IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
PROGRAMA DEL DIPLOMA DEL BI



# MARKSCHEME

## May 2005

## ECOSYSTEMS AND SOCIETIES

## Standard Level

## Paper 1

# 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) 1920 *accept answers between 1910 and 1940* ***[1]***

(ii) exponential growth / rate of increase accelerates over time / J curve (provided understanding of rate is demonstrated) ***[1]***

(iii) crude birth rate – crude death rate;
÷ 10; ***[2]***

(b) (i) mammals = 40<br>birds = 48 } (±3) *both needed for* ***[1]*** ***[1]***

(ii) both show exponential increase;
mammals rate of increase has been more irregular;
since 1650 more bird species extinct than mammal species; ***[2 max]***
*Accept other reasonable answers*

(iii) species is classified as extinct when there is no reasonable doubt that the last individual has died;
when exhaustive surveys throughout its historic range have failed to record an individual;
surveys should be over a time frame (diurnal, seasonal, annual) appropriate to life cycle and life form;
*Accept "none left" (or similar) for* ***[1 max]*** ***[2 max]***

(c) *Award* ***[1 max]*** *for relationship*
human population growth and increasing extinctions are positively correlated / *OWTTE*;
human population increase has caused increases in extinctions;

*Award* ***[3 max]*** *for reasons*
humans have caused (exponential) increase in extinctions through habitat degradation/destruction/fragmentation;
pollution;
hunting / collecting / harvesting and thereby driving species to extinction; ***[4 max]***

**2.** (a) (i) input = antibiotics;
outputs from crop production = eroded soil;
outputs from packaging = solid waste;
outputs from distribution = greenhouse gases;
*4 correct = **[2]**, 2 or 3 correct = **[1]**, 1 correct = **[0]***
*accept other reasonable responses*; ***[2 max]***

(ii) recycling (where solid waste is used again);
incineration (where solid waste is burned);
landfill (where solid waste is buried); ***[2 max]***

(b) (i) eutrophication ***[1]***

(ii) oxygen depletion leading to the death of aerobic organisms;
development of algal blooms deprives water of oxygen as bacteria break the blooms down;
increased turbidity;
loss of macrophytes;
reduction in length of food chains as fewer species can be supported;
reduction in biodiversity as vulnerable species become extinct;
increased sedimentation; ***[2 max]***

(c) (i) open system ***[1]***

(ii) an open system involves the exchange of matter and energy with surroundings;
(from the diagram it can be seen that) both energy and matter are being exchanged;
closed systems do not occur naturally and isolated systems do not exist; ***[2 max]***

(iii) *Accept any reasonable evaluation. Answers could include*:
clearly shows every stage of the farming system from farm to consumer;
shows most of the inputs required and the negative environmental outputs which result (often ignored in the usual analysis of such systems);
negative – no mention of profits or products, only adverse environmental impact;
confusing as flows of energy along the system are not illustrated;
no actual figures for amounts shown, *i.e.* not proportional;
distinction between stores, inputs, outputs, processes, outcomes is unclear; ***[4 max]***
*Both strengths and weaknesses must be included for full marks. If only strengths **or** weaknesses **[2 max]**.*

**3.** (a) (i) 6 ***[1]***

(ii) producers = first accumulator / algae, plants / level 1
top carnivores = ultimate accumulators / humans / level 6
*Both required for* ***[1]*** ***[1]***

(iii) pesticide becomes increasingly concentrated as you go up the food chain;
because each successive trophic level supports fewer organisms and so the pesticide becomes concentrated in the tissues;
a progressively longer life span – intake of many individuals of a lower level; ***[2 max]***

(b) (i) energy is used in respiratory processes at each trophic stage and is lost as heat;
also lost as waste; ***[2]***

(ii) pyramid of biomass represents biomass at a given time; whereas pyramid of productivity represents rate at which stocks are being generated;
pyramid of biomass is measured in units of mass / energy / J $m^{-2}$ / g $m^{-2}$ ;
pyramid of productivity is measured in units of flow / J $m^{-2}$ $yr^{-1}$ / g $m^{-2}$ $yr^{-1}$; ***[2]***

**4.** (a) *This can be argued either way, although it is more probable that Kuan Tzu was an ecocentrist. Give credit for strong justification.*

*Ecocentrist because*
the proverb seems to be advising taking a long term view;
clearly advocates education and ecocentrism stresses importance of self-reliant comunities;
through education people will arguably learn to value the environment and use resources sustainably;
refers to "the people" and this perhaps suggests a lack of faith in elites/authorities;

**or** *technocentrist because*
education will help lead to technological development;
through technology we will find longer term solutions to environmental problems;
we need to understand natural processes in order to control them;
faith in the ability of people to overcome obstacles; ***[4]***

(b) education – level and type will affect environmental awareness;
economic conditions – will shape views towards environment *e.g.* short term or long term view;
political context – will affect *e.g.* how groups in society are organized / treated;
cultural views – will affect predominant attitudes to the environment;
religious view – holy texts / doctrine may dictate relationship between people and creation / nature; ***[2 max]***
*Accept other reasonable answers.*

**5.** (a) (i) most fish will be found in places where temperatures are moderate;
normal distribution of fish;
some fish will be able to survive at more extreme temperatures (but they will be in a state of physiological stress); ***[2 max]***

(ii) at low and high temperatures, only small populations of fish are supported due to physiological stress ***[1]***

(iii) density–independent because temperature is a factor which affects populations regardless of population size ***[1]***

(b) *Accept any reasonable response. Answers could include:*
salinity / water pH / flow velocity / wave action / soil pH / light intensity / wind speed / soil moisture / drainage / slope / particle size / mineral content ***[2 max]***
*4 correct =* ***[2]****, 2 or 3 correct =* ***[1]****, 1 correct =* ***[0]***

(c) *For example, flow velocity:*
use a flow meter;
insert into water just below surface and take a number of readings to ensure accuracy;
results can be misleading if only one part of stream is measured;
water flows can vary over time and with depth; ***[3 max]***