CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 series

0680 ENVIRONMENTAL MANAGEMENT

0680/21 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.

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CAMBRIDGE
International Examinations

1 (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]

(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]

(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]

2 (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]

(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]

(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]

(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: 80]