



MARKSCHEME

November 2014

ENVIRONMENTAL SYSTEMS AND SOCIETIES

Standard Level

Paper 1

14 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.

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 RM Assessor™ 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. RM Assessor™ 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 **OWTTE** (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) incineration;
landfill;
composting;
recycling;
waste minimization/reduce such as reduction of packaging used;

[1 max]

(ii)

Advantage <i>Incineration</i>	reduces volume of waste; produces a sterile ash; can be used to generate energy/electricity;
Disadvantage	heavy metals may be in the ash; ash still needs to be disposed of; toxic air/atmospheric/CO2/ greenhouse gas pollution may occur; smell; noise/traffic pollution from trucks transporting to site; community objection to location of incinerator;

Advantage <i>Landfill</i>	cheap; methane generated can be used to generate heat and electricity;
Disadvantage	smell; large area needed; leachate pollution; attracts vermin; landfill gases generated; wind-blown litter from site; cost/availability of land; noise/traffic pollution from trucks transporting to site; community objection to siting of landfill;

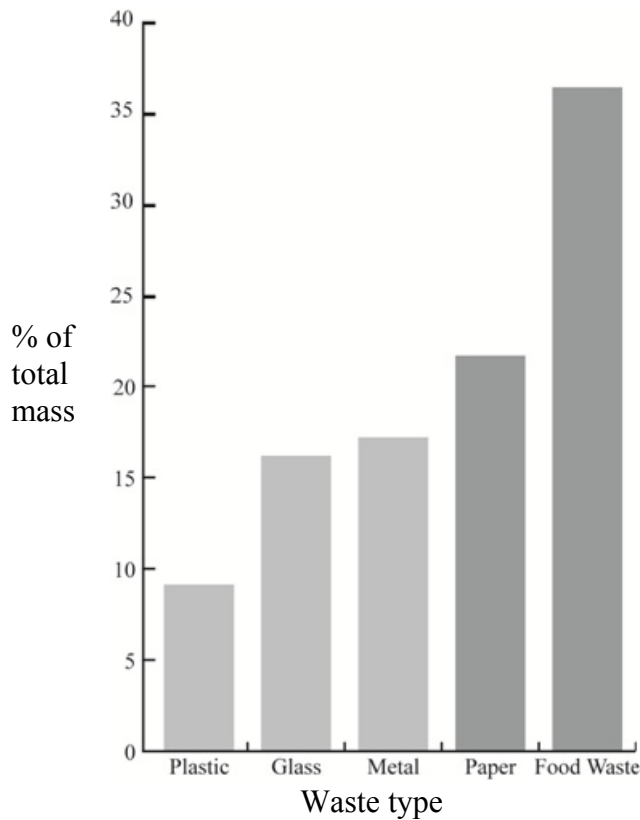
Advantage <i>Composting</i>	creates manure; provides natural soil conditioner/fertilizer for gardens; produces marketable commodity; can be done at any scale <i>eg</i> from household to municipal;
Disadvantage	requires sorting of waste; smells; attracts vermin/fly nuisance; only applicable to organic material; contains biohazards; requires time to produce product; requires land space;

Advantage <i>Recycling</i>	reduces need for manufacturing of goods; reduces use of resources; reduces landfill/incineration;
Disadvantage	requires sorting; time consuming; not all waste can be recycled; requires storage space/area; increased cost due to need for different/specialised collection centres; requires transportation/collection;

[2 max]

(b) (i) paper: 22 (%) and food waste: 36 (%); **[1 max]**

(ii)



[1 mark] for the correct placement of both bars on the graph (accept +/- 1% on the drawn bars within the graph);

[1 mark] for labelling both axes correctly

y-axis is percentage of solid domestic waste/percentage of total waste and x-axis is the type of waste;

[2 max]

(c) (i) The maximum number of a species or “load” that can be sustainably supported by a given environment; OWTTE **[1 max]**

(ii) range of resources used is large;
humans substitute resources when they become scarce;
resource use varies according to lifestyle;
technological developments change the way resources are used;
human populations import resources from other areas;
Do not credit responses that explains why the human population size changes.

[2 max]

2. (a) (i) renewable; **[1 max]**
- (ii) population size / reduction in population size;
numbers of mature individuals / reduction in number of mature individuals;
reduction in geographic range;
increase in fragmentation of habitat;
quality of habitat;
area of occupancy;
probability of extinction / threat to habitat/species;
Two points from above required for [1 mark].
Do not credit "poor/low breeding success/rates".
Do not award marks for activities such as hunting unless link is made to one of the above factors eg reduction in population size. **[1 max]**
- (b) the grass/plants would grow more / increased/rapid growth of grasses;
tree seedlings may grow into trees;
the area becomes more wooded/succession occurs;
other herbivores move into the niche that is now available;
increased population of other herbivores;
overeating of grass/over use of resources causing decline in population of herbivores;
food web is disrupted and impact may be felt higher up as less food available to carnivores; **[2 max]**
- (c) $\left(80\,000 - 40\,000 = 40\,000 \text{ in } 20 \text{ years } \frac{40\,000}{20} = \right) 2000 \text{ (elephants per year) ;}$ **[1 max]**
- (d) cull/kill the extra elephants / allow trophy hunting to raise money and to lower population;
use contraception/methods to stop elephants reproducing successfully;
relocate the extra elephants to new areas;
enlarge the conservation areas;
create corridors to link reserves and allow movement of elephant to underpopulated areas;
use/introduction of natural predators to control/reduce population size; **[2 max]**

3. (a) Award a mark for every two organisms correctly identified using a key (example below) up to **[3 max]**. Accept lists as below or flow diagrams;
 Award **[1 mark]** for 2 or 3 correctly identified organisms;
 Award **[2 marks]** for 4 or 5 correctly identified organisms;
 Award **[3marks]** for 6 or more correctly identified organisms;
 Do not allow unquantified features eg long/short tail.

For example:

1a Organism has more than 3 visible paired legs Go To 2

b Organism has less than 3 visible paired legs Go To 6

2a Organism has antennae longer than its head Go To 3

b Organism has antennae shorter than its head = Caddis fly Larva

3a Organism has only one pair of antennae Go To 4

b Organism has only one pair of antennae = Shrimp

4a Organism has two tail extensions = Stonefly

b Organism has more than two tail extensions Go To 5

5a Organism has clear segmented legs = Mayfly

b Organism seems to have unsegmented legs = Water louse

6a Organism has no visible legs = Sludgeworm

b Organism has some visible legs Go To 7

7a Organism has a clearly segmented body = Bloodworm

b Organism does not have a clearly segmented body = Rat tailed maggot

[3 max]

(b)
$$\frac{150(150-1)}{1(1-1)+4(4-1)+45(45-1)+100(100-1)}$$
 ;

1.88/1.879/1.9;

Both top and bottom values of equation need to be correct to be credited mark for showing working out.

[2 max]

- (c) (i) substances or energy produced by human activity that has a detrimental/negative effect on organisms and/or environments;
 The addition to an environment of a substance or an agent (such as heat) by human activity, at a rate greater than that at which it can be rendered harmless by the environment, and which has an appreciable effect on the organisms within it; OWTTE

[1 max]

- (ii) higher diversity in stream A/lower diversity in stream B;
 more species in stream A/less in stream B / six species in stream A and only 4 species in stream B;
 Stream B has mainly/high abundance of worms (bloodworms and sludgeworms);
 Stream B has no mayfly nymph/caddis fly larva present / Stream A has presence of mayfly nymph/caddis fly larva;
 Do not allow differences in Simpson's Diversity Index

[2 max]

(iii) *Stream B*

a smaller range of species is found/less diversity/dominated by only two species;

absence of larva/nymph that are pollution non-tolerant /require clean water in stream B;

pollution tolerant species/worms are dominant in stream B;

has a smaller Simpson's Diversity Index;

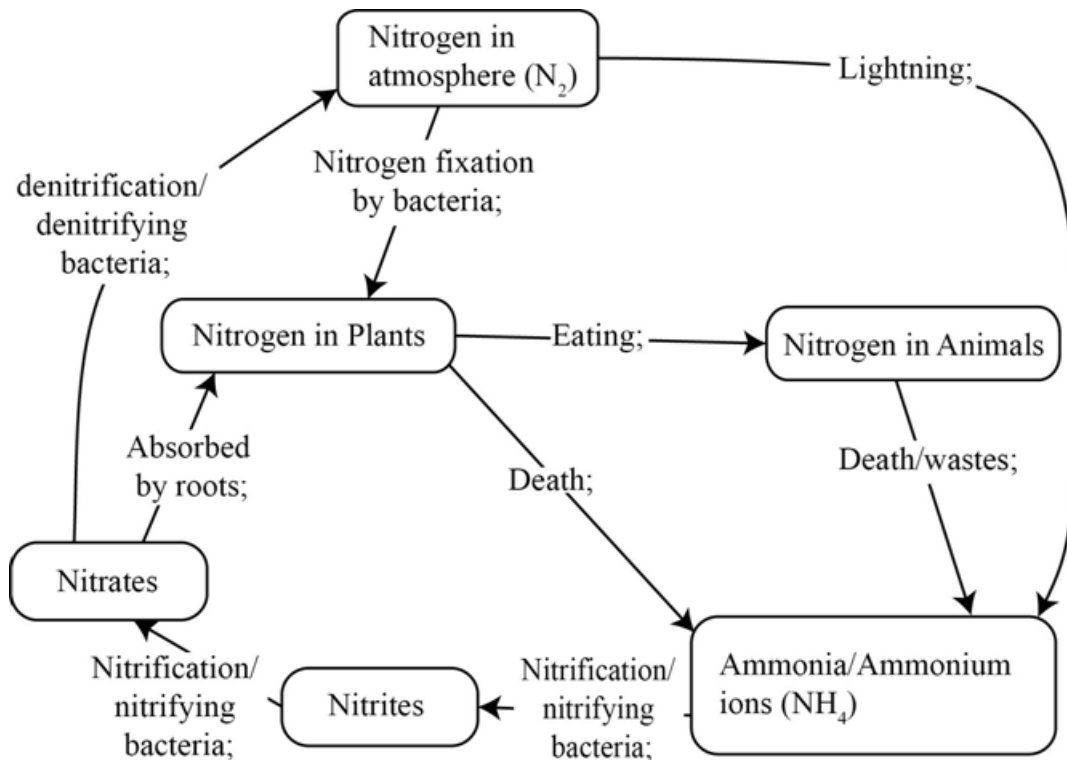
No mark if no stream/stream A is identified as the polluted stream.

Do not accept only "absence of larva/nymph" or "abundance of worms", link needs to be made with concept of pollution tolerance/non-tolerance.

[1 max]

4. (a) set of similar ecosystems with the same climatic conditions that determine the climax vegetation that can grow there; OWTTE [1 max]
- (b) *Named biome: tundra/tropical rainforest/desert. [2 max] if no biome is named.*
large quadrats to include largest vegetation of area;
stratified sampling so all ecosystems in the biome are sampled / use of random sampling method;
capture and take mass of all organisms in quadrat;
take wet mass and convert to dry mass using representative data if available;
dry samples to obtain biomass;
use average calculated value of biomass per quadrat to extrapolate to represent whole area;
samples taken at different seasons;
representative samples are dug up for vegetation;
use conversion tables to determine tree biomass/height and circumference data used; OWTTE [3 max]
- (c) (i) geology/soil type;
slope/gradient;
rainfall;
temperature;
hours of sunlight/insolation/aspect;
human interference in the area / tourism access;
altitude;
latitude;
Do not accept longitude.
Do not accept "sampling that harms/damages the organisms". [2 max]
- (ii) clearance of land for agriculture;
holding it in an early stage of succession / plagiosere;
grazing of land by livestock;
trampling from tourism;
human activities (eg tourism) leading to fires;
pollution from named human activities (eg mining);
introduction of plant/weed species/change to vegetation from near agricultural land;
Note: Do not award mark for statements such as "fire", "agriculture" without appropriate reason. [2 max]

5. (a) *Must include: clear arrows with processes attached*
Award [1 mark] for 2 arrows correctly labelled.



Only credit arrow labelled with process (not storages).
Allow any other reasonable arrow with process.

[3 max]

- (b) transfer is the movement/change in location of nitrogen in the cycle;
 whereas transformation is chemical conversion/change of state of nitrogen in the cycle;
[1 max] *if there is no reference made to the nitrogen cycle but student distinguishes between transfer and transformation process.*
Accept examples of each process such as examples given below

Transfer [1 max]:

nitrates from soil to roots of plants;
 movement of nitrogen in plants to nitrogen in animals;

Transformations [1 max]:

bacteria convert one form of nitrogen to another;
 ammonium to nitrite;
 nitrite to nitrate;
 denitrification from ammonium/nitrate to N₂;

[2 max]

- (c) use of Haber process to produce fertilizers / addition of nitrogen fertilizers/manure to soil;
 addition/removal of nitrogen fixing plants in agriculture monocultures;
 removal of crops without addition of fertilizers (loss of nitrogen in cycle for a particular area) / removal of plants/crops resulting in reduction of nitrogen in the soil;
 addition of nitrogen compounds to the atmosphere by combustion of fossil fuels;

[2 max]

6. (a) more people in world and so less freshwater to share;
freshwater being used from fossil resources/aquifers at unsustainable rate;
development needs more/uses more water;
global warming is making some areas drier;
pollution of freshwater is limiting available source;
rivers cross international boundaries;
uneven distribution of water leaving some areas with a limited/insufficient supply;
control of water means control of agriculture/agriculture profit/food resources;
Award [2 max] where one reason is explained in sufficient depth.
Also credit responses that cover two valid reasons.
Do not award marks where a reason for water scarcity is not given. [2 max]
- (b) increase the cost of water;
public education programmes;
promote use of water efficient goods;
incentive schemes for replacing water wasting devices with water saving ones;
metering water use;
fines for wasting water;
bans on hoses/washing cars etc/restrictions of date and time of using hoses;
encouraging/incentives for the use of low water use plants in gardens;
Do not award marks for actions such as "have showers instead of baths" without explanation of how that is achieved. [1 max]
- (c) *Technocentric would apporove of a dam [1 mark]:*
as a technological solution for collecting and storing water;
large scale and supplies many people/areas;
the reservoir can be used by many groups for a variety of activities;
Ecocentric would oppose new dams [1 mark]:
as they would prefer smaller/local water storage solutions;
would prefer recycling and using less water and therefore avoid the need for dams;
would consider dams as interrupting environments downstream /reducing flow;
Do not accept only "technocentric support dams and ecocentric oppose dams." [2 max]
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