INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

M99/460/S(3)

ENVIRONMENTAL SYSTEMS

Standard Level

Wednesday 12 May 1999 (morning)

Paper 3 — 1 hour 15 minutes

A

Candidate name:	Candidate category & number:

This examination paper consists of 2 sections, Section I and Section II.
Section I refers to Options A, B and C.
Section II refers to Options D, E and F.
The maximum mark for each question is 15.
The maximum mark for this paper is 45.

INSTRUCTIONS TO CANDIDATES

Write your candidate name and number in the boxes above.

Do NOT open this examination paper until instructed to do so.

Section I: Answer ONE option from Section I in the spaces provided.

Section II: Answer TWO options from Section II in the spaces provided.

At the end of the examination, complete box B with the letters of the options answered.

B

QUESTIONS ANSWERED
I/
II/
II/

C

EXAMINER	MODERATOR
/15	/15
/15	/15
/15	/15
TOTAL /45	TOTAL /45

D

IBCA
/15
/15
/15
TOTAL /45

EXAMINATION MATERIALS

Required:
Calculator

Allowed:
A simple translating dictionary for candidates not working in their own language

SECTION I

Options on analysing ecosystems – Options A, B and C

*The compulsory question below relates to the detailed study of an ecosystem in a marine, terrestrial or freshwater environment. Select the option on which you will base your answers by marking (X) **ONE** box only.*

		Mark (X) ONE box
A	Analysing Marine Ecosystems	
B	Analysing Terrestial Ecosystems	
C	Analysing Freshwater Ecosystems	

1. (a) List **three** physical factors that vary in a named ecosystem from the option you selected above. *[1]*

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(b) Select **one** of the factors listed in (a), and for the factor you select, suggest how it might vary over time and how you might measure this variation. *[4]*

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(This question continues on the following page)

(Question 1 continued)

(c) Identify a human activity that might change the named physical factor in the ecosystem. Suggest a way in which it might change and explain the effect that this change has on the ecosystem. *[4]*

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(d) Select **one** other ecosystem from your chosen option. Compare and contrast the physical and ecological characteristics of this ecosystem with those of the ecosystem selected in (a). *[6]*

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SECTION II

This section contains a question on each of Options D, E and F.
Answer TWO of these questions, related to your chosen options.

Option D – Impacts of resource exploitation

2. (a) Define the term *monoculture*. *[1]*

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(b) Give **two** reasons why monocultures might be dangerous for the environment. *[2]*

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(c) In subsistence farming, the average yield of traditional varieties of wheat is 500 kg ha^{-1}. The table below shows how the yield of improved wheat varieties changes with different farming systems.

	Wheat Yields (kg ha^{-1})
Highest achieved	9500
Developed country average	2300
Global average	1900
Developing country average	1500

Using this information:

(i) Explain why traditional varieties are still grown although their yields are comparatively low.

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(ii) Explain why the yields in developed and developing countries are different, assuming that farmers use the same varieties. *[2]*

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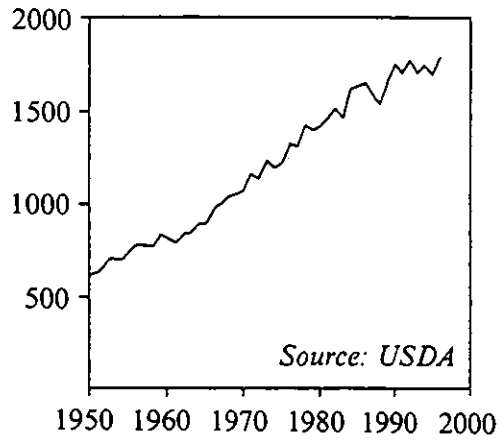
(This question continues on the following page)

(Question 2 continued)

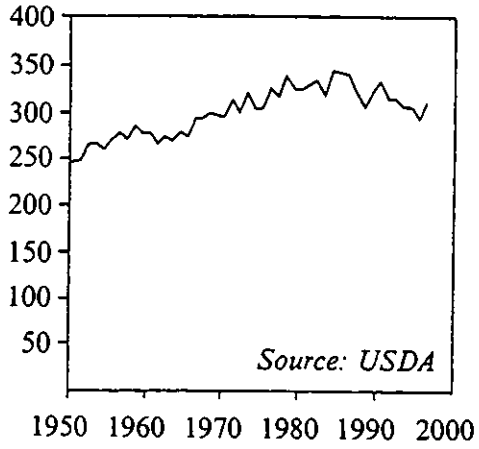
(d) The graphs below show world grain production and world grain production *per capita.*

Graph A



World grain production

Graph B



World grain production *per capita*

[Source: L.R. Brown *et al*, *State of the World 1997*, p. 25, W.W. Norton & Co., 1997]

(i) Describe the trends shown in graphs A and B and discuss the implications for the human population. *[3]*

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(ii) Describe **two** factors limiting increase in world grain production. *[2]*

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(This question continues on the following page)

(Question 2 continued)

(e) The grain equivalent consumption of an average American diet is 800 kilograms per year and for an average Indian diet is 200 kilograms per year.

(i) Explain this statement. *[2]*

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(ii) If the world's grain harvest reaches 2000 million tonnes per year, how many people consuming an American type diet would this support? *[1]*

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Option E – Conservation and biodiversity

3. (a) Define the term *biodiversity*. *[1]*

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The table below gives the number of breeding bird species found in different parts of North and Central America.

Area	**Approximate Latitude**	**Number of breeding bird species**
Alaska	65°	222
British Columbia	55°	267
California	40°	286
Guatemala	15°	472
Costa Rica	10°	603

(b) (i) What appears to be the relationship between biodiversity and latitude? *[1]*

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(ii) Give **two** reasons why this relationship might exist. *[2]*

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(iii) Name **one** other factor which may be relevant in an analysis of the relationship between biodiversity and latitude, as shown by these data. *[1]*

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(Question 3 continued)

(c) Give **two** reasons why the conservation of biodiversity is important. *[2]*

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(d) (i) Biodiversity may be conserved by a species-based or a community-based approach. Protected areas are one means of preserving communities, list **two** others. *[1]*

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(ii) Protected areas now cover 5.9 % of the Earth's land surface and will probably never cover more than 10 %. Give **two** reasons for this and review the success of a named protected area. *[3]*

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(Question 3 continued)

(e) For a named species, review the strengths and weaknesses of the species-based approach to conservation. *[4]*

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Option F – Pollution

4. (a) Using a named example in each case, explain the difference between point and non-point source pollution. *[2]*

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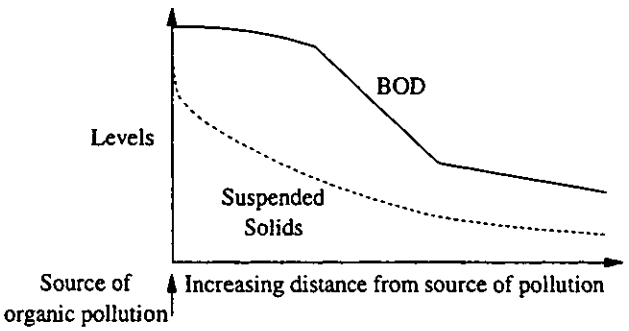
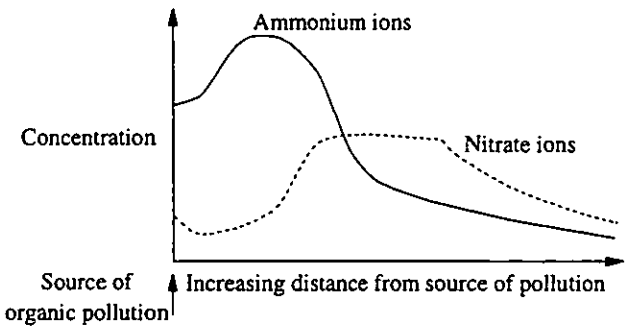
(b) The effects of organic pollution downstream from a source are shown in the graphs below.

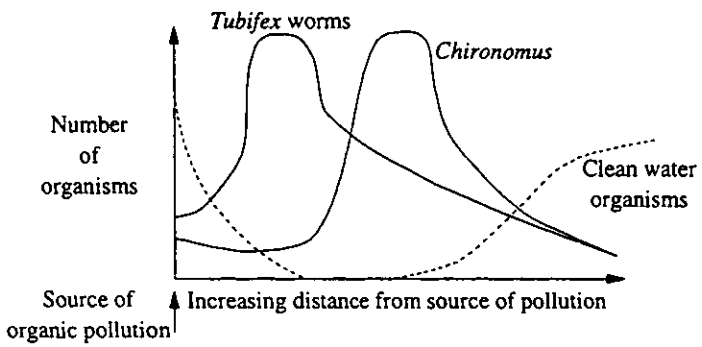
Graph A



Graph B



Graph C



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(Question 4 continued)

(i) Name **two** sources of pollution that might cause the changes shown in the graphs. *[1]*

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(ii) What is BOD and why is it important to measure it in the assessment of pollution? *[2]*

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(iii) On Graph A, draw in the change in oxygen levels that you would expect. *[1]*

(iv) Account for the change in ammonium and nitrate ion concentrations in Graph B. *[1]*

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(v) How could the *Tubifex* worm and *Chironomus* population numbers in Graph C be used to measure pollution? *[2]*

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(This question continues on the following page)

(Question 4 continued)

(c) A proposal has been received for a new intensive dairy farm, growing 100 hectares of wheat. The plan also includes a campsite for 50 tourists. The land is not developed at present. Describe the process by which the impact of the development might be assessed and discuss the pollutants which the farm might produce. *[6]*

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