



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Advanced Subsidiary Level

CANDIDATE  
NAME

CENTRE  
NUMBER

--	--	--	--

CANDIDATE  
NUMBER

--	--	--	--



**ENVIRONMENTAL MANAGEMENT**

**8291/21**

Paper 2 Hydrosphere and Biosphere

**May/June 2013**

**1 hour 30 minutes**

Additional Materials: Answer Booklet/Paper

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.  
Write in dark blue or black pen.  
You may use a soft pencil for any diagrams, graphs, tables or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.  
**DO NOT WRITE IN ANY BARCODES.**  
Electronic calculators may be used.

**Section A**

Answer **all** questions.  
Write your answers in the spaces provided on the question paper.

**Section B**

Answer **one** question from this section.  
Answer the question on the separate answer paper provided.

At the end of the examination,

1. fasten all separate answer paper securely to the question paper;
2. enter the question number from Section B in the grid opposite.

For Examiner's Use	
<b>Section A</b>	
1	
2	
<b>Section B</b>	
<b>Total</b>	

This document consists of **12** printed pages.

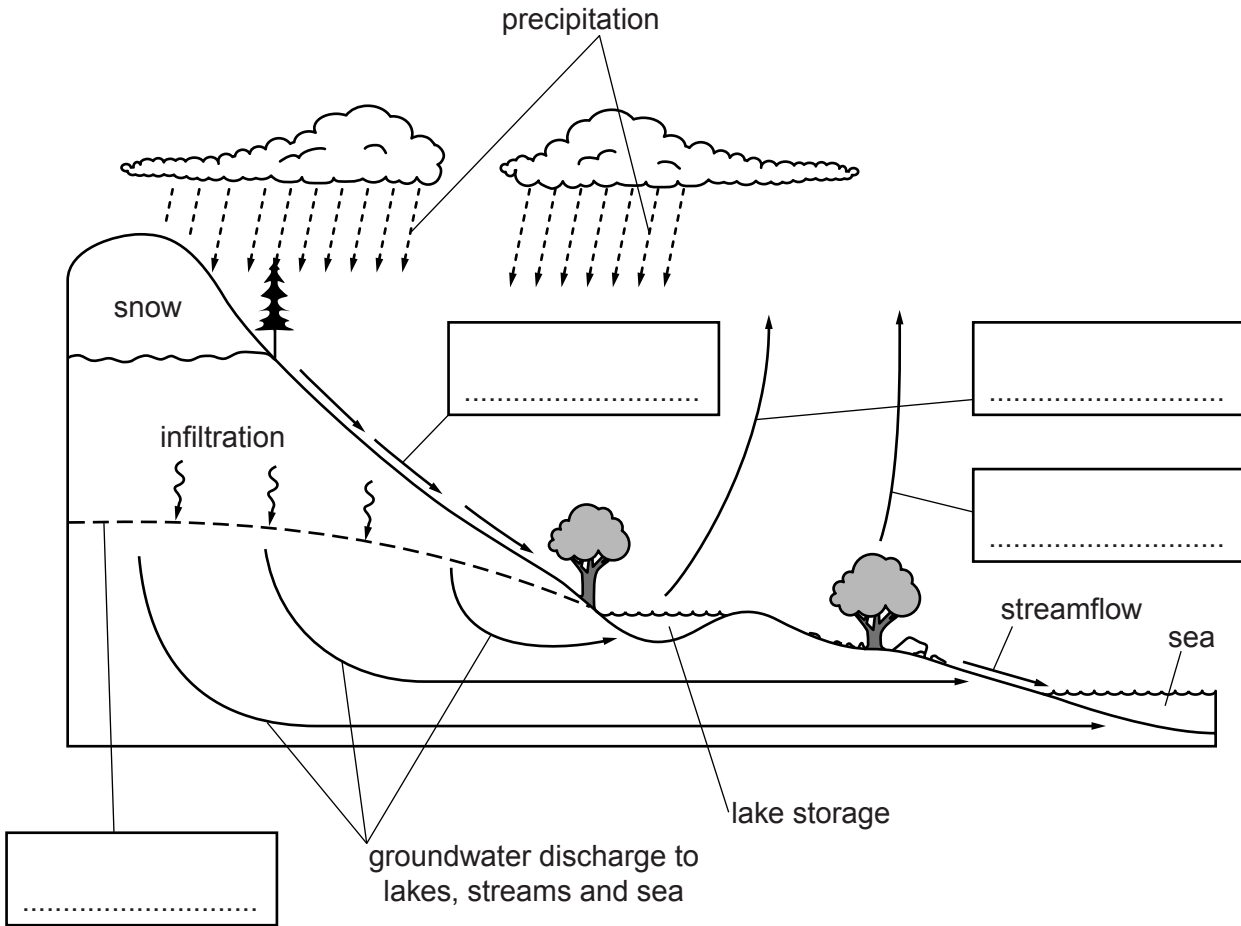


**Section A**

Answer **all** questions in this section.

For  
Examiner's  
Use

- 1 (a) Fig. 1.1 shows the components of the water cycle within a river valley.



**Fig. 1.1**

- (i) Insert the following labels into their appropriate boxes in Fig. 1.1:

**evaporation      transpiration      surface runoff      water table** [4]

- (ii) Explain why although the contents of Fig. 1.1 can be described as a water cycle it is also an open system.

.....  
 .....  
 .....  
 ..... [2]





2 (a) What is meant by the terms *biodiversity* and *biomass*?

For  
Examiner's  
Use

biodiversity .....

.....

.....

.....

biomass .....

.....

.....

..... [4]

(b) Fig. 2.1 shows both nutrient flow and energy transfer in an ecosystem.

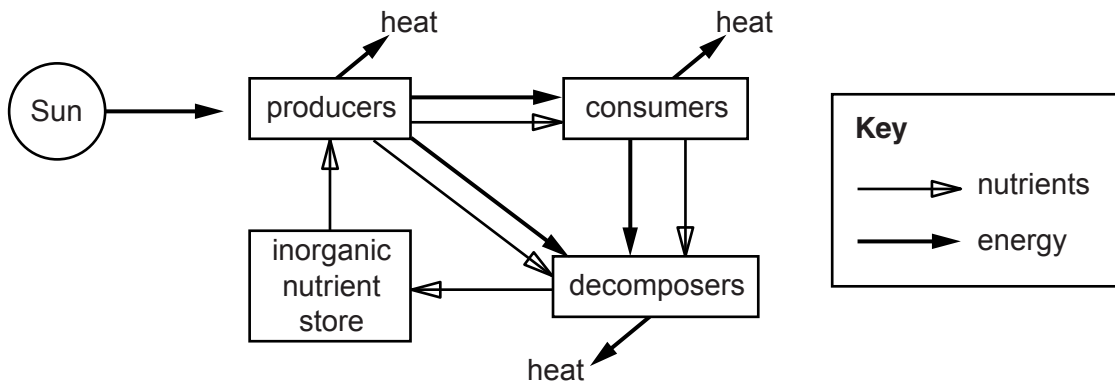


Fig. 2.1

(i) With reference to Fig. 2.1, describe the flow of nutrients in an ecosystem.

.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

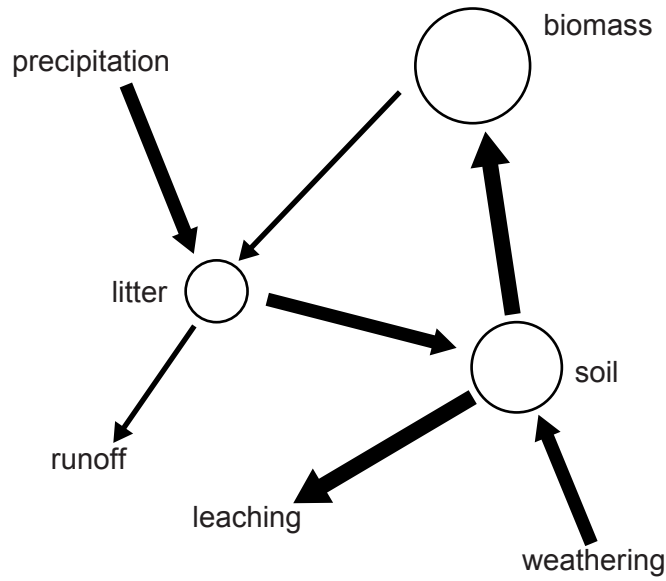
(ii) With reference to Fig. 2.1, describe the transfer of energy in an ecosystem.

.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

**Question 2(c) starts on page 8**

(c) Fig. 2.2 is a nutrient model for a rainforest ecosystem. The size of the circles corresponds to the quantity of nutrients stored. The width of the arrows corresponds to the quantity of nutrient flow.

*For  
Examiner's  
Use*



**Fig. 2.2**

(i) Give two reasons for the quantity of nutrients in the biomass store.

- 1 .....
- .....
- .....
- 2 .....
- .....
- ..... [2]



(ii) Explain why the litter nutrient store is the smallest.

.....  
.....  
.....  
..... [2]

(iii) Describe the effect of deforestation upon the flows and stores in Fig. 2.2.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [6]

[Total: 20]

For  
Examiner's  
Use

## Section B

Select **one** question from this section.

- 3 (a) Fig. 3.1 shows how the use of hydroelectric power (HEP) developed between 1965 and 2006 in different regions of the world.

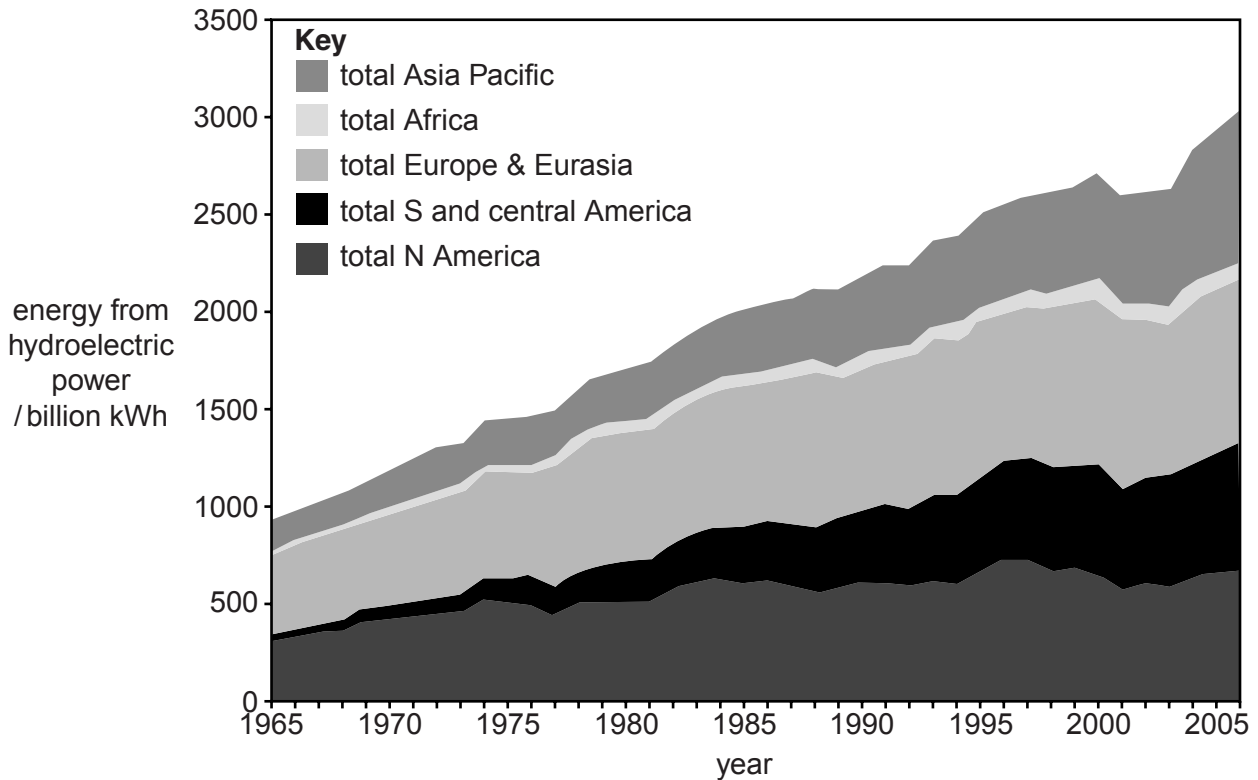


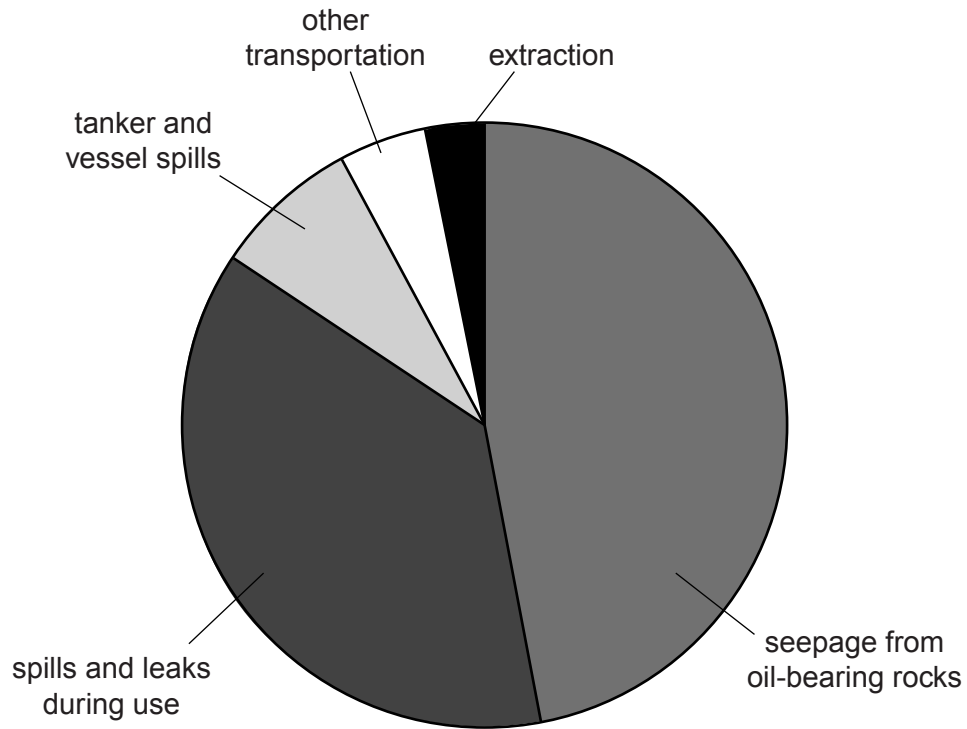
Fig. 3.1

Describe and explain the variations in the development of HEP shown in Fig. 3.1. [10]

- (b) Hydroelectric power stations usually require water storage behind dams. With reference to examples you have studied, assess the extent to which the benefits accrued from storing water for HEP are frequently outweighed by disadvantages. [30]

[Total: 40]

- 4 (a) Fig. 4.1 shows the sources of petroleum that lead to marine pollution, and the annual contribution made by each source.



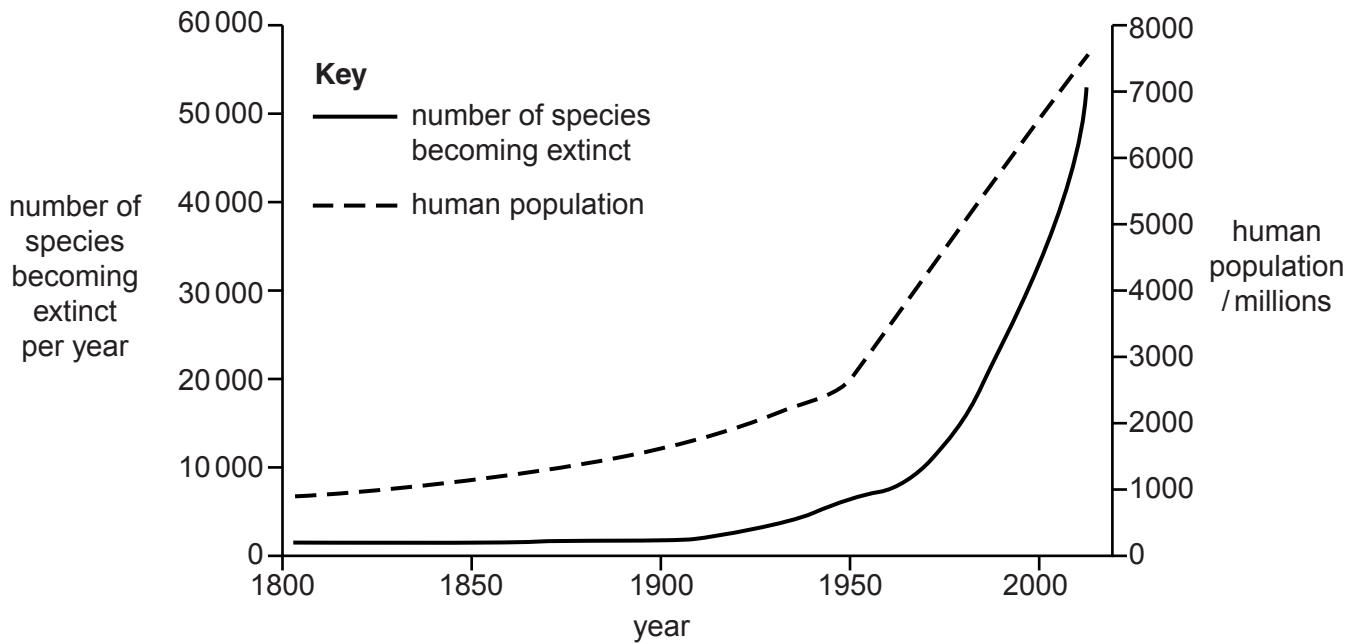
**Fig. 4.1**

With reference to Fig. 4.1 briefly discuss the contributions made by these sources. [10]

- (b) Explain why there are difficulties associated with trying to reduce the causes and effects of marine pollution. Assess **two** strategies that can be used to manage the issue of marine pollution. [30]

[Total: 40]

5 (a) Fig. 5.1 shows changes in species extinction and human population between 1800 and 2012.



**Fig. 5.1**

Describe and explain the relationship between species extinction and human population shown in Fig. 5.1. [10]

(b) With reference to **one** area of ecological importance you have studied, assess the conservation strategies used to preserve its species. [30]

[Total: 40]

*Copyright Acknowledgements:*

Question 1c © Flood Risk; [www.scotland.gov.uk/Publications/2011/06/15150211/7](http://www.scotland.gov.uk/Publications/2011/06/15150211/7).

Question 2 © Energy Flow; <http://www.marietta.edu/~biol/102/ecosystem.html>.

Figure 2

Question 3 © <http://www.energyinsights.net/cgi-script/csarticles/articles/000001/000133.htm>; source, BP, 2007.

Question 4 © Reprinted with permission from Oil in the Sea III, 2002, by the National Academy of Sciences, Courtesy of the National Academies Press, Washington DC.

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity. University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge