

# **MARKSCHEME**

**May 2007**

**ECOSYSTEMS AND SOCIETIES**

**Standard Level**

**Paper 2**

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## General Marking Instructions

### Subject Details: Ecosystems and Societies SLP2 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.

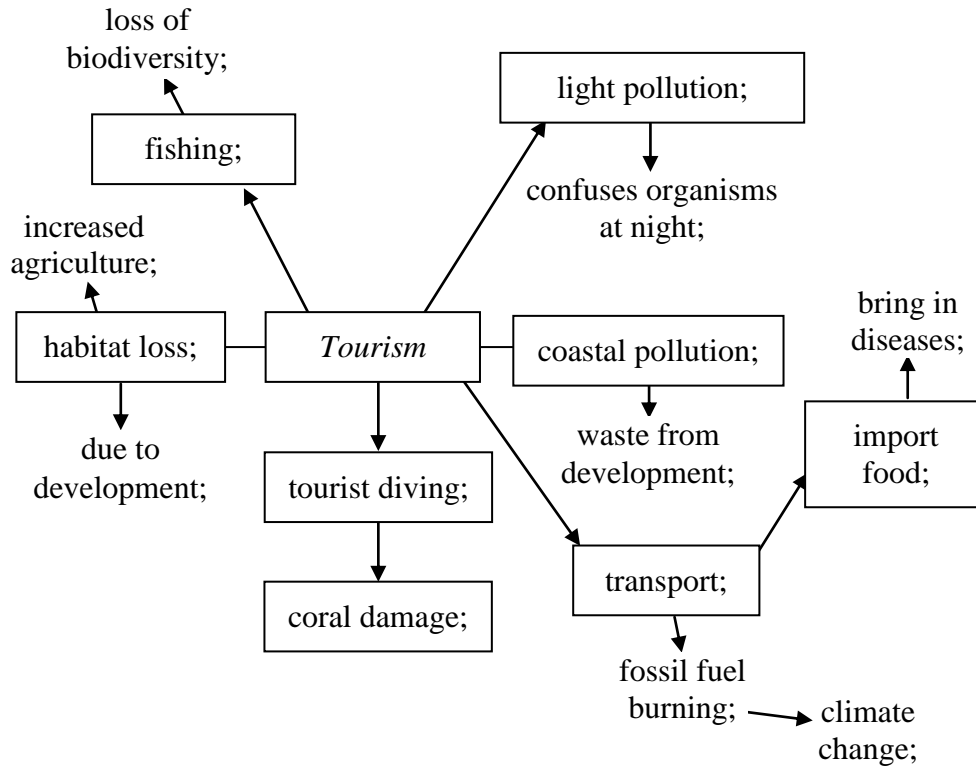
When deciding upon alternative answers by candidates to those given in the markscheme, consider the following points:

- 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 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.

## SECTION A

1. (a) the landmass has a low elevation / no land higher than 4 metres;  
the islands are relatively small (less than 1 km across);  
the islands are in a tectonically active ocean;  
not sheltered by large land masses; [2 max]
  
- (b) groundwater – replenishable;  
rainwater – renewable;  
freshwater from desalination – renewable; [3]  
*Accept replenishable as a classification of rainwater.*
  
- (c) Maldivian ground water has been contaminated with ammonia, phosphates,  
nitrates and chloride;  
nitrates – below WHO guidelines;  
ammonia – two island exceeds WHO guidelines ( $\times 4$ );  
phosphate – all islands exceed WHO guidelines ( $\times 3$  to  $\times 9$ );  
chloride – all islands exceed WHO guidelines ( $\times 2$  to  $\times 5$ );  
sources of contamination – domestic waste / agricultural waste / landfill waste /  
degrading organics / tsunami debris / sea water / sewage; [4 max]  
*Award [3 max] for description and [2 max] for two or more sources of contamination.*
  
- (d) (i) tourists consume relatively large amounts of freshwater / Maldives has a  
finite amount of groundwater and annual rainwater budget;  
when tourist needs outstrip supply, tourism will have reached and gone beyond  
these limits; [2]
  
- (ii) by 2050 the numbers of countries with a chronic scarcity (below 2740 litres  
capita<sup>-1</sup> day<sup>-1</sup>) of water will have increased;  
between 2000 and 2050 the percentage of people in the world suffering from  
chronic water scarcity will rise (from 3.7% to 17.8%); [2]  
*Figures are not required.*
  
- (e) *strategy*: tourist numbers could be limited;  
*evaluation*: which reduces resource use and tourist pressures;  
however, also reduces tourist revenue;  
  
*strategy*: development taxed to pay for habitat protection and conservation;  
*evaluation*: may make tourism more expensive/less profitable, but may guarantee  
sustainable environment and tourism for the future;  
  
*strategy*: tourist environmental education;  
*evaluation*: environmentally aware tourist less likely to cause damage, e.g.  
standing on coral / using waste excessively; [6 max]  
  
*Award [4 max] if only two strategies addressed, [2 max] if only one strategy  
addressed. Accept any other reasonable suggestions.*

(f)



[4 max]

Award [1] for each impact, up to [4 max]. Accept any other reasonable points and model design.

(g)

tourism generates valuable hard currency/revenue for many LEDCs;  
 generates job opportunities;  
 introduces people to new cultures, societies, ideas and environments;  
 highlights conservation issues and environmental problems;

[2 max]

## SECTION B

### General Essay Markscheme

Each essay is marked out of [20] of which [2] are for clarity of expression, structure and development of ideas.

- [0] Quality of expression, structure and development is poor.
- [1] Quality of expression, structure and development is limited.
- [2] Quality of expression is clear, structure is good and ideas are well developed.

2. (a) Earth is a closed system;  
inputs – solar radiation/Sun’s energy/light and output – heat energy;  
materials recycled within the system / matter recycled (may discuss space ships and meteorites moving a small amount of matter in and out); [3]
- (b) climate change is a significant shift in climatic conditions;  
may be warming or cooling;  
positive feedback allows for movement away from equilibrium and decreases stability;  
negative feedback dampens down deviation from equilibrium and increases stability;  
*example model:*  
ice caps melting leads to reducing albedo / more dark sea to absorb heat / temperature increase leading to more ice cap melting thus positive feedback;  
ice caps melting leads to more evaporation more clouds / albedo effect of clouds stop energy reaching Earth’s surface / decrease warming thus negative feedback;  
in short-term, positive feedback model appears to operate *e.g.* temperature change over industrial period / in the long-term, negative feedback appears to operate *e.g.* glacial cycles; [7]
- (c) *advantages: [2 max]*  
allows us to predict;  
simplifies complex systems;  
can change inputs and see what happens;  
can show them to others;  
*Accept any other reasonable suggestions.*  
*disadvantages: [2 max]*  
not accurate;  
rely on the expertise of the people making them;  
on validity of input data;  
different people interpret them differently;  
can be hijacked politically; [4 max]  
*Accept any other reasonable suggestions.*

- (d) *Responses to this question will depend on the candidate's own personal viewpoint but examples could be:-*

*example 1:*

*stating viewpoint: [1 max]*

global warming is the biggest threat to life on Earth ever and we are heading for catastrophe;

*evidence: [3 max]*

evidence for heating of the Earth is overwhelming;

evidence from increasing greenhouse gases caused by human activities;

ice caps retreating;

glaciers retreating;

sea levels rising;

more floods;

hurricanes increase in severity;

*example 2:*

*stating viewpoint: [1 max]*

global warming may be occurring but has throughout the life of the Earth and will bring benefits to many people;

*evidence: [3 max]*

shift of biomass towards the poles will mean crops can grow where they could not before;

more rainfall in some areas is a good thing;

if the Arctic ice melts, we can mine for minerals and oil under the Arctic sea;

large areas of Siberia and Canada will be warmer and easier to live in;

**[4 max]**

*Award up to [3 max] for any three pieces of evidence. Accept any other reasonable suggestions.*

*Expression of ideas: [2 max]*

**Total: [20]**

3. (a) *named example:*  
*e.g. acid rain;*

*description: (e.g. acid rain): [3 max]*

alter human activity – education of impact of burning coal / switch to non-fossil fuels / burn sulfur-free coal;

regulate and reduce pollution at source – add scrubbers to chimneys / capture CO<sub>2</sub> at source / penalties for having sulfur-rich coal;

clean up and restore ecosystem – lime lakes / remove contaminated soil / lime surrounding landscapes / replant trees in affected ecosystems;

*evaluation: (e.g. acid rain): [3 max]*

no local effects so difficult to stop people using sulfur-rich fossil fuels / effects often felt in countries distant to source of pollution;

legislation requires regulators to check compliance;

liming treats symptoms, not cause, so needs repeating;

[7]

*Award any other reasonable suggestions.*

- (b) troposphere ozone – increase is a problem;  
stratosphere ozone – depletion is the problem;

*troposphere ozone:*

formed as secondary pollutant when photochemical reaction occurs between NO<sub>x</sub> and other pollutants;

trees may die / damage to crops / causes irritation to skin and eyes in organisms / other respiratory problems;

*stratosphere ozone:*

depletion of the ozone layer by CFCs and other halogenated gases / ozone depletion allows more UV light to reach the Earth;

mutation in cells *e.g.* algae / eye cataracts in sheep/humans / skin cancers in humans / tissue damage in photosynthetic organisms;

[6]

*Accept other reasonable responses.*



- (c) *Depends on the arguments used but responses require a statement of belief on sustainable development.*

*example 1:*

*statement: [1 max]*

I do not believe sustainable development is possible in the long-term as we have finite resources and will not have enough for everyone to use as much as they want / non-renewable resources will run out;

*justification: [4 max]*

humans are not prepared to reduce their standards of living;  
80% live in LEDCs and are using more and more resources;  
cannot find new technologies fast enough to replace fossil fuels;  
not enough renewable resources;  
humans are incapable of stopping population growth;

*example 2:*

*statement: [1 max]*

I believe sustainable development is possible as we have the technology to use renewable resources for all our needs;

*justification: [4 max]*

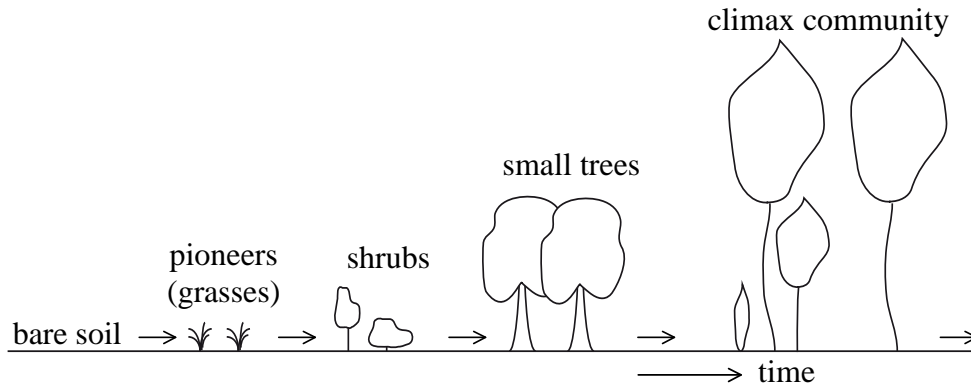
micro generation using wind turbines and solar power *etc.* will provide energy for domestic homes and factories;  
transport could use hydrogen powered engine using water as a fuel;  
humankind will use less energy, insulate buildings more;  
legislation will make us reuse and recycle more;  
technological developments in crop growing will mean more production; [5 max]

*Award [1] for a definition of sustainable development.*

*Expression of ideas: [2 max]*

*Total: [20]*

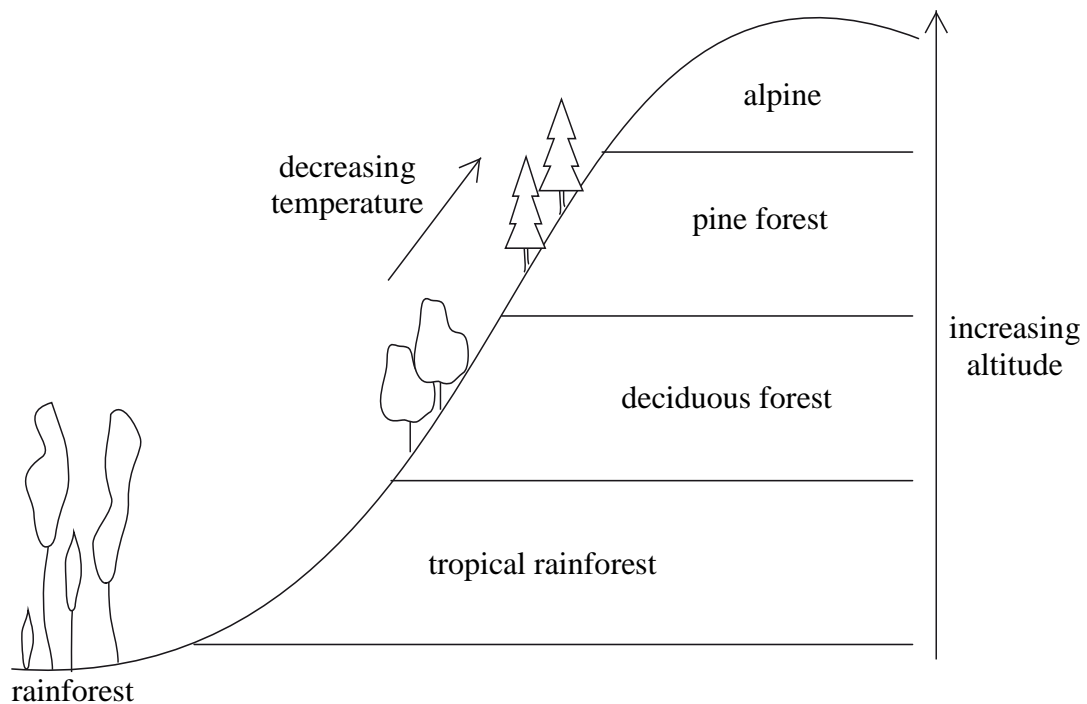
4. (a) *succession*: orderly change over time in an ecosystem;  
succession *e.g.* temperate forest development;



*zonation*: the arrangement/patterning of plant communities/ecosystems, into parallel/sub - parallel bands in response to change, over a distance, in some environmental factor;

zonation *e.g.* changes in ecosystems up a mountain with increasing altitude;

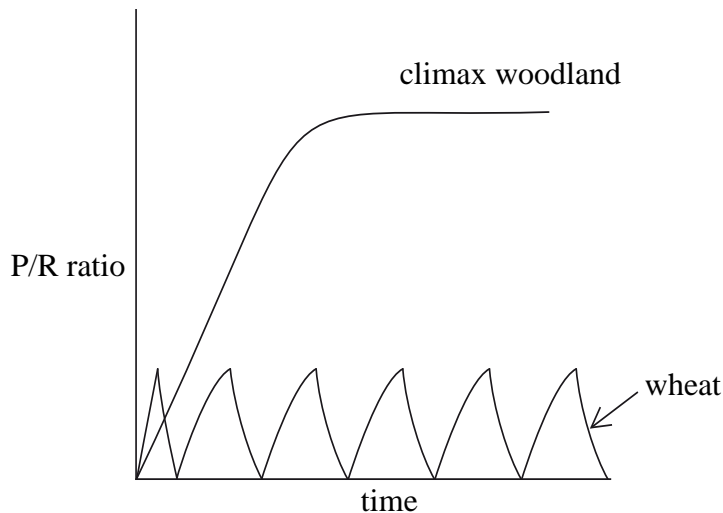
*Accept other reasonable responses.*



[6 max]

*Award [1] for definition, [1] for example and [1] for a diagram of each process.*

- (b) food production system *e.g.* intensive wheat production;  
natural ecosystem *e.g.* deciduous woodland;



*Diagram is not required  
though concepts may be  
expressed in words.*

both wheat fields and woodlands have low initial productivity;  
increases rapidly as biomass accumulates;  
wheat harvested before production:respiration = 1;  
herbivores controlled or isolated from the food production system;  
natural woodland consumer community increases so naturally high productivity is  
balanced by consumption and respiration;  
woodland reaches climax when production:respiration = 1 / all productivity is balance by  
respiration;

**[6 max]**

*Award [2 max] for examples and [4 max] for comparisons.*

- (c) *characteristics:* **[3 max]**  
greater habitat diversity;  
complex ecosystem;  
various niches;  
different nutrient and energy pathways;  
large size;  
little human activity;  
minimal pollution;  
plentiful abiotic factors *e.g.* water, light, heat;  
different trophic levels;

*threats:* **[3 max]**

pollution – kills some species, makes conditions impossible for others / Trent Biotic  
Index organisms / degradation of ecosystems;  
selective logging;  
hunting of top carnivores;  
human activities – burning / building;  
grazing animals;  
climate change;

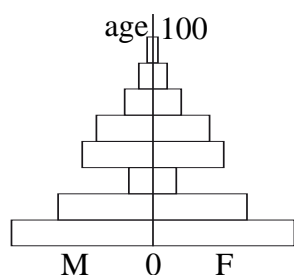
**[6 max]**

*Award credit if named examples are used.*

*Expression of ideas:* **[2 max]**

**Total: [20]**

5. (a) population pyramids give age/sex structure for country;  
 age/sex pyramids identify percentage of providers and dependents within a country;  
 allows for monitoring change in dependent to provider ratio;  
 measures the size/structure of a population over-time;  
 number in fertile age bracket;  
 expanding/contracting population;  
 gender ratios;  
 birth rate and death rate;  
 impact of events, *e.g.* wars, disease, *etc.*



Award [1] for a diagram.

[5 max]

- (b) global population continues to rise / *per capita* resources consumption increasing /  
 resource exploitation is reaching its limits;  
 technology can increase carrying capacity *e.g.* GM crops/fertilizers/alternative energy  
 sources;  
 must use resources more effectively;  
 as resources are depleted they become more economically expensive;  
 economic growth means demand for resources is increasing so cost increases (crude oil);  
 may not be sustainable in the long-term;  
 Accept any other reasonable suggestions.

[6]

	<i>Advantages</i>	<i>Disadvantages</i>
(c) <i>reducing use</i>	resources are conserved / last longer;	hard to do / slows economic growth / reduces standard of living in present consumer culture;
<i>reusing</i>	reduces resources use; saves energy in extraction, processing or recycling;	health and safety issues / loss of technological edge;
<i>recycling</i>	reduces resource use <i>e.g.</i> aluminium recycling versus energy efficient; reduces landfill / increased environmental awareness; <i>e.g.</i> aluminium cans/bottles;	not economic as lot of energy required to recycle <i>e.g.</i> plastics/paper / lower quality materials;

[7 max]

Award [1] for each advantage and disadvantage. Award credit for relevant examples.

Expression of ideas: [2 max]

Total: [20]