IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
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MARKSCHEME

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ECOSYSTEMS AND SOCIETIES

Standard Level

Paper 1

9 pages

General Marking Instructions

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 <u>underlined</u> 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 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.
- 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.
- Units should always be given where appropriate. Omission of units should only be penalized once. 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) a community of interdependent organisms and the physical environment they inhabit / *OWTTE*; ***[1]***

(b) *e.g.* water flow through a river ecosystem; ***[1]***
Accept any reasonable answer that identifies a flow and an ecosystem.
*Award **[0]** if no named ecosystem.*

(c) biomass within trees and plants / nutrient within soil; ***[1]***
Do not accept for example "trees" or "soil". The item stored must be identified.

(d) 0.04; ***[1]***

(e) *e.g.* tropical rainforest and tundra;
mean NPP tropical rainforest greater than tundra / mean biomass tropical rainforest far greater than tundra;
NPP per kg biomass of tropical rainforest is far lower than tundra;
Candidates may give figures from the table but they need to make comparative statements.

tropical rainforest hot and wet so greater opportunity to develop large biomass / high rate of photosynthesis and high rate of respiration so NPP/per kg biomass/ per year is low;
tundra cold and dry so low rates of photosynthesis and respiration / plants slow growing, slow accumulation of biomass, relatively large growth in biomass per year; ***[4 max]***
*Award up to **[2 max]** for comparison and up to **[2 max]** for explanation. Award any other combination of two ecosystems.*

(f) *name of primary producer*: *e.g.* grassland;

method: ***[2 max]***
collect all the vegetation (including roots, stems, leaves) within a series of (1m×1m) quadrats;
weigh vegetation;
dry the vegetation until no further weight loss is encountered / dry weight represents biomass; ***[3 max]***
*Award **[2 max]** if no named primary producer.*

2. (a) the enrichment of a water body (lake, stream *etc*.) by increased nutrient inputs (primarily phosphates and nitrates);
depletion of oxygen content of water;
leads to the development of algal blooms;
the enrichment may be natural/artificial;
accelerated by human activity; ***[2 max]***

(b) *process A*: (agricultural) run-off / surface flow / nutrients entering lake;
process B: leaching / sedimentation / seepage / dead remains sinking / infiltration; ***[2]***
Accept other reasonable responses.

(c) *agricultural source*:
fertilizers (containing phosphates and nitrates) / animal waste / manure;
Do not accept pesticides.

non-agricultural source:
detergents (domestic) / industrial effluent / sewage; ***[2]***

(d) identify potential sources of eutrifying materials (detergents, fertilizers, effluents);
identify if source is point/non-point pollution;
put in strategies for removing/reducing these pollutants *e.g.* reduce fertilizers use;
use organic fertilizers / use detergents with no phosphates / prevent run-off, *etc.*;
remove contaminated sediment from water body / dredge it;
re-oxygenate water body;
nets to reduce organic input;
educate water source users about eutrophication problems; ***[3 max]***

3. (a) wave power / solar radiation / heat pumps / water wheels; ***[1]***
Accept other suitable answers if appropriate.

(b) *Award **[2]** if both answers are correct and **[1 max]** if one or two partial answers are correct.* ***[2]***

Alternative renewable energy source	***How the energy is produced***	***Major limitation***
Tidal Power	*Energy is produced by using the ebbing and/or flooding tide to turn turbines and produce electricity.*	good tidal range required / right shape of coastline / interferes with navigation / impact on wildlife / expensive; *(only **one** limitation required)*
Wind Power	*Wind turbines are driven by available wind energy. The wind energy is turned into electrical energy via a generator. The electrical energy is supplied to an electrical grid to do work.*	*Dependent on the wind; no wind equals no energy.*
Biofuel	plant material burned directly to produce heat / transformed into ethanol (used as fuel) / converted to methane (methane digestion); *(only **one** method required)*	*Produces emissions and requires large areas to grow biofuel crop.*

(c) MEDCs traditionally / culturally dependent on fossil fuels;
fossil fuels are energy-efficient / easy to transport / relatively cheap;
changing to renewable energy on a large scale requires massive capital investment / cultural inertia against change to renewables / many renewables depend on environmental conditions that are not constant (*e.g.* wind, sunshine, waves); ***[3]***

(d) *named food production system*: *e.g.* rice paddies

application of fertilizer;
using herbicides;
insecticides;
irrigation;
changing crop type/variety;
using GM crops; ***[2 max]***
*Award **[1 max]** if no named food production system.*
Note: *that food production system must be reasonably specific. Do not accept e.g. agriculture.*

(e) carrying capacity is the number of individuals/species/load an area of land/an environment can support (providing resources and absorbing waste);
ecological footprint is area of land (and water) required to support an individual/population (providing all resources and absorbing waste);
ecological footprint is a theoretical area whereas carrying capacity refers to a real area;
they are the opposite/inverse of each other;
carrying capacity involves sustainable support of a population, whereas footprints are not necessarily sustainable; ***[3]***

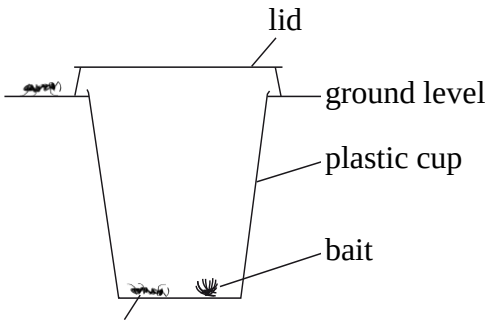
4. (a) high profile/charismatic species catch public attention both nationally and internationally (*e.g.* tiger – India);
however, species based conservation favours charismatic organisms and is less successful in saving "non cuddly" species;
saving a named species requires preserving the animal's habitat this benefits all other organisms in that habitat;
however a species can be artificially preserved (*e.g.* in a zoo) whilst its natural habitat is destroyed (*e.g.* Giant Panda); ***[3 max]***
*Award any three of the above points **[1]** each or any other suitable suggestions.*

(b) *area A*: ***[1 max]***
fragmented and small with a large perimeter area ratio / large edge effect so lots of disturbance;
fragmented so difficult migration between fragments;
small size may limit species contained / limit population sizes;
Accept other reasonable responses.

area B: ***[1 max]***
large perimeter area ratio / relatively small edge effect so less disturbance;
large size promotes high biodiversity;
large size so good for large vertebrates/top carnivores/large species populations;
Accept other reasonable responses.

area C: ***[1 max]***
as large as B but dissected by a road which acts as a barrier to species migration;
road increases edge effect some more disturbance ;
road allows easier access to the interior of reserve for monitoring ;
road gives easier access for poachers;
some evaluative element is required (*i.e.* how the characteristic relates to the ecosystem in a positive or negative way); ***[3]***
Accept other reasonable responses.

(c) (i)



[2]

*Award **[1]** for the diagram and **[1]** for up to three labels.*
Accept pitfalls designed to collect larger species.

(ii) a falling value would suggest a loss of diversity / in this instance a loss in the invertebrate biodiversity;
this data could be used to identify a biodiversity decay problem / kick start a management strategy to assess the cause and reverse the trend; ***[2]***
Award credit if specific management strategies to address loss in biodiversity are suggested.

(iii) use Lincoln index / capture-mark-release-recapture method;
capture ground beetles, mark-release;
after a period of time recapture and count those with and without marks; ***[2 max]***

(d) due to the process of plate tectonics the Earth's surface has gradually broken up and drifted apart over many millions of years;
this process has allowed groups of organisms to become isolated and evolve along different paths dictated by their new surrounding and environmental conditions / plate movement not only isolates groups but also subjects them to new climates and environmental conditions; ***[2]***
Accept other reasonable responses.