



# **MARKSCHEME**

**November 2012**

## **ENVIRONMENTAL SYSTEMS AND SOCIETIES**

**Standard Level**

**Paper 1**

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## 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) (altitudinal) zonation; [1]
- (b) lack of water (due to permafrost);  
cold temperatures;  
few soil nutrients / poor soils;  
steep slopes;  
thin soils;  
exposure to wind; [2 max]  
*Accept other reasonable suggestions. Do not credit altitude, oxygen, sunlight, low rainfall or stating only 'temperature' / 'humidity'.*
- (c) each zone will move further up the mountain;  
(shift in rainfall patterns may result in) disappearance of one (or more) type of vegetation; [1 max]  
*Accept other reasonable responses.  
Give credit if candidate identifies one vegetation type and suggests how it will be found at a higher location.  
Do not accept "melting of snow" unless related to a change in vegetation.*
2. (a) (hardy) species able to withstand difficult conditions / species in the first stage of succession / species beginning (initiating) ecological succession / *OWTTE*; [1]  
*Do not credit definition of 'invasive species'.*
- (b) loss of biodiversity / may outcompete native species / may disrupt food chains as particular prey is consumed / may block sunlight (preventing photosynthesis) / may provide additional food source; [1]
- (c) pollution of nearby groundwater/ lakes/ rivers;  
herbicides may kill other species in addition to the target species;  
may build up in tissues / bioaccumulation;  
species higher up the food chain may be particularly affected / biomagnification;  
development of herbicide resistance;  
adding toxicity to soil / pollution of soil; [2 max]  
*Do not accept eutrophication. Award max of 1 mark for reference to social and economic problems caused by use of herbicide.*

3. (a) the gain by producers in energy or biomass (per unit area per unit time) remaining after allowing for respiratory losses / gross productivity minus respiration / rate of photosynthesis minus (rate of) respiration / NPP is the amount of energy or biomass available to consumers in an ecosystem; [1]  
*Do not accept only equation  $NPP = GPP - R$  without explanation of what the symbols mean.*
- (b) more light/insolation around the equator (sun directly overhead) so higher NPP; warmer in tropics so higher NPP; NPP is limited by availability of water / NPP is limited by precipitation rates / NPP is limited by bands of aridity at approximately 30 degrees North and South of equator / NPP is higher around the equator since precipitation is heaviest (due to the Intertropical Convergence Zone (ITCZ)); NPP is low at high latitudes due to low light intensity/ low temperatures/ permanent darkness in winter; [2 max]  
*Do not credit soil fertility or only reference to location without discussion of the climatic factors of light/temperature/precipitation.*
- (c) presence of endemic species; high (rates of) biodiversity (biological hotspots); presence of keystone species; iconic landscapes / high aesthetic value; ecosystems which provide an important ecological service e.g. climate regulation (rainforests); [2 max]  
*Do not credit high net primary production rates.*
- (d) name of area e.g. Amazonian Rainforest under threat from economic interests such as logging companies/ mining companies/ small-scale farmers; underlying cause of the problem is underdevelopment/ political corruption/ short-term approach to the forest/ population growth; [1 max]  
*To award the **single [1]** mark, a named area must be included in the response (naming a biome e.g. tundra is not sufficient) together with stating a human activity and relating it to a specific threat.*  
*Allow any other reasonable example.*

4. (a)  $(\frac{2000-1000}{1000} \times 100\%)$

100%;

[1]

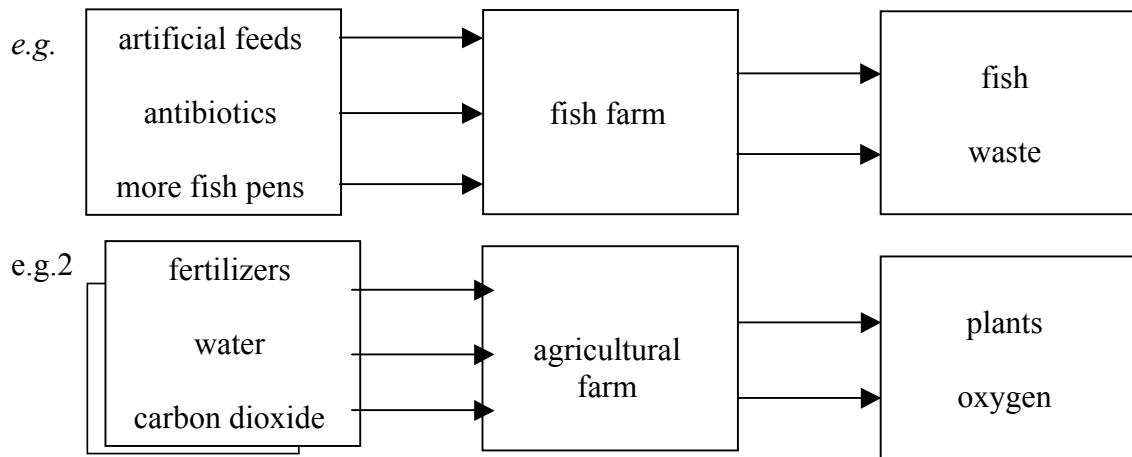
Accept figures between 95% and 100%. Only final answer required.

(b) Award [1] for three appropriate inputs.

Award [1] for two appropriate outputs.

Award [1] for drawing which shows flows / arrows into and out of a food production system (do not need to be labelled as flows and storages). Arrows must go in correct direction.

[3 max]



The food production system should be named (e.g. beef production/arable farming) but the name does not need to be in a box.

Do not accept “technology” without a specific example e.g. pest resistant crop seeds. Do not accept “capital” without example of how money is used e.g. farming labour.

Do not accept ‘food’ (as either input or output) without specific example (e.g. cattle feed or beef).

Do not credit answers that have similar inputs/outputs (e.g for outputs – (1) fruit and (2) leaves).

Allow any other reasonable example.

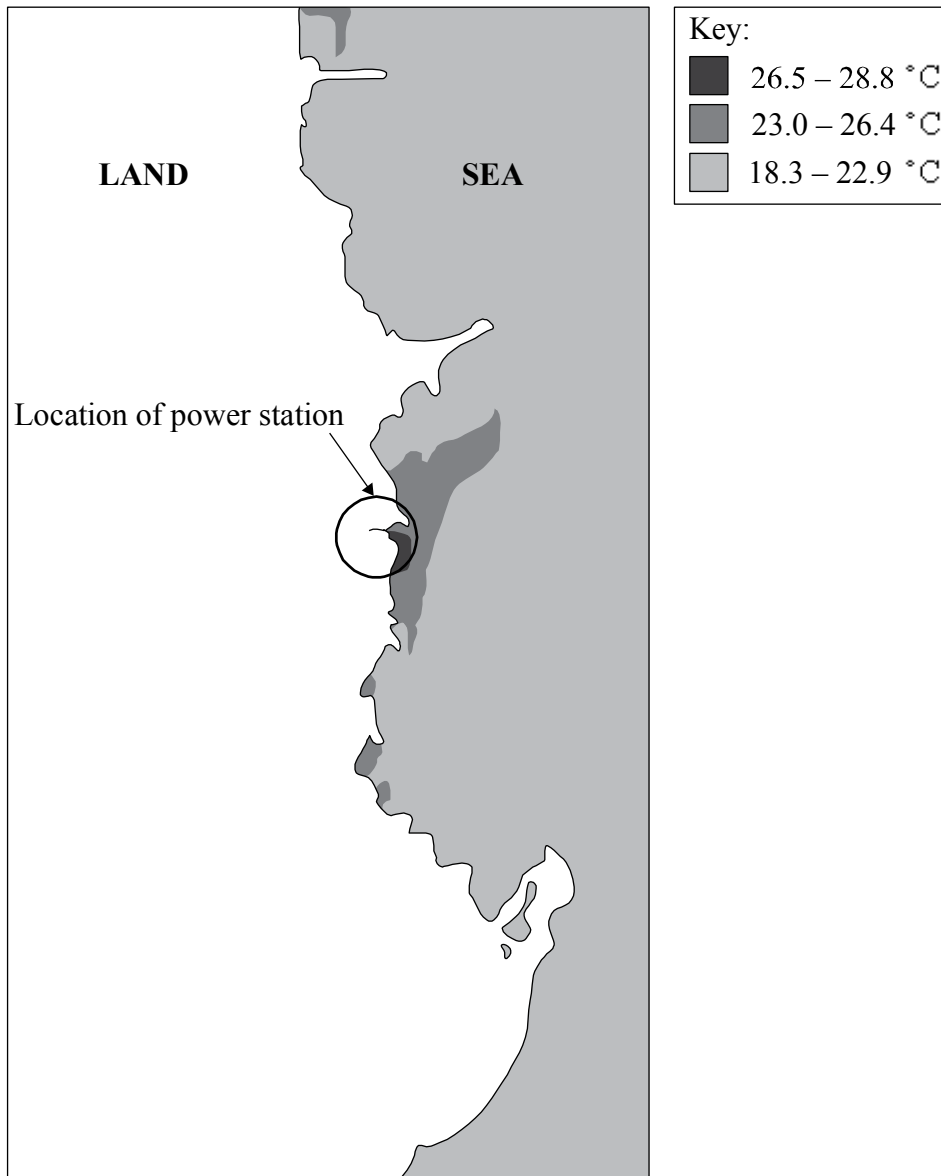
- (c) soil degradation from erosion;  
 eutrophication from agricultural run-off;  
 moral/ethical dilemmas from factory farming;  
 pollution from insecticides / pesticides / fertilizers ;  
 salinization from over irrigation;  
 lowered water tables / over abstraction of ground water;  
 loss of valuable habitats e.g. wetlands drained for agriculture;  
 Accept other reasonable responses.

[2 max]

- (d) footprint for a meat eater is likely to be much larger than for a vegetarian;  
production of meat requires a greater energy input than growing crops;  
(meat eater is) eating at a higher trophic level;  
means land is required to create feed for livestock and for raising livestock;  
transport of meat for processing will increase the footprint size;  
diet based on imported goods will lead to a bigger footprint / local goods will lead to a smaller footprint;  
more fossil fuel consumed in process of transportation;  
increase in material consumption for packaging;  
greater (food) consumption will mean a bigger footprint;  
more natural resources (land, fossil fuel, irrigation) required for meeting increased demand;

*[2 max]*

5. (a)



*Award [1] for clear label which locates power station on coast next to the ocean temperatures of 26.5 – 28.8 °C. Do not accept location within the sea.*

**[1 max]**

(b) *1 mark for named transformation process e.g. decomposition / (aerobic) respiration / anaerobic respiration;*

*1 mark for effect:*

*Less (aerobic) respiration  
increased anaerobic respiration;  
increased decomposition;*

**[2 max]**

*Do not accept “more growth of heat tolerant species” or statements referring to effect of increased HEAT to a transformation process.*



(c)

	<b>Factor affecting choice of pollution management strategy</b>
<i>Local</i>	local attitudes/cultural beliefs to the environment/enforcement of local authorities;
<i>National</i>	legislation/political agenda / economic resources;

**[2 max]**

*Accept other reasonable responses.*

(d)

<b>Agreement</b>	<b>Issue</b>
<i>Montreal protocol</i>	CFC use / ozone depletion;
<i>Kyoto protocol</i>	global warming/ climate change/ carbon dioxide emissions;
<i>CITES</i>	(international) trade in endangered species / loss of biodiversity;

**[2 max]**

*Award [1] for one or two correct responses.*

*Award [2] for three correct responses.*

6. (a) highest populations tend to have lower values of exposed (or at risk) property;  
 majority of vulnerable cities are located between the tropics;  
 the largest proportion of cities with large vulnerable populations are located in Asia;  
 the most expensive (costly) at risk properties are located in MEDCs (USA & Japan); **[2 max]**  
*Accept other reasonable responses that include quantitatively interrelated parameters inferred from this table and NOT from theoretical knowledge of this issue.*
- (b) *LEDCs:*  
 are not equipped with the economic/medical resources to evacuate people/cope with large numbers of migrants;  
 have higher populations so more people at risk;  
 populations are already vulnerable and therefore any drop in living standards will affect them to a greater degree;  
 have fewer resources to pay for engineering works such as coastal defences to offset threats; **[2 max]**
- (c) global warming will lead to thermal expansion of water and melting of (land based) glacier/ice cap/ice sheets leads to sea level rise; **[1]**  
*Do not accept ice masses clearly located in the sea/ocean e.g., "melting iceberg".*
- (d) small changes are difficult to measure precisely;  
 much variation across ocean systems;  
 variation in levels due to currents/tides;  
 sea level is fluctuating;  
 height of land is changing as it slips further into the sea in some places and is uplifted in other places;  
 are based on satellite (or tide gauges) measurements (e.g. satellite altimetry) which are tedious to analyse / expensive / difficult to have continuous data; **[1]**
- (e) (i) *coastal ecosystems* **[2 max]**  
*Award 1 mark for effect and 1 mark for corresponding explanation. Do not credit two different effects.*

<b>Effect [1 mark]</b>	<b>Explanation [1 mark]</b>
increased coastal erosion / scraping away sand to reveal mud;	increased wave action (crashing onto coastlines / beach) / (altered) beach dynamics / due to physical abrasion;
mangroves reduction / destruction;	intrusion of salty water / altering (increase in salinity) of brackish water/ increased wave action;
coral reefs unable to obtain sufficient light;	as sea levels rise / due to increase in turbidity of water;
harder for wading birds to obtain food;	due to wetland flooding ;
changing soil pH;	saltwater intrusion onto land;

*Accept other reasonable responses.*

- (ii) *human health:* **[2 max]**  
*Award 1 mark for effect and 1 mark for corresponding explanation. Do not credit two different effects.*

<b>Effect [1 mark]</b>	<b>Explanation [1 mark]</b>
more mosquitoes that may cause diseases (like malaria);	increases in stagnant water due to flooding (increase in mosquito habitat);
succumbing easier to disease (especially for children and elderly) / suffering;	as people are forced to migrate;
spreading of new (for a specific locality) diseases;	changes in distribution of organisms such as invasive species/ pathogens/ vectors/ prey species (due to water flooding);
malnutrition / hunger (which evidently increases the risk for disease / reduces resistance of immune system);	saltwater intrusion onto coastal agricultural land means reduction in food/ production capacity/ physical destruction of crops;

*Accept other reasonable responses*

**[4 max]**

7. (a)

<b>Pyramid</b>	<b>Stage of demographic transition</b>
A	2;
B	3;
C	1;
D	4;

**[2 max]**

*Award [0] for **one** correct stage.  
 Award [1] for **two** or **three** correct stages.  
 Award [2] for **four** correct stages.*

- (b) carrying capacity; **[1]**
- (c) technology – to increase productivity of the land *e.g.* through application of fertilizers;  
 increasing amount of land under production for food *e.g.* draining wetlands;  
 switching to renewable sources of energy *e.g.* solar power;  
 importing resources from outside the area;  
 conservation / reduced consumption / recycling or reusing material; **[3 max]**  
*Accept other reasonable responses explaining how carrying capacity may be increased.*