



# **MARKSCHEME**

**November 2009**

**ECOSYSTEMS AND SOCIETIES**

**Standard Level**

**Paper 1**

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## General Marking Instructions

*Assistant Examiners (AEs) will be contacted by their team leader (TL) by e-mail (or telephone) – if 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 by e-mail at any time if they have any problems/queries during the marking process.*

### Note:

The DHL courier service must be used to send assessment material to your team leader/senior moderator and to IB Cardiff. (However, this service is not available in every country.) The cost is met directly by the IB. It is vitally important that the correct DHL account number is used.

If you have any queries on **administration** please contact:

Barry Evans  
Examinations Administration Department (EAD)  
IB Cardiff  
Peterson House  
Malthouse Avenue  
Cardiff Gate  
Cardiff CF23 8GL  
GREAT BRITAIN

Tel: + (44) 29 2054 7777

Fax: + (44) 29 2054 7778

E-mail: [barry.evans@ibo.org](mailto:barry.evans@ibo.org)

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. Do **not** circle subtotals. **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. **We have 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.
- Words that are underlined are essential for 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 markscheme, then award the mark.
- 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.
- 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) use of aerial photography/satellite imagery;  
simple field count; (*original study used zodiac inflatables to examine each bay*)  
ideally under similar conditions on each occasion (*e.g. time of year, time of day*);  
problem of incomplete counting;  
some individuals might be invisible offshore; **[2 max]**  
*Award [1 max] if answer relies solely on capture-mark-release method (Lincoln Index).*  
*Method not really suitable for populations of very large mammals, particularly in remote locations.*
- (b) (i) initial low population (1985);  
long-term increase to a high value (2005);  
significant intermediate falls in numbers (1998, 2001, 2003);  
slight evidence of cycles in numbers / rise over 3–5 years followed by decline; **[2 max]**  
*Accept any other reasonable answers.*
- (ii) perhaps numbers formerly reduced by sealing;  
population builds up following cessation of disturbance/with conservation;  
changes possibly due to variations in food supply;  
changes possibly due to predation (killer whale, leopard seal);  
changes possibly due to climatic variation; **[3 max]**  
*Accept any other reasonable answers.*

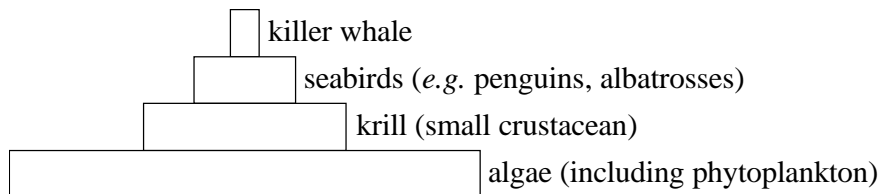
2. (a) Award [2 max] for four correct, [1 max] for two or three correct and [0] for one correct. *Note: "Fish" should only be awarded once.*

<i>Trophic level</i>	<i>Organism</i>
<i>Top carnivore</i>	killer whale;
<i>Producer</i>	algae;
<i>Primary consumer (herbivore)</i>	krill / fish;
<i>Secondary consumer (carnivore)</i>	fish / seals / blue whale / seabirds;

[2 max]

- (b) correct shape of pyramid;  
correct labels for layers;

e.g.



[2]

- (c) (i) (feedback) that tends to damp down/neutralize/counteract any deviation from an equilibrium to promote stability / *OWTTE*;

[1]

- (ii) *Many examples might be selected.*

e.g. relationship of populations of killer whale and seal population;  
rise in number of seals → provides more food for killer whales → increased success in breeding and survival → greater predation on seals → decline in seal numbers;

[2]

*Award [2 max] for any reasonable example, with argument. Allow answers in the form of a diagram.*

- (d) substantial rise in numbers of krill – predation pressure reduced;  
reduction in numbers of algae – increased demand from krill;  
reduction in number of killer whales – important food source reduced;  
rise in number of carnivorous fishes – increased availability of krill / deflection of food chains;

[2 max]

*Accept any other examples with reasoning. Award [1] for the example and [1] for the reasoning.*

- (e) renewable;  
a whale population is a self-maintaining biological resource, relying ultimately on the Sun's energy;

[2]

*Award [1 max] for any reasonable correct explanation and [0] for a diatribe against Japanese whaling.*

- (f) (i) light / temperature / pH / salinity / dissolved oxygen / nutrients;  
*Allow any reasonable factor appropriate to a marine ecosystem.*

[1]

- (ii) e.g. measure temperature with thermometer / temperature probe;  
repeat at different depths;  
repeat at different times of year/day;  
multiple measurements each time / calculate mean value;  
different areas within the ecosystem;

[2 max]

3. (a) Antarctic ice cap is formed by accumulation of snow at very high latitudes; and the compaction of this snow into ice over thousands of years; Antarctica therefore represents by far the largest store of freshwater; ice is lost through calving of icebergs/melting; [2 max]  
*Accept any other reasonable answers.*  
*Allow answers in the form of a flow diagram or similar.*
- (b) (i) “greenhouse effect” as energy is radiated out less quickly through CO<sub>2</sub> “blanket”;  
 accelerated melting of ice;  
 ice-free areas increased;  
 tundra-like vegetation expands;  
 increased productivity of Antarctic plant life;  
 increased secondary/decomposer productivity of Antarctic terrestrial ecosystems;  
 alternatively, rise in sea level might cause reduction of ice-free areas on coasts; [3 max]  
*Award [0] for a discussion of marine ecosystems.*
- (ii) increase in combustion of fossil fuels (oil, coal, natural gas);  
 destruction of forests; [1 max]
4. (a) species diversity: the variety of species of organisms in an ecosystem per unit area; it measures both the number of species present, and their relative abundance / *OWTTE*; habitat diversity: the number of habitats/ecological niches per unit area in an ecosystem / *OWTTE*; [2 max]  
*Definitions based on Glossary, need not be verbatim, but must mention unit area.*
- (b) (i) *Allow any reasonable example but the answer must give actual name (toponym) or a brief description for [2 max], “forest”, “lake” or “river” is insufficient.*  
*e.g.*  
*Penguin Island:*  
 small island off Fremantle, Western Australia;  
 coastal scrub;  
  
*Grantchester Meadows:*  
 area adjoining the River Cam, eastern England;  
 damp grassland and wetland;  
  
*Fairgrounds Road, Woodbridge, Connecticut:*  
 small area of secondary deciduous woodland;  
 woodlot (mainly maple); [2 max]
- (ii) *e.g. Penguin Island:*  
 ownership and management by a public authority since 1987 (Western Australia Department of Conservation and Land Management);  
 visitor access to island tightly supervised and concentrated in particular areas;  
 access to seabird colonies restricted during breeding season;  
 management integrated with that of adjacent waters – a marine park – many food chains lead from sea towards island;  
 in this way diversity of breeding seabird colonies is maintained; [2 max]



5. (a) for each of two areas;  
under similar conditions (*e.g.* time of day);  
and for a similar period;  
collect a sample of insects;  
using a net/other appropriate method;  
identify specimens using field guide/key *e.g.* AIDGAP key (*or similar*);  
count number of each species;  
apply Simpson's diversity index formula;  
$$D = \frac{N(N-1)}{\sum n(n-1)};$$
higher value of  $D$  represents higher diversity; **[3 max]**
- (b) high species diversity generally correlates with high habitat diversity;  
high species diversity is associated with long food chains and complex food webs;  
complexity in the energy/nutrient flow pathways in an ecosystem makes for stability;  
other things being equal, where there is a choice, efforts should be made to conserve  
the system with the greater diversity; **[2 max]**  
*Accept any other relevant answers.*
6. (a) *Allow any appropriate answer but it must be a species and not a biological group  
or a variety. It must also be within last 500 years i.e. dinosaur is unacceptable.  
Examples offered may include:*  
dodo / Thylacine (Tasmanian wolf) / passenger pigeon / great auk; **[1]**
- (b) *e.g. dodo:*  
large creature suitable as a source of food/animal protein;  
for fresh-meat-starved visiting seamen on sailing ships;  
extremely tame/lack of predators therefore lack of evasion response;  
flightless – ground-living and therefore easily caught;  
later – competition with introduced animals (*e.g.* pigs);  
eggs/young eaten by introduced rats *etc.*;  
habitat destruction;  
endemic to small island – Mauritius – so total population relatively low; **[3 max]**  
*Accept any other reasonable answers.*
7. an ecosystem is not to be valued solely in terms of the commercial value of its output/crop;  
*e.g.* timber, game, catchment protection for a forest;  
value may be aesthetic;  
*e.g.* beauty of upland ecosystems of English Lake District;  
value may be spiritual/religious;  
*e.g.* spiritual value of Uluru (Ayers Rock) to indigenous people of Central Australia; **[3 max]**  
*Accept any other reasonable answers.  
Award [2 max] if no examples.*
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