M12/4/ENVSO/SP1/ENG/TZ0/XX/M

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MARKSCHEME

May 2012

ENVIRONMENTAL SYSTEMS AND SOCIETIES

Standard Level

Paper 1

10 pages

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 ***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) as remaining forest/habitat declines (so) tiger population declines; ***[1]***

(b) Lincoln index / capture-mark-release-recapture / capture-mark-recapture / capture-mark-release;
count in one area and extrapolate to whole area;
counting density of fecal material;
aerial photography / satellite imagery;
radio tagging; ***[1 max]***
Allow any other reasonable suggestion.

(c) tigers are difficult to observe/identify;
density of vegetation;
may lose tag;
difficult access;
predatory nature of tigers;
tigers are large/dangerous mammals so capture-mark-release (method) is difficult;
the same tiger may be counted more than once in a count/census / difficulty obtaining representative numbers;
the method could cause injury to the animal;
migration/movement of tigers;
Allow any other reasonable suggestion. ***[1 max]***

(d) ideal shape to reduce edge effects;
sufficiently large size for territory/to support viable population;
buffer zones to keep people away;
(management plan) to protect from poachers/hunters;
community involvement;
avoiding islands / provision of corridors to allow interbreeding;
quality of habitat / similar conditions of natural habitat / enough water and food resources; ***[2 max]***

(e) *strengths:* ***[2 max]***
captivity is not the best but acts as a good substitute;
zoos with breeding programmes could increase numbers of tigers;
zoos help to educate;
(in well-managed zoos) tigers are provided with proper diet and enough space;
provides safe haven temporarily (while habitats are preserved) / tigers can be reintroduced later;

weaknesses: ***[2 max]***
tigers may have problems of re-adaptation to wild;
people may get used to seeing tigers in zoos assuming it is normal;
the ultimate salvation for endangered animals lies in the protection of their habitats;
habitats in zoos are very different from natural habitats for tigers;
ethical issues around caged animals;
lack of genetic variety in a zoo/group of zoos; ***[3 max]***

2. (a) *point source*:
sewage outfall/effluent pipe;

non-point source:
agricultural/erosion/run-off/leaching of fertilizers in a large area; ***[2]***
Do not accept acid rain.

(b) open system;
because it exchanges matter **and** energy with surroundings; ***[2]***

(c) a measure of the amount of dissolved oxygen required to break down the organic material (in a given volume of water through aerobic biological activity); ***[1]***

(d) (i) trout, perch, salamanders and frogs; ***[1]***
*All four required to award **[1]**.*

(ii) these species will be at the limits of their tolerance;
may have reduced health;
may have reduced reproductive success;
these species are relatively high in the food chain;
loss of food species;
may be exposed to additional pollutants *e.g.* heavy metals; ***[2 max]***
Allow any other reasonable suggestions.

3. (a) no, because energy should decrease in each trophic level; ***[1]***

(b) a group of organisms that interbreed and produce fertile offspring; ***[1]***

(c) $100 \times 99 / 4900$;
2.02 ; ***[2]***

(d) (i) presence/absence of wings;
presence/absence of legs;
number of legs;
presence/absence of antennae/feelers;
segmented/non-segmented body; ***[1 max]***
*Award **[1]** for **two** correct suggestions.*
Allow any other reasonable suggestions.

(ii) aspects of some organisms change with season/development stage;
sexual variation;
only already discovered species can be identified;
judgment may be difficult (subjective)/may require expertise;
differences might simply be variations within a species; ***[1 max]***
Allow any other reasonable response.

4. (a) (i) (19.7 million × 0.76 =) 14.972 million (ha); ***[1]***
Units (ha) not required. Accept 15 million (ha).

(ii) *Ecological footprint is higher for France because*:
higher production of waste;
greater energy consumption for industry/domestic activities;
(probably) differences in diet / more likely to have a diet based on animal products which requires more land;
has more intensive (productive) farming;
uses more energy for transport and movement of goods/people;
greater wealth allows higher consumption of goods;
greater consumption of natural resources such as water; ***[3 max]***
Allow any other reasonable suggestions.
Responses related to transportation and technology should be linked to energy, waste or other resource related point.

(b) (i) the maximum number of a species/individuals/load that can be sustainably supported by a given environment; ***[1]***

(ii) the range of resources used by humans is usually much greater than for any other species;
humans can substitute one resource for another;
resource requirements vary according to lifestyles;
technological developments lead to changes in resources demand/availablity for consumption;
can be artificially altered by importing goods;
when discussing human populations global carrying capacity is more significant;
amount of resources are often estimates / full stocks of resources are not always known;
immigration/migration; ***[3 max]***
Allow any other reasonable suggestions.

5. (a) loam; ***[1]***

(b) loam/Soil B, as it has the optimum combination/balance of sand, silt and clay / easily workable / drains well / retains moisture/nutrients / well aerated; ***[1]***

(c) soil conditioners/fertilizers;
afforestation;
wind reduction techniques / wind breaks / shelter belts / strip cultivation;
terracing/contour ploughing;
(sustainable) irrigation;
prevent overgrazing;
prevent deforestation;
prevent trampling;
prevent over use of soil;
implementation of legislation / United Nations Convention to Combat Desertification (UNCCD); ***[1 max]***
*Award **[1]** for any **two** correct measures.*

(d)

Transfer Processes	Transformation Processes
erosion / run-off / wind movement / absorption / organic matter being deposited / precipitation / irrigation / diffusion / percolation / ploughing;	evaporation (volatilization) / condensation / oxidation / reduction / nitrification / decomposition / photosynthesis / respiration;

[2]

*Award **[1]** for any **two** transfer processes.*
*Award **[1]** for any **two** transformation processes.*
*Award **[1]** for **one** transfer and **one** transformation process.*

(e) energy efficiency will depend on the specific food being produced in the system;
absorption of solar energy by producers in aquatic systems tends to be less efficient as some light is absorbed/reflected by water;
food chains in aquatic systems are much longer so available energy is reduced from the original input energy;
in crop systems, most food is harvested from relatively low trophic levels / in aquatic systems most food is harvested from higher trophic levels;
energy conversions along the food chain are more efficient in aquatic systems as less biomass is locked up in bone and skeletal materials compared to flesh;
aquatic producers achieve faster growth rates than terrestrial producers; ***[3 max]***

6. (a) ash would reflect sunlight back to space/prevent sunlight penetrating atmosphere / increases atmospheric albedo / global dimming;
reduction in energy input leads to fall in global temperatures;
greenhouse gases released could contribute to global warming;
ash from volcano reduces the albedo of snow leading to increase in temperatures; ***[2 max]***

(b) sulphur dioxide/SO_2/SO_x;
nitrogen oxide/NO/NO_x;
carbon dioxide/CO_2; ***[2 max]***

(c) *Named atmospheric pollutant*:
e.g. metals (lead, mercury) / CO_2 / SO_x / NO_x / organic compounds;

Method: ***[2 max]***
e.g. filter-collected:
use a monitor/probe;
select correct material (filter paper / rain gauge water);
weighing filter before and after collection;
extraction of material filtered / chemical analysis;
select location and time for sampling / take measurements at different locations/regular intervals;
Allow any other reasonable direct method. ***[3 max]***