



**ECOSYSTEMS AND SOCIETIES
STANDARD LEVEL
PAPER 1**

Monday 14 May 2007 (afternoon)

1 hour

Candidate session number

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INSTRUCTIONS TO CANDIDATES

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all of the questions in the spaces provided. You may continue your answers on answer sheets. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.
- At the end of the examination, indicate the number of answer sheets used in the appropriate box on your cover sheet.



1. (a) Outline the term *ecosystem*. [1]

- (b) State an example of a flow within a **named** ecosystem. [1]

- (c) State **one** example of biological storage within a forest ecosystem. [1]

- (d) Calculate the net primary productivity per kg of biomass for the boreal forest ecosystem in **Figure 1** below. [1]

Figure 1 Comparison of ecosystem productivity

Ecosystem	Mean net primary productivity / $\text{kg m}^{-2} \text{yr}^{-1}$	Mean biomass / kg m^{-2}	Net primary productivity per kg biomass per year
Temperate forest	1.20	32.5	0.037
Boreal forest	0.80	20.0
Tropical rainforest	2.20	45.0	0.049
Savanna grassland	0.90	4.0	0.225
Tundra	0.14	0.6	0.233

[Source: adapted from *Geography Review*, 1991, 5, No 1, page 17]

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(Question 1 continued)

- (e) Compare and explain the data for **two** of the ecosystems in **Figure 1**. [4]

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- (f) Briefly outline a method for measuring biomass of a primary producer. [3]

Name of primary producer:

Method:

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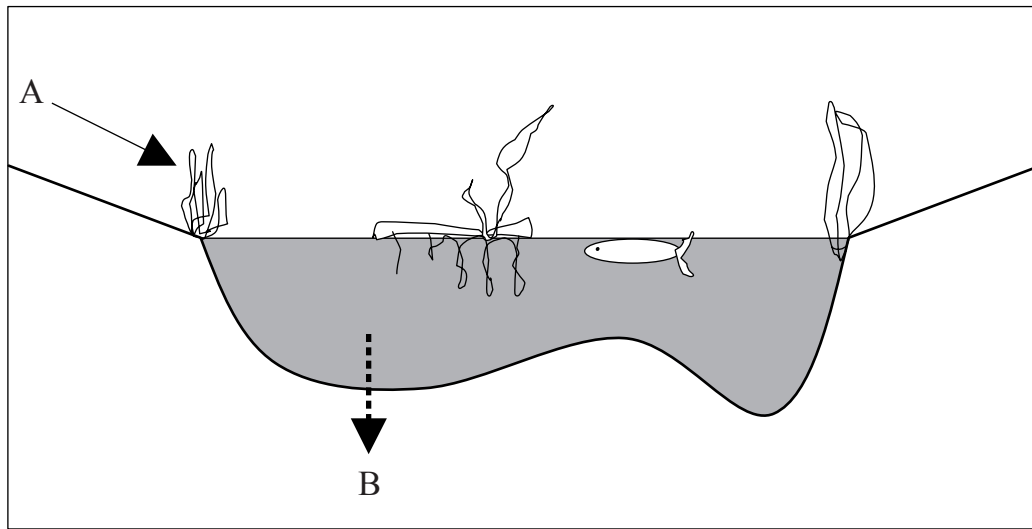
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2. **Figure 2** Diagrammatic representation of a eutrophic lake



- (a) Define the term *eutrophication*. [2]

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- (b) Identify process A and process B. [2]

Process A:

Process B:

- (c) Suggest **one** agricultural source and **one** non-agricultural source that may account for high phosphate levels. [2]

Agricultural source:

Non-agricultural source:

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(Question 2 continued)

- (d) Suggest how an environmental manager may reduce the impact of eutrophication. [3]

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3. **Figure 3** Renewable energy alternatives, how the energy is produced and their limitations

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.
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	Produces emissions and requires large areas to grow biofuel crop.

(a) State **one** other form of alternative renewable energy source not listed above. [1]

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(b) Complete **Figure 3** above for tidal power and biofuel. [2]

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(Question 3 continued)

- (c) Most MEDCs are still dependent on non-renewable forms of energy. Suggest reasons why MEDCs have not adopted renewable energy sources. [3]

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- (d) With reference to a **named** food production system you have studied, describe **two** ways in which food supply per unit area can be increased. [2]

Named food production system:

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- (e) State the difference between *carrying capacity* and *ecological footprint*. [3]

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4. (a) Discuss the strengths and weaknesses of a species based approach to conservation. [3]

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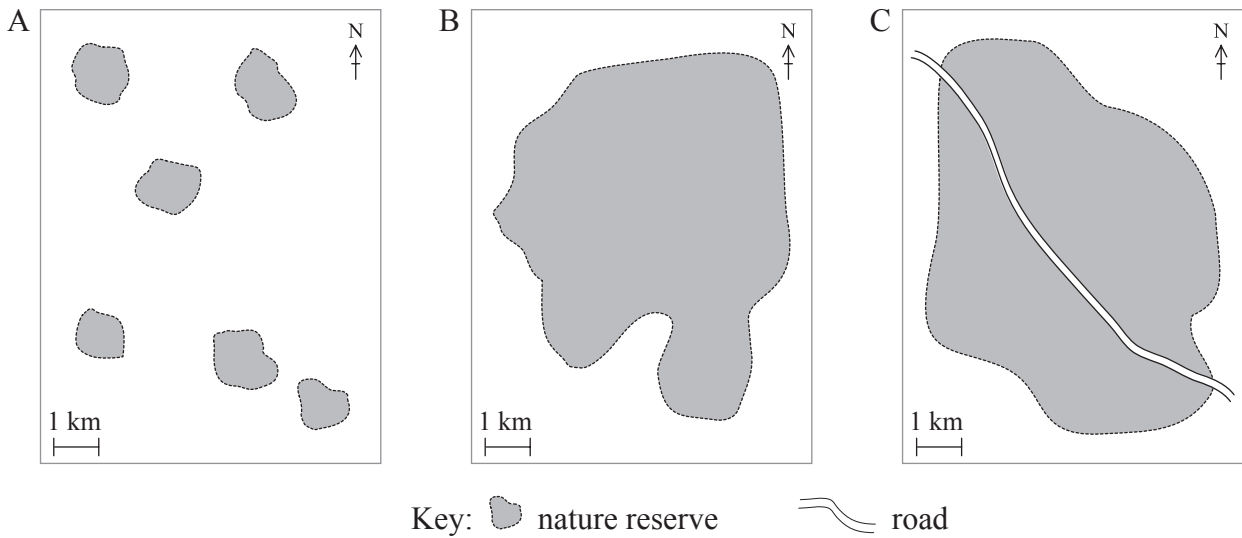
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Figure 4 below shows three different shapes of nature reserves.

Figure 4



- (b) Discuss the strengths **or** weaknesses of the shapes of the nature reserves in **Figure 4**. [3]

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(Question 4 continued)

Figure 5 below shows a table of invertebrates caught within a small woodland nature reserve using a series of pitfall traps.

Figure 5 Pitfall trap data for invertebrates

Invertebrates	Number
Springtails	520
Ground beetles	400
Greenflies	43
Spiders	33
Centipedes	34
Flies	24
Harvestmen	27
Woodlice	12
Ants	13
Wasps	17

Simpson's Diversity Index = 2.895

- (c) (i) Draw and label a pitfall trap.

[2]

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(Question 4 continued)

- (ii) The pitfall trap technique was used over a four-year period to monitor invertebrate species diversity. Each year the value fell by approximately 12 %. Suggest how this information may be used to manage the woodland nature reserve in the future. [2]

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- (iii) Outline a method for estimating the population size of ground beetles in the woodland nature reserve. [2]

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- (d) Outline the relationship between plate tectonic theory and species evolution. [2]

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