



22056301

**ECOSYSTEMS AND SOCIETIES
STANDARD LEVEL
PAPER 1**

Wednesday 11 May 2005 (afternoon)

1 hour 15 minutes

Candidate session number

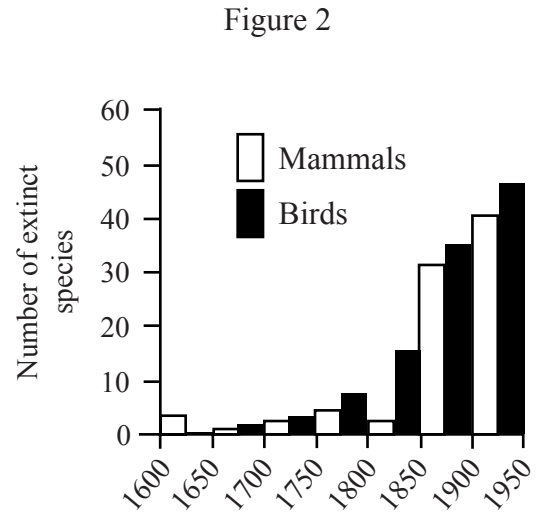
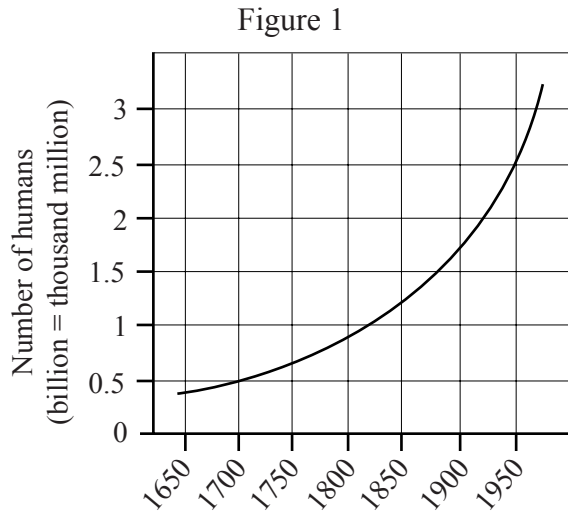
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INSTRUCTIONS TO CANDIDATES

- 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 school code and candidate code 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. Figure 1 shows the Earth's human population increase over time and Figure 2 shows the number of species which became extinct in each 50 year period since 1600.



[Source: Goudie, A (1993) *The Human Impact on the Natural Environment*, Blackwell, p.125]

- (a) (i) Estimate the date at which the human population reached 2 billion. [1]
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- (ii) Describe the pattern of growth in Figure 1. [1]
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- (iii) State how the natural increase rate for human populations is calculated. [2]
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(Question 1 continued)

[1]

- (b) (i) Determine how many species of mammals and birds became extinct from 1900 to 1950.

Mammals

Birds

- (ii) Compare the rates of extinction between birds and mammals since 1650.

[2]

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- (iii) Outline the criteria used to classify a species as extinct, according to the Red Data books.

[2]

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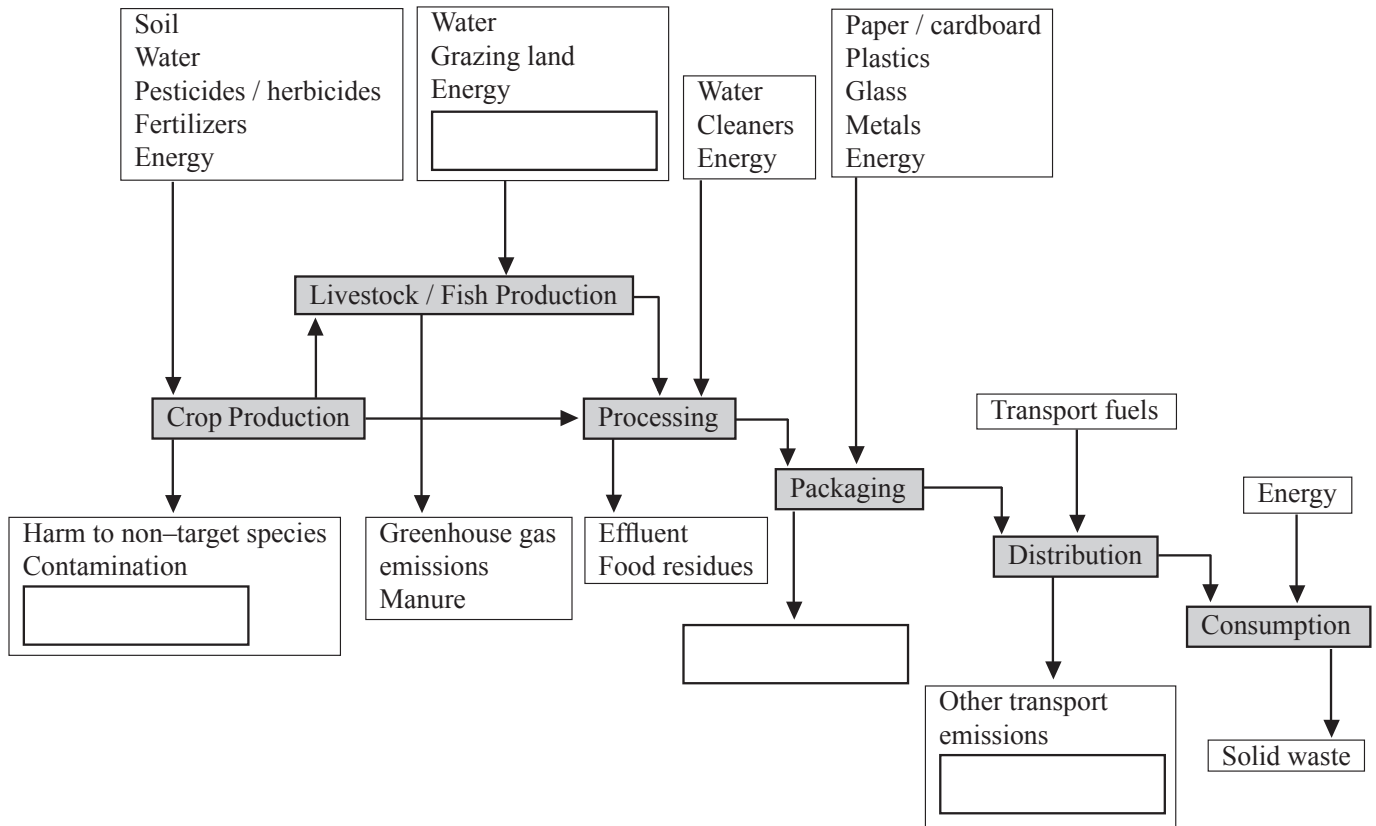
- (c) State a probable relationship between the data in Figures 1 and 2, and suggest reasons for your answer.

[4]

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2. Figure 3 is a systems diagram showing the inputs and outputs in a farming system.

Figure 3



[Source: adapted from UNEP (2000) *Sustainable Agri-Food Production and Consumption Forum*,
<http://www.agrifood-forum.net/issues/index.asp>]

- (a) (i) Complete figure 3 by naming the missing inputs and outputs. Select your answers from the following list: [2]

solid waste
 eroded soil
 greenhouse gases
 antibiotics

- (ii) Outline **two** management strategies for dealing with solid waste. [2]

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(Question 2 continued)

- (b) (i) Name the process which is accelerated by fertilizers washing into lakes and rivers. [1]

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- (ii) Outline **two** impacts of the process you named in (b) (i) on aquatic ecosystems. [2]

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- (c) (i) State whether the model shown in figure 3 illustrates an open system, a closed system or an isolated system. [1]

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- (ii) Justify your answer to (c) (i). [2]

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- (iii) A model is a simplified description designed to show the structure or workings of an object, system or concept. Discuss the strengths and limitations of the model shown in figure 3. [4]

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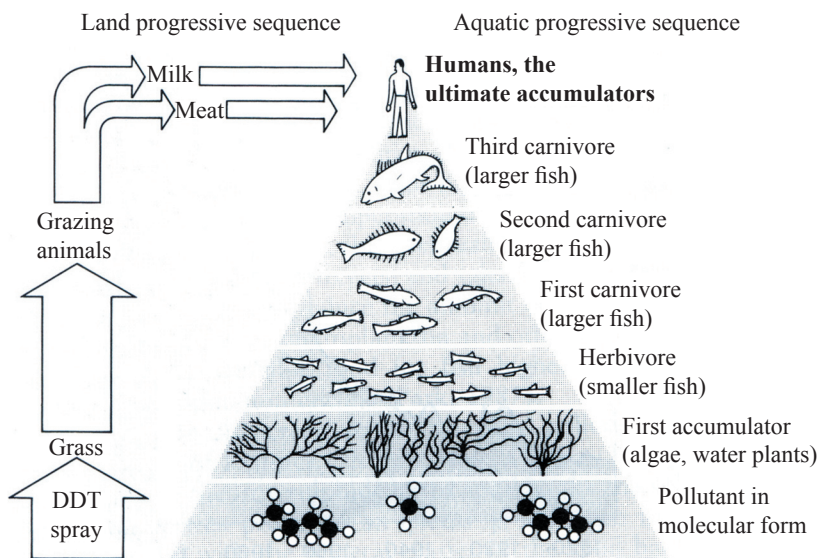
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3. Figure 4 shows a simple aquatic food chain which has been exposed to a pesticide called DDT.

Figure 4



[Source: Adapted from Goudie, A (1993) *The Human Impact on the Natural Environment*, Blackwell, p.219]

- (a) (i) State how many trophic levels are shown in figure 4. [1]

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- (ii) Identify which trophic level represents: [1]

the producers

the top carnivores

- (iii) State and explain what may be happening to the concentration of pesticide in the food chain. [2]

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(Question 3 continued)

- (b) An estimated 1000 kg of plant plankton are needed to produce 100 kg of animal plankton. The animal plankton is in turn consumed by 10 kg of fish, the amount needed by a person to gain 1 kg of body mass.

- (i) Explain why the amount of biomass declines at each successive trophic level. [2]

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- (ii) Distinguish between a pyramid of biomass and a pyramid of productivity. [2]

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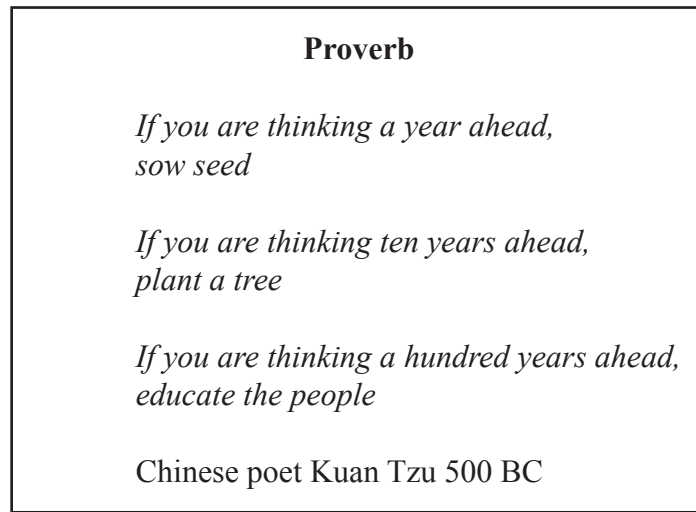
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4. Figure 5 contains an ancient Chinese proverb.

Figure 5



- (a) The poet Kuan Tzu could be seen as an ecocentrist or a technocentrist. Justify whether you think his views are ecocentric or technocentric. [4]

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- (b) Outline **two** factors which may affect someone's environmental philosophy. [2]

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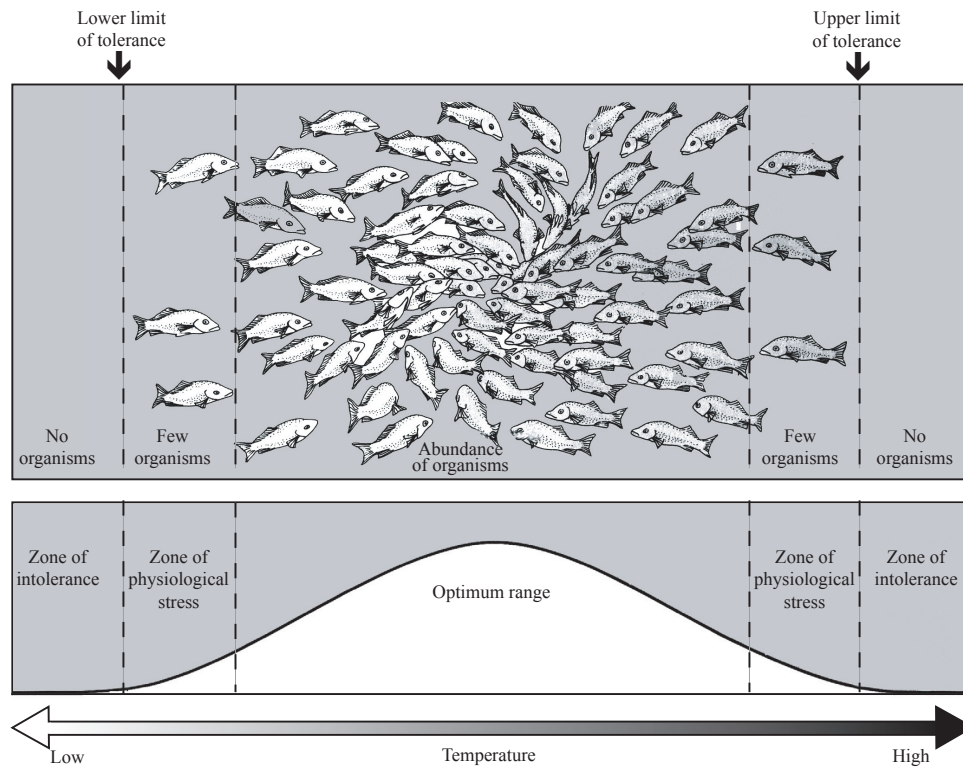
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5. Figure 6 shows the range of tolerance to temperature for a fish population.

Figure 6



[Source: Tyler Miller, G (1990) *Living in the Environment*, Wadsworth, p. 85]

- (a) (i) Outline what the graph in figure 6 shows about fish density and temperature. [2]

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- (ii) Explain what is meant by a limiting factor in the context of the fish population in this lake. [1]

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- (iii) State, giving a reason, whether temperature is a density-dependent or density-independent factor in the regulation of fish populations. [1]

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(Question 5 continued)

- (b) Temperature is an abiotic feature of an ecosystem. List **four** other abiotic factors of an ecosystem. [2]

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- (c) With reference to **one** abiotic factor you have named in (b), outline and evaluate a method for measuring this factor. [3]

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