

MARKSCHEME

May 2004

ECOSYSTEMS AND SOCIETIES

Standard Level

Paper 1

*This markscheme is **confidential** and for the exclusive use of examiners in this examination session.*

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General Marking Instructions

*After marking a sufficient number of scripts to become familiar with the markscheme and candidates' responses to all or the majority of questions, Assistant Examiners (AEs) will be contacted by their Team Leader (TL) by telephone. The purpose of this contact is to discuss the standard of marking, the interpretation of the markscheme and any difficulties with particular questions. It may be necessary to review your initial marking after contacting your TL. **DO NOT BEGIN THE FINAL MARKING OF YOUR SCRIPTS IN RED INK UNTIL YOU RECEIVE NOTIFICATION THAT THE MARKSCHEME IS FINALIZED.** You will be informed by e-mail, fax or post of modifications to the markscheme and should receive these about one week after the date of the examination. If you have not received them within 10 days you should contact your Team Leader by telephone. Make an allowance for any difference in time zone before calling. **AEs WHO DO NOT COMPLY WITH THESE INSTRUCTIONS MAY NOT BE INVITED TO MARK IN FUTURE SESSIONS.***

You should contact the TL whose name appears on your “Allocation of Schools listing” sheet.

Note:

Please use a personal courier service when sending sample materials to TLs unless postal services can be guaranteed. Record the costs on your examiner claim form.

1. Follow the markscheme provided, do **not** use decimals or fractions and mark only in **RED**.
2. Where a mark is awarded, a tick (✓) should be placed in the text at the **precise point** where it becomes clear that the candidate deserves the mark.
3. Sometimes, careful consideration is required to decide whether or not to award a mark. In these cases write a brief note in the **left hand margin** to explain your decision. You are encouraged to write comments where it helps clarity, especially for moderation and re-marking.
4. Unexplained symbols or personal codes/notations on their own are unacceptable.
5. Record subtotals (where applicable) in the right-hand margin against the part of the answer to which they refer (next to the mark allocation for Section A). Do **not** circle sub-totals. **Circle the total mark for the question in the right-hand margin opposite the last line of the answer.**
6. Where an answer to a part question is worth no marks, put a zero in the right-hand margin.
7. Add together the marks for each question and enter this in the box marked TOTAL in the Examiner column on the front cover of the exam paper.
8. After entering the marks on the front cover check your addition to ensure that you have not made an error. Check also that you have transferred the marks correctly to the front cover. **The IBO carries out script checking and a note of all clerical errors may be given in feedback to examiners.**
9. Every page and every question must have an indication that you have marked it. Do this by **writing your initials** on each page where you have made no other mark.
10. A candidate can be penalized if he/she clearly contradicts him/herself within an answer. Make a comment to this effect in the left hand margin.

Subject Details: Ecosystems and Societies SLP1 Markscheme

General

A markscheme often has more specific points worthy of a mark than the total allows. This is intentional. Do not award more than the maximum marks allowed for part of a question.

When deciding upon alternative answers by candidates to those given in the markscheme, consider the following points:

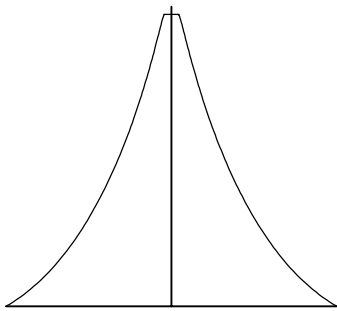
- Each marking point has a separate line and the end is signified by means of a semicolon (;).
- An alternative answer or wording is indicated in the markscheme by a “/” either wording can be accepted.
- Words in (...) in the markscheme are not necessary to gain the mark.
- The order of points does not have to be as written (unless stated otherwise).
- If the candidate’s answer has the same meaning or can be clearly interpreted as being the same as that in the mark scheme, then award the mark.
- Mark positively. Give candidates credit for what they have achieved, and for what they have got correct, rather than penalising them for what they have got wrong.
- Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.
- Occasionally, a part of a question may require a calculation whose answer is required for subsequent parts. If an error is made in the first part then it should be penalized. However, if the incorrect answer is used correctly in subsequent parts then **follow through** marks should be awarded. Indicate this with “**ECF**”, error carried forward.
- Units should always be given where appropriate. Omission of units should only be penalized once. Indicate this by “**U-1**” at the first point it occurs. Ignore this, if marks for units are already specified in the markscheme.
- Do not penalize candidates for errors in significant figures, unless it is specifically referred to in the markscheme.

1. (a) (i) the area of land required to support a defined human population at a given standard of living. (The measure takes account of the area required to provide all the resources needed by the population and assimilation of all wastes.); [1]

(ii) $\frac{1.1+1.2}{5.4} \times 100 = 42.6\%$; [1]

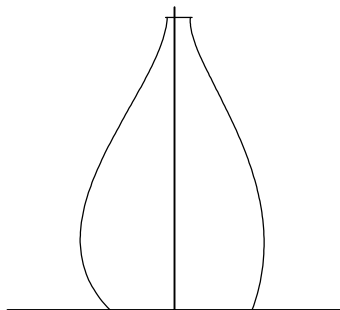
(iii) Canada has a larger consumer driven economy;
 Canada has a greater car culture;
 Canada has higher consumer spending *per capita*;
 Canada – climate difference – more energy required for heating; [2 max]

(b) (i) *Diagram should demonstrate high birth rate and high adult death rate.*



[1]

(ii) *Diagram should demonstrate a falling birth rate and a larger proportion of adults and aged persons.*



[1]

(c) (i) *Award [1] for any two of the following.*
 education / legislation / rising living standards / economic incentives;
Accept other reasonable answers. [1]

(ii) *Award [1] for any two of the following.*
 education / better diet / improved health care / political stability / disease control;
Accept other reasonable answers. [1]

(iii) LEDCs tend to have a diet based on plant products/plants with little meat (12 % approximately) whereas MEDCs tend to have a greater amount of animal protein in their diet (30 % approximately);
 it is less efficient to eat animal protein than plant material, so greater surface area needed to produce the same amount of food;
 countries that have a high animal protein content in their diets potentially have a larger ecological footprint / *OWTTE*; [3]

2. (a) *renewable*: natural resources that have a sustainable yield or harvest equal to or less than their natural productivity, *e.g.* food crops / timber in the long-term / ground water (over hundreds of years);
- replenishable*: non-living natural resources that depend on the energy of the sun for their replenishment, *e.g.* groundwater / ozone layer;
- non-renewable*: natural resources which cannot be replenished within a time scale of the same order as that at which they are taken from the environment, *e.g.* fossil fuels / minerals; [3]
- An example is required in each case in order to score the mark.*
- (b) use of (global) resources at a rate that allows natural regeneration and minimizes damage to the environment / *OWTTE*; [1]
- (c) resource value is dynamic / changes over time;
as man advances (technologically, culturally) his resource base changes;
resources become more valuable as new technologies need them;
e.g. flint used to be an important resource but now its redundant / uranium only becomes a resource with the advent of the nuclear age; [3 max]
Accept any other reasonable answers.
- (d) (i) *year 2*: 125;
year 6: 24500; [1]
Both needed for [1].
- (ii) *year 5*; [1]
- (iii) the population will ultimately crash; [1]
- (iv) over population leading to unrealistic demands for limited resources;
financial motives (greed) – exploitation of resources beyond sustainable limits for short-term financial gain (cod fishing);
use of resource beyond sustainable limits due to lack of knowledge of resource’s sustainable level; [2 max]

3. (a) (i) energy is neither created nor destroyed / energy is conserved / *OWTTE*; [1]
- (ii) $1000 \text{ kJ} - 100 \text{ kJ} (10\%) = 900 \text{ kJ}$;
 output = $900 \text{ kJ} - 135 \text{ kJ} (15\%) = 765 \text{ kJ}$; [2]
- (b) (i) 1. evaporation;
 2. transpiration / evapotranspiration;
 3. precipitation;
 4. run-off / infiltration; [2]
Four correct [2], three or two correct [1].
- (ii) too simplistic / no values / no indication of time / two dimensional; [1]
Accept other reasonable answers.
- (iii) $1960 = 2 \times 10^3 \text{ km}^3 \text{ yr}^{-1}$ $2000 = 4 \times 10^3 \text{ km}^3 \text{ yr}^{-1}$;
 $\frac{4-2}{2} \times 100 = 100\%$; [2]
Correct answer on its own, award [2].
- (iv) increasing global population requiring more water;
 industry expanding and requiring more clean water (cooling processes, *etc.*);
 globally, greater use of water for irrigation;
 increase in water use by developing countries; [3]
Accept other reasonable answers.

4. (a) (i) the natural or artificial enrichment of a body of water, (particularly with respect to nitrates and phosphates);
that results in depletion of the oxygen content of the water / *OWTTE*; [2]
- (ii) do not allow agricultural waste (including fertilizers) to run into water courses / legislate against the use of fertilizer / adopt less fertilizer intensive agricultural practices / install fertilizer (waste) traps in farm drainage networks; [1 max]
Accept other reasonable answers.
- (iii) removable of algal mats / oxygen pumping / removal of contaminated sediments / flush systems with oxygenated water / chemically denature fertilizer; [1 max]
Accept other reasonable answers.
- (iv) green tax on fertilizer making it more expensive;
use other methods of enhancing crop production *e.g.* organic compost;
switch to organic farming;
implement standards / control re run-off from agricultural land;
change crop varieties *e.g.* use a variety with lower phosphate requirements; [2 max]
- (v) developing economies so need to increase productivity – cash crops;
to increase productivity and so provide more food for increasing populations;
to increase productivity and so be better placed to compete in a world market; [2 max]
Accept other reasonable answers.
- (b) (i) $N(N - 1) = 5235 \times 5234 = 27399990$;
 $\sum n(n - 1) = 552 + 20 + 30 + 2248500 + 1438800 + 6247500 = 9935402$;
 $D = \frac{27399990}{9935402} = 2.8 / 2.76$; [3]
- (ii) death of aerobic organisms;
loss of macrophytes;
shorter food chains;
loss of diversity; [2 max]
- (c) (i) composting; [1]
Accept other reasonable answers.
- (ii) difficult to manage infrastructure to collect organic waste;
apathy and inertia of public;
cost may be prohibitive;
difficult to sort organic waste from other waste at source or further into process;
no market for end product;
cultural and social reluctance; [2 max]
Accept other reasonable answers.
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