;

Minimum answer remains close to what is already provided in the introduction to the question.

A little explanation beyond is likely to make the answer worth two marks instead of one.  
1 or 2 marks.

Explanation developed in relation to the importance of biodiversity and / or advantages of maintaining rich and varied ecosystems, especially those that are unique as in Madagascar.

3 or 4 marks. [4]

- (ii) IUCN – The World Conservation Union; link organisation between governments, government agencies and many different non-governmental organisations;  
Its slogan is 'The Green Web';

WWF – World Wide Fund for Nature; uses the slogan 'Taking action for a living planet';  
Charity / NGO funded by supporters focuses on conservation of wildlife and their habitats, as well as the wider implications of man's activities on the environment; Funds particular conservation projects such as tigers in India;

CITES – Convention on International Trade in Endangered Species of Wild Flora and Fauna; an international agreement between countries to ensure that the international trade in specimens of wild animals and plants does not threaten their survival;  
High profile examples include trade in elephant ivory and rhino horns;

Description of work:

Basic knowledge = 1 mark.

Fuller description = 2 marks.

Description gives a good idea of work undertaken by it = 3 marks. [3]

- (e) (i) Tourism that is environmentally and ecologically sound i.e. it takes into account needs of natural environments, habitats and species as well as local communities, ensuring that their ways of life and traditions are maintained.

Some understanding – perhaps the environmental without the social = 1 mark.

Well understood and stated = 2 marks. [2]

- (ii) tourists will only come if the forests and their wildlife are preserved since these are what they are coming to see / the attractions;  
by giving local people income and involving them, they become less likely to clear the forests and capture animal species;  
they are very poor people and need an income to stop them doing this;

Two points made along these lines. 2 @ 1 mark each. [2]

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- (f) (i) forests are carbon stores, trees trap carbon dioxide as part of the process of photosynthesis, when cleared and burnt the carbon dioxide is released into the atmosphere contributing to the 'greenhouse effect' and global warming;

locally forests contribute to high rates of evapo-transpiration which maintains water sources in the atmosphere for condensation and rainfall;

- (ii) possible advantages – developing countries *receive* an income / foreign exchange; Instead of selling logs, mining and using the land for agriculture, all of which involve forest clearances, with all the advantages that maintaining natural forests brings globally; financial incentive for governments to *conserve* forests will exist;

possible disadvantages – may be difficult to monitor with much clearance continuing because many of these areas are not under direct government control; existence of corrupt local officials, money may also be siphoned off by corrupt politicians; perhaps unlikely that local people will see any financial benefits;

Only general comment throughout, little development for either description or explanation.

One part may be a lot better answered than the other = 1–2 marks.

Fuller responses, meaningful description and explanation, perhaps a lack of balance in the strength to the two parts = 3–4 marks.

Full responses and well balanced = 5 marks.

[5]

**[Total: 40]**