



MARKSCHEME

May 2014

ENVIRONMENTAL SYSTEMS AND SOCIETIES

Standard Level

Paper 1

12 pages

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General Marking Instructions

Assistant Examiners (AEs) will be contacted by their team leader (TL) through Scoris™, by e-mail or telephone – if through Scoris™ or by e-mail, please reply to confirm that you have downloaded the markscheme from IBIS. The purpose of this initial contact is to allow AEs to raise any queries they have regarding the markscheme and its interpretation. AEs should contact their team leader through Scoris™ or by e-mail at any time if they have any problems/queries regarding marking. For any queries regarding the use of Scoris™, please contact emarking@ibo.org.

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1. Follow the markscheme provided, award only whole marks and mark only in **RED**.
2. Make sure that the question you are about to mark is highlighted in the mark panel on the right-hand side of the screen.
3. Where a mark is awarded, a tick/check (✓) **must** be placed in the text at the **precise point** where it becomes clear that the candidate deserves the mark. **One tick to be shown for each mark awarded.**
4. Sometimes, careful consideration is required to decide whether or not to award a mark. In these cases use Scoris™ annotations to support your decision. You are encouraged to write comments where it helps clarity, especially for re-marking purposes. Use a text box for these additional comments. It should be remembered that the script may be returned to the candidate.
5. Personal codes/notations are unacceptable.
6. Where an answer to a part question is worth no marks but the candidate has attempted the part question, enter a zero in the mark panel on the right-hand side of the screen. Where an answer to a part question is worth no marks because the candidate has not attempted the part question, enter an “NR” in the mark panel on the right-hand side of the screen.
7. If a candidate has attempted more than the required number of questions within a paper or section of a paper, mark all the answers. Scoris™ will only award the highest mark or marks in line with the rubric.
8. Ensure that you have viewed **every** page including any additional sheets. Please ensure that you stamp “seen” on any page that contains no other annotation.
9. Mark positively. Give candidates credit for what they have achieved and for what they have got correct, rather than penalizing them for what they have got wrong. However, a mark should not be awarded where there is contradiction within an answer. Make a comment to this effect using a text box or the “CON” stamp.

Subject Details: Environmental Systems and Societies SLP1 Markscheme**Mark Allocation**

Candidates are required to answer **ALL** questions. Total = **[45 marks]**.

1. A markscheme often has more marking points than the total allows. This is intentional.
2. Each marking point has a separate line and the end is shown by means of a semicolon (;).
3. An alternative answer or wording is indicated in the markscheme by a slash (/). Either wording can be accepted.
4. Words in brackets () in the markscheme are not necessary to gain the mark.
5. Words that are underlined are essential for the mark.
6. The order of marking points does not have to be as in the markscheme, unless stated otherwise.
7. If the candidate's answer has the same "meaning" or can be clearly interpreted as being of equivalent significance, detail and validity as that in the markscheme then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by **WTTE** (or words to that effect).
8. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.
9. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script.
10. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the markscheme.

1. (a) (i) sun/sunlight/solar radiation/insolation; [1 max]
- (ii) removal of organisms from the lake/removal of fish/fishing/removal of reeds/run-off/outfall/outflow/loss of heat (to environment); [1 max]
Do not accept only 'respiration/evaporation/transpiration'
Accept any other appropriate response.
- (iii) *Accept any appropriate food chain from figure 1 with four different trophic levels and correct direction of arrows indicating flow.*
eg phytoplankton (diatoms) → zooplankton → small fish (perch) → bird (kingfisher); [1 max]
- (iv) increase in secondary consumers/organisms in trophic level below them (eg small fish);
 reduction in primary consumers/zooplankton due to increase in secondary consumers population;
 less competition for other tertiary consumers;
 increase in bird population due to less competition;
 loss of biodiversity; [2 max]
- (v) out competes local species;
 introduction of disease;
 loss of biodiversity;
 reduce/feed off other species;
 provides an additional food source to native species leading to increase in native population;
 may have little or no effect;
 may not adapt to new environment and die out;
 may breed with native species/interbreeding; [2 max]
Accept any other appropriate response.

(b)

Agricultural Pollutant	Fertilizer	Pesticide
Impact on the lake	eutrophication/excessive algal growth with accumulation of dead organic matter leading to reduction of oxygen;	death of some species /loss of biodiversity /bioaccumulation within organisms of pesticide/ biomagnification within the food chain;
Management strategy	reduce use of fertilizer/ only apply during dry weather conditions/do not apply near a watercourse/pump oxygen into the lake/remove excessive plant growth;	legislate/reduce use of pesticides /use alternatives methods of pest control (eg biological control/natural predators)/use GMOs/only apply during dry weather conditions;

[2 max]

Do not accept use of organic fertilizers/manure.

Accept any other appropriate response.

Award [1] for any two or three correct responses.

Award [2] for four correct responses.

2. (a) (i) *LEDCs*: approx 4 billion; [1]
Accept between 3.5 to 4.3 billion/54-69 %
- (ii) *MEDCs*: approx 0.1/0.2 billion; [1]
Accept within 0 to 0.2 billion /0-20 %/no change/stable/WTTE
- (b) *Reason needs to be explained fully for [3 max] eg.*

Reason (1 mark only)	Explanation (2 marks)
where there is no social security/state pension people may rely on children economically/ more people in LEDCs rely on subsistence farming hence have more children;	to help on the farm/provide labour; to look after them as they get older;
lack of finances in LEDCs;	lack of sexual education; lack of access to contraception;
cultural/religious belief;	influence use of contraception; having more children/boys can improve status within some societies;
economic development;	it is more expensive in MEDCs to bring up children than in LEDCs; pensions are more common in MEDCs so that people are less dependent on their children in old age and therefore have fewer children;
health/sanitation;	improvements in LEDCs can reduce death rates and therefore contribute to population growth; due to good survival rates in MEDCs, people often have fewer children;
empowerment/equality rights/education of women can reduce birth rates;	due to time pursuing career/marrying later; more awareness of contraception/birth control; more personal/economic independence;
high fertility/birth rates;	cultural/religious belief; need for greater work force; prestige; lack of sexual education; lack of finance for contraception;
low death rates;	improvements in medicine/health care; improvements in sanitation; improvement in diet/ nutrition;

Accept any other appropriate response.

[3 max]

- (c) (i) lack of water/poor irrigation/low precipitation;
soil degradation;
lack of adequate space/fertile land;
pests/disease;
climate change/global warming/extreme weather conditions;
natural disasters;
overfishing/exhaustion of fisheries;
infrastructure restrictions limiting transport of food;
war/conflict limiting availability;

Do not accept only 'increase in population results in greater demand which we are unable to meet'. Accept any other appropriate respons.;

[2 max]

- (ii) water resources are polluted/contaminated;
water resources are used up/rate of water consumption is greater than the rate of replenishment;
global warming/climate change/drought;
water used for purposes such as mining/industry /agriculture;
financial resources to source water (eg boreholes/reservoirs);
Accept any other appropriate response.

[2 max]

- (d) *Do not award [1 mark] for named example*
up to individuals to decide/freedom of choice/ethical decisions for governments;
goes against religious beliefs/conflicts with cultural beliefs;
belief that technology will provide a solution to rising populations;
otherwise parents have little support in the fields or anyone to look after them in future years;
country has large amount of resources to support increase in population;
expect growth rate will decline as country develops;
population growth is required for development;
cost of implementing policy;

[2 max]

3. (a) (i) visual observations/aerial photography/satellite imagery ;
 count in one area and extrapolate to whole area
 radio tagging;
 counting density of fecal material;
 Lincoln index/capture-mark-release-recapture/capture-mark-recapture
 /capture-mark-release method; [1 max]
Do not accept only 'count gorillas'.

- (ii) Award [1 max] for any two of the list below
 poaching for food/body parts /hunting for food
 live capture to trade as exotic pets
 habitat degradation/loss/fragmentation/loss of food and water
 civil war/unrest
 disease
 predation from other animals
 natural hazards eg drought. [1 max]
Do not accept only 'low reproductive rates' or 'global warming'.

- (iii) Reason needs to be explained to achieve [2 max] eg.

Reason [1 mark]	Explanation [1 mark]
adoption/enforcement of legislation/agreements	enforcement of anti-poaching legislation deters/removes poachers (and therefore conserves gorilla population); enforcement of CITES to reduce trade in species reduces demand for animal parts;
conservation partnership with local communities/benefits to the community (eg via tourism);	encourages community to help protect and conserve species;
education/raising awareness;	helps to reduce demand for gorilla parts/such animals as pets;
habitat protection/restoration/conservation;	increase food/resources/habitat range;
adequate funding of conservation projects;	allowing implementation of any of the above eg enforcement of anti-poaching/ working with local communities/ education/habitat protection; captive breeding and reintroduction programme;

Do not accept only 'breeding programmes'. [2 max]

(b) *Pros/strengths: [2 max]*

restricting international trade reduces threat to the species;
raises profile of endangered species;
encourages education about endangered species;
changes attitudes to use of animal parts/private zoos/such animals as pets;
can encourage research/funding into conservation management;

Cons/weaknesses: [2 max]

focused on preservation rather than conservation management;
adversely can restrict benefit to local community;
participation is not mandatory;
CITES focused on individual species conservation rather than habitat loss
(primary threat to wildlife);
human use of wildlife can be used positively in conservation/if people benefit
from wildlife there is an incentive to maintain wild habitats;
enforcement can be difficult;
trade is driven underground/black market;
(There is some possible overlap with) UN Convention of Biological Diversity
(focused on loss of biodiversity) takes a more comprehensive approach than
CITES;

[4 max]

(c) *Award [1 max] for any two of the list below.*

ideal shape to reduce edge effects
size large enough to support viable population
quality of habitat/enough water and food
avoiding islands/provision of corridors to allow interbreeding
buffer zones to keep people away
protection from poachers/hunters
community involvement.

[1 max]

Do not accept 'size or shape of area' or 'conservation of habitat.'

4. (a)

1	animals/heterotrophs/herbivores/consumers
2	nitrates /NO ₃ - / nitrites /NO ₂ -
3	nitrogen fixation
4	Decomposition/ammonification/mineralization

[2 max]

For 3 - do not accept lightning or the Haber process.

Award [1] for two or three correct responses and [2] for four correct responses.

(b) (i) *Impact on flow: [1 max]*

less plants available for feeding;
reduce of flow into dead organic matter;

[1 max]

Do not accept 'plants absorb less nitrogen'.

(ii) *Impact on storage: [1 max]*

less nitrogen stored within plants;
less nitrogen within dead organic matter /soil;
less nitrogen within animal store;
more nitrogen in the atmosphere;

[1 max]

(c) addition of fertilizers/soil conditioners;
planting leguminous plants (e.g. clover);
wind reduction techniques/wind breaks/shelter belts/strip cultivation/crop rotation;
cultivation techniques/terracing/contour ploughing;
forestation/re-afforestation;
agroforestry/forest farming;

[2 max]

*Do not credit 'leave land fallow/empty of animals' or only 'plant grass'.
Accept any other reasonable response.*

(d)

movement of non-biodegradable material in food chain;
potential to biomagnify;
potential to bio-accumulate/bio-concentrate;

[2 max]

Accept any other reasonable response.

5. (a) (i) increased evaporation/decreased precipitation leading to lack of water;
climate change/increased temp not optimal for local crops;
rise in sea level leading to loss/flooding of agricultural lands;
spread of pest species into new areas with warmer/wetter temperatures; [1 max]
Accept any other reasonable response.
- (ii) decrease in agricultural productivity in Southern hemisphere/closer to equator/lower latitudes;
increase in agricultural productivity towards the pole/away from equator/higher latitudes; [1 max]
- (b) (i) feedback that amplifies or increase change;
leads to exponential deviation away from the equilibrium/WTTE; [1 max]
- (ii) increase in melting of permafrost leads to increase in methane levels which increase the mean global temperature;
reduction in snow/ice cover reduces reflection/albedo (effect)/promotes absorption of energy, increases temperature; [1 max]
Accept any other reasonable response.
- (c) *Viewpoint that human activity is contributing to global warming / we should be concerned [2 max]*
evidence from sediment/ice cores of human induced warming;
current rate of warming is unprecedented;
increase in greenhouse gas emissions from human activities (since Industrial Revolution) correlates with increase in global temperature;
evidence of dramatic affects of global warming in recent times *eg* melting of ice caps/shifting of biomes/extreme weather/coastal inundation/loss of biodiversity/social conflict;
positive feedback loops could lead to exponential change/potentially devastating tipping points;
- Viewpoint that human activity is not responsible for global warming / we do not need to be concerned: [2 max]*
part of natural cycles and not human induced;
technology will provide solutions to any problems caused by global warming;
prediction models of climate change/global warming are inaccurate;
impacts are over exaggerated;
global warming may be mitigated by negative feedback mechanisms;
scientist are self serving and manipulate results to produce findings that attract funding for further research;
- Do not award marks if the candidate only recognizes the different perspectives.
Award marks only if the candidate provides evidence to support that perspective.* [4 max]
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