

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

MARK SCHEME for the October/November 2014 series

5014 ENVIRONMENTAL MANAGEMENT

5014/11

Paper 1, maximum raw mark 120

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Section A

- 1 (a) (i) SE Asia, Australia and the Pacific; [1]
- (ii) South and Central America; [1]
- (iii) North America; [1]
- (b) any relevant advantage, such as:
 export earnings from sales of oil;
 revenue used to improve infrastructure/build schools/hospitals/transport routes, etc.;
 fuel/petrol/diesel for transport;
 power source for industry;
 raw material for industry/petrochemicals; [3]
- (c) (i) *hot deserts*:
 EITHER solar;
 because cloudless skies/abundant sunshine/maximum insolation;
 OR wind;
 because trade winds are strong/constant/few obstacles to wind movement;
- (ii) *equatorial climate regions*:
 EITHER HEP;
 because abundant rain/many rivers;
 OR biomass/biofuels;
 because abundance of trees/vegetation; [4]
- 2 (a) (i) any figure between 24° and 30° inclusive; [1]
- (ii) Africa larger/more than twice as large;
 both either side of the Equator/in the tropics; [2]
- (iii) it needs hot/warm temperatures; [1]

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(b) (i) mosquitoes lay eggs/breed in (stagnant) water; [1]

(ii) any relevant idea, such as:

advantages for people: new land for farming/industry/building/any sensible use;
straight routes can be built;

disadvantages for the environment:

changes the ecosystem;

loses habitats;

death of wildlife;

may reduce rainfall locally/less moisture for plants;

At least one advantage needed for maximum marks.

[3]

(iii) stops insect being able to bite/contact the person;
stops mosquito becoming infected by biting an infected person;
the mosquitoes (mainly) bite between dusk and dawn;
insecticide kills the insects;
relatively cheap method;

[2]

3 (a) (i) plots at 335 in 1980, 355 in 1990 AND 380 in 2000 all joined by a line and to 2010; [1]

(ii) 45; [1]

(iii) 2090–2094; [1]

(iv) start of the food chain for fish; [1]

(b) (i) sulfur dioxide;
nitrogen oxides;
released when fossil fuels are burnt;
coal-fired power stations/industry/vehicle exhausts;
mix with water/rain droplets; [4]

(ii) kills fish in rivers/lakes;
acid soils have poor yields; [2]

4 (a) (i) bar for 2008 at 650 000; [1]

(ii) much faster 2008–2012;
600 000 in 40 years/68–08 but 450 000 in 4 years/08–12;*
15 000 per year 68–08 and 112 500 per year 08–12;**

Accept a tolerance on the figures of 15 000 either side.

Accept a tolerance of 1000 either side.

[2]

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(b) any sensible suggestion, such as:

development of new industry;
 people seek better paid jobs in city;
 attracted by better social facilities / hospitals / schools etc.;
 attracted by the entertainment facilities;
 high birth rate because young migrants;
 rural – urban migration;
 immigrants settle in cities for work;

[3]

(c) any sensible suggestion, such as:

no cars – efficient / regular / cheap public transport;
 legislation / penalties;

energy – renewable / solar / wind / used to make energy;
 energy efficient homes;

waste – re-use / recycle / compost;

water – re-use waste water (for gardens etc.);
 water saving appliances;
 water meters;

[4]

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Section B

- 5 (a) (i) letter order **E, D, C, B, A**;;

All correct for two marks.

Three correct for one mark.

[2]

- (ii) cyclone (**E**), drought (**D**) and flood (**B**);

All three and no others for one mark.

[1]

- (iii) hazard plus minimal detail;
another hazard plus minimal detail;
further detail;

short-term events:

some only last a few minutes;

most are over within hours or days;

volcanoes and droughts can last longest, but often just months at most;

long-term events:

possible for some to keep happening for several years, or keep repeating themselves;

such as droughts (e.g. Sahel);

and occasionally a volcano (e.g. on Montserrat);

All three choices in the question are possible choices.

[3]

- (b) (i) X = destructive / convergent / converging

Y = constructive / divergent / diverging

[2]

- (ii) earthquakes occur at plate boundaries most tectonic activity being concentrated on plate boundaries / strongest / on top of plate boundary / epicentre;
plates are moving;

ref. ripple effect e.g. gets less moving away;

an explanation about what is happening at destructive / conservative plate boundaries which leads to earthquake formation (e.g. friction / jolting);

[3]

- (iii) 9.2 in 2004;

[1]

- (iv) 2004–2007;

includes top three years for earthquake numbers;

10 in 2005, 7 in 2004 and 6 in 2006 / 27 of the total number of 43 in this 4-year period

Accept 63%.

[3]

- (v) suggests that the risk is (very) high / since at least one earthquake of magnitude 6.0 or more occurred in every year / since the average in the 10-year period was more than four strong earthquakes a year;

[1]

- (vi) appropriate scale accurately marked on y-axis and y-axis labelled;

All plots correct using bars for two marks.

At least four correct plots for one mark.

[3]

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- (vii) *magnitude on Richter scale/earthquake strength:*
referring to those of exceptional strength such as the 9.2 and 8.6, and/or by referring to the logarithmic nature of Richter scale;

nature of the earthquake:

such as depth of the focus/length of ground shaking/frequency/strength of after-shocks;

low lying coastal locations are also at risk from tsunamis;

density of population:

highest in urban areas, many coastal areas;

least in mountainous areas/none in the islands of Indonesia that are not inhabited;

high density of high rise buildings increases risks to people living or visiting there;

time of day earthquake occurred:

people more alert to what is happening during the day and more likely to be able to reach open spaces;

human factors related to:

earthquake proofing of buildings;

preparations in advance (with examples such as education/food supplies/shelters/medical facilities);;

differences between rich and poor neighbourhoods in terms of house structure also in terms of inferior locations of slums on hillsides where landslides are more likely to be triggered;

[5]

- (c) (i) ocean location where sea-water heats up most/is warm (around the Equator);
26/27 °C are needed for cyclone formation;

further details about how this triggers off rising air currents/leading to condensation of water vapour/formation of towering cumulonimbus clouds/formation of deep area of low pressure;

[3]

- (ii) (end of summer season) when sea-water temperatures are at their highest/sea-water takes longer to heat up than land surfaces which means later than the time when the Sun is overhead;

[1]

- (iii) Philippines is much closer to the source area/cyclones reach the Philippines first;

further supporting use of the map such as:

location of the islands in relation to Japan and Hong Kong/or to tracks of cyclones which become more varied away from the source so that only some carry on towards Hong Kong or Japan whereas fewer miss the Philippines;

[2]

- (d) (i) *evidence for heavy rainfall:*
(severe) flooding (everywhere);
flash floods;
(most of the dead were) from drowning;
houses swept into rivers and out to sea;

[2]

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- (ii) island nature of the country so very vulnerable to effects of cyclones/ cyclones happen (every year/ often/ regular) since one of the closest land areas to the source/ comment about the way the tracks of the cyclones bend northwards; [1]

- (iii) *physical factors:*
 wind strength was too weak;
 to trigger mobile phone text messages;
 great wind strength usually expected from typhoons hitting the Philippines;
 but on this occasion it was flooding which did the damage;
 massive amounts of rainwater must have fallen to make the rivers flood so badly showing the force of nature;
 and perhaps its non-predictability (all natural hazard events are different);
 Cagayan de Oro geographical factors of steep-sided mountains:
 proximity to the sea;
 deforested slopes*;

human factors:

poverty meant slum houses /poor quality houses have been built;
 lack of planning leads to building on sand banks in the middle of the river;
 lack of money spent by government with examples such as to build shelters;
 lack of flood defences;
 despite previous warnings about a location between steep mountain sides and the sea;
 lack of sending advance warnings;
 not looking at advance weather information as would be the case in a more developed country;
 lack of shelters;
 deforested slopes*;
 * *Credit once only.*

or a mixture of the two:

can never prevent large losses of life from natural hazards;
 on the other hand, most developed countries are much better prepared than was the Philippines, especially considering that typhoons are regular events and there is a known time of the year when they will occur;

[7]

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- 6 (a) (i) accurate plots for the three percentages;
sectors correctly labelled; [2]

(ii) *lakes and rivers*

it is fresh / sweet water / does not need desalination;
easily accessible surface supplies;
widely available / widespread distribution;
reliable source / large amounts of water can be readily available;

small amount comparatively;
most at risk from pollution / problems of dirty water supply;
surface waters used as places of disposal for human wastes / ref. water-borne diseases;
in some places natural contamination as well / other hazards (dangerous animals);
may destroy habitats supported by existence of lakes and rivers;

Max. two marks.

glaciers

it is fresh water / does not need desalination;
clean water supply;
more water released in summer when often it is most needed;
very extensive supply (biggest reservoir of fresh water on Earth) / supplies some of the world's major surface rivers (e.g. Ganges);

located in some of the most inaccessible places away from people;
winter freezing can cut off supplies to people;
store decreasing as mountain glaciers are melting;

Max. two marks.

[4]

(iii) *possible labels:*

rainwater to fill the aquifer;
arrows or labels to show water seeping underground through the aquifer;
aquifer labelled as permeable or porous rock either in key or on diagram;
impermeable (impervious) rock labelled in key or on diagram;
(limestone / sandstone / chalk / shale) in correct place in key or on diagram;
(granite / marble / basalt / slate) in correct place in key or on diagram;
additional labelling about impermeable acting as a water trap for the permeable;
labelling for folding of rocks / downfold / syncline;

[3]

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- (iv) contamination by terrestrial activities;
ref. pollution control measures;
- running out of water in the aquifer, use > replenishment;
ref. water conservation measures;
- collapse of ground;
constructing buildings / dykes to take account / recharge of aquifer;
- saltwater intrusion in coastal sites;
water conservation;
- overexploitation leads to less water elsewhere / other countries / ref. to conflict;
political discourse / agreement;
- ref. engineering problems / cost of drilling / hard to extract;
aid for money / expertise from outside;

At least two marks needed from each of problems and from solutions.

[6]

- (b) (i) *high water stress:*
Asia, because it has about 59–60% of total world population for 35–38% of world's water resources.
Europe with 12–14% of population for 7–9% of water.

low water stress:

South America, because it has only 5–6% of the world population for 25–27% of the world's water resources.

Oceania, because it has only 1–2% of population for 5–6%.

N and C America it has only 5–7% of population for 15%.

Asia / Europe and South America / Oceania / N and C America;
use of supporting values for each;;

[3]

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(ii) *physical reasons:*

Africa hotter climates on average;
more evaporation/less precipitation effectiveness;

continent has varied distribution of rainfall;
large areas / many countries with a hot desert climate (e.g. Sahara desert);

e.g. Sahel noted for droughts;
and unreliable precipitation from year to year;
O.R.A. for Europe.

human reasons:

lower levels of economic development in Africa;
developing countries less able to afford to manage their water resources by dam
building / river control / water transfer / extraction from underground sources / desalination;

the biggest use of water in Africa is for agriculture;
irrigation not needed as much in the cooler climates of Europe because economies are
less agriculture dependent;
O.R.A. for Europe.

*One mark for identifying a reason. Second mark for elaboration / development /
exemplification.*

[4]

(c) (i) sea-water is (forced) through (thousands) of fine membranes (to take out the salt). [1]

(ii) *suggestions include:*

a lot of energy is needed;
so cost of fuel used since fuel costs in the oil producing countries of the Middle East will
be lower;
lower percentage of salt in sea-water in some locations;
such as near river mouths, so that less energy is used for its separation;
costs involved in importing technology / skilled personnel;
developing countries may need to import technology / skilled personnel;
economy of scale argument;

One suggestion with some elaboration or two suggestions for two marks.

[2]

(iii) (very) expensive;

more expensive than obtaining fresh water from rivers and aquifers;
cheapest desalination is 1 \$US compared with only 20 cents for rivers;
desalination can cost as much as 5 \$US making it 25 times more expensive;
comment stressing the massive size of the difference meaning that desalination will only
be used where surface and groundwater supplies are inadequate;

[2]

(iv) 38% circled or otherwise clearly identified;

[1]

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- (v) they can afford it;
lots of (valuable) oil;
rich in energy sources;
oil/gas;
- few/no alternative supplies/not water rich;
as desert countries;
- population centres are close to the coast;
sea-water is available;
- increasing demand for water;
as rapid population growth/increased standard of living/urbanisation/tourism; [3]
- (vi) *increase unlikely:*
can be justified by reference to massive costs;
- in an era of rising world energy costs/future energy crisis;
likely to be increased only in countries where the water need is great and nothing cheaper is available;
- increase likely:*
in response to increased world need for water;
- due to rising world populations;
rising standards of living;
leading to increased consumption of water per head;
as (energy prices fall/alternative energy becomes available) will be more likely;
more food output to feed world's people will need more irrigation water;
desalination might be the only local/national alternative, despite its costs; [2]
- (d) (i) most likely answer is to refer to water-efficient methods of irrigation, such as:
- trickle drip irrigation;
root zone/clay pot irrigation;
the method described emphasising how the water is targeted at plant roots;
calculate water need of crop and just use that/not water excessively;
to reduce wastes by seepage and evaporation;
changing crops to ones which need less water for successful growth/increased use of drought resistant varieties/saline tolerant plants;
water re use/reclamation/recycling; [3]
- (ii) salination;
leaching (of minerals)/infertile;
eutrophication;
reduced river flow downstream from usage area;
loss of wetland habitat;
loss of biodiversity;
waterlogged;
- Credit one development mark for any of these.* [4]

[Total: 120]