

Environmental systems and societies
Standard level
Paper 1

Thursday 21 May 2015 (afternoon)

Candidate session number

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1 hour

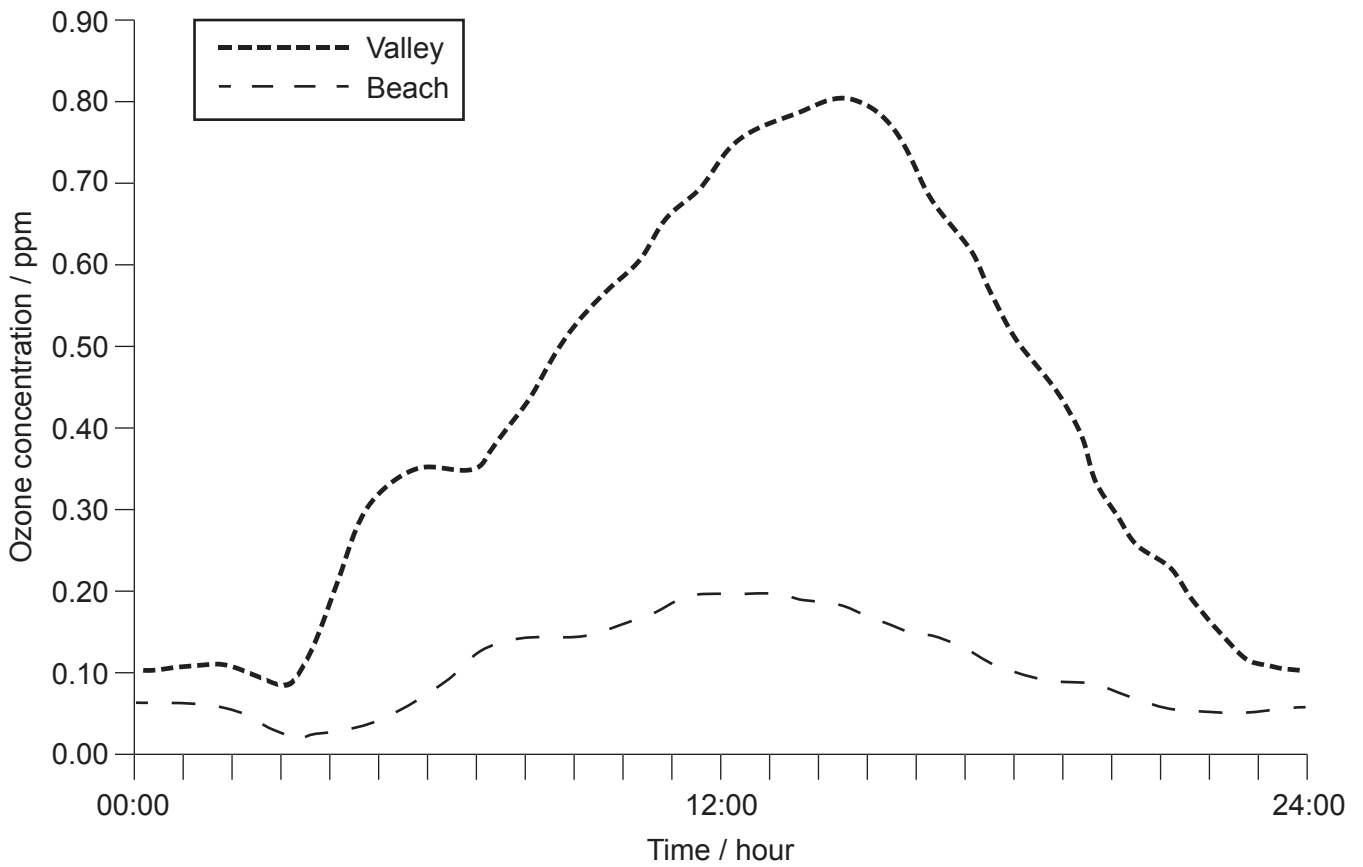
Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all questions.
- Write your answers in the boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[45 marks]**.



1. **Figure 1:** Changes in atmospheric ozone concentration in Los Angeles (California, USA) over a 24-hour period.

Figure 1



[Source: *The Sourcebook for Teaching Science* by Norman Herr. Jossey-Bass/John Wiley ISBN: 978007879-72981. 2007. Chapter 20 "Graphing, Spreadsheets and Scientific Data Analysis", section 20.4: Scatter and Line Graphs. Used with permission from Wiley.]

- (a) State the **two** primary air pollutants from fossil fuels which contribute to the formation of photochemical smog. [1]

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(Question 1 continued)

(b) Identify **two** effects of tropospheric ozone. [2]

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(c) With reference to **Figure 1**:

(i) explain why ozone concentration changes over this 24-hour period. [2]

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(ii) explain why ozone levels are highest within the valley. [2]

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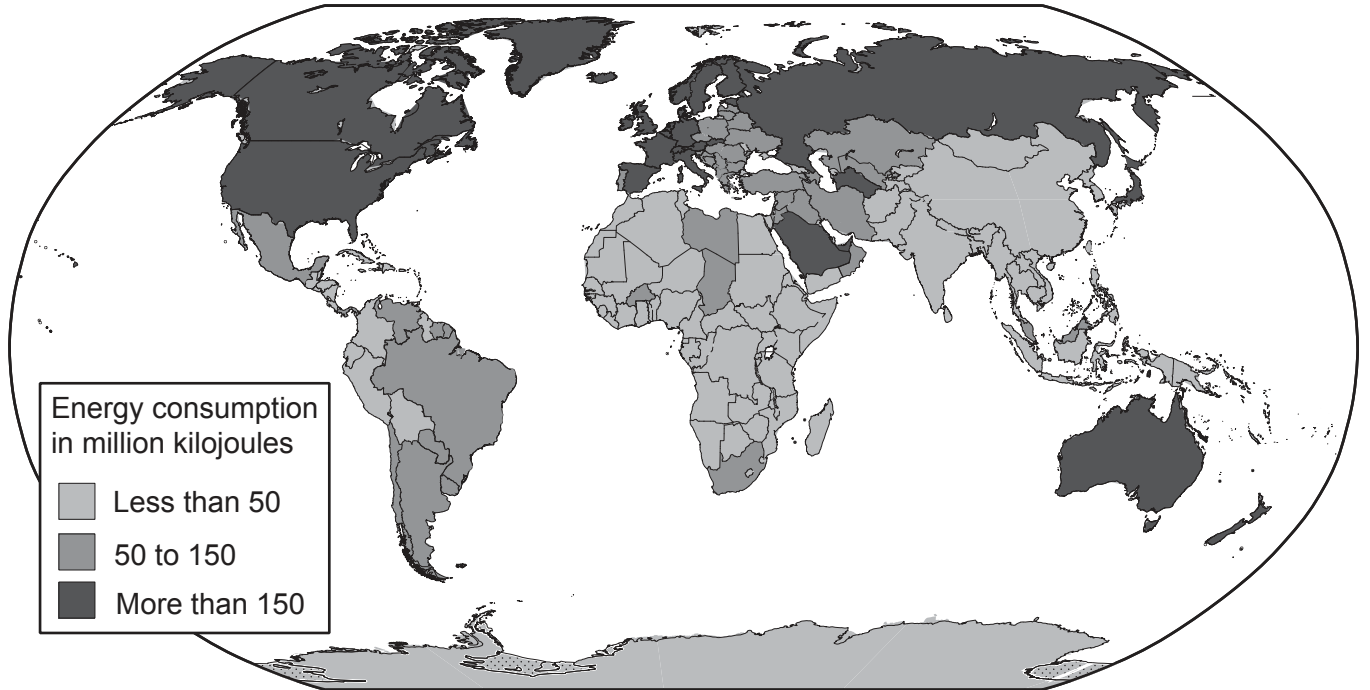


16EP03

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2. **Figure 2:** Energy consumption *per capita* in 2004.

Figure 2



[Source: GRID-Arendal (www.grida.no)]

(a) Outline **two** reasons for the difference in energy consumption between North and South America.

[2]

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16EP04

(Question 2 continued)

- (b) Explain why **two** countries with similar energy consumption *per capita* may have very different ecological footprints.

[3]

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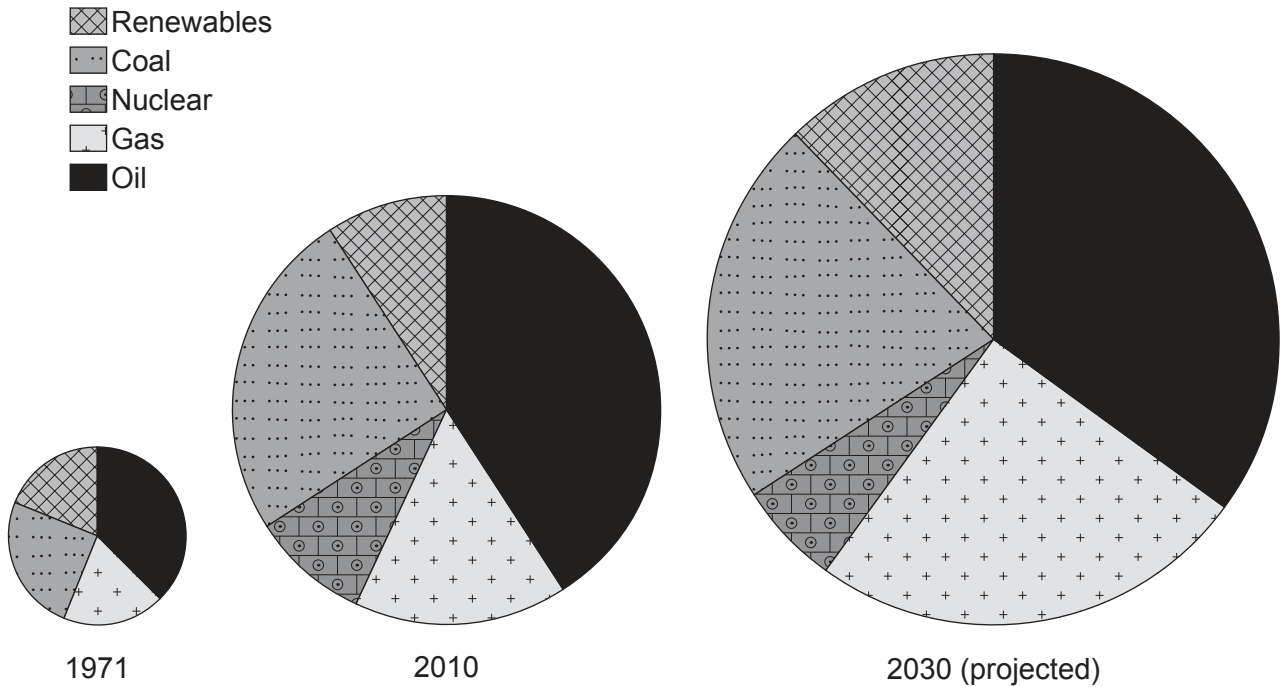
16EP05

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(Question 2 continued)

Figure 3: Historical and projected changes in the proportions of different energy sources used.

Figure 3



[Source: GRID-Arendal (www.grida.no)]

(c) Suggest **two** factors that may cause the proportion of non-fossil fuels to be greater than projected for 2030.

[2]

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16EP06

(Question 2 continued)

- (d) State **one** advantage and **one** disadvantage in the table below for each of the energy sources listed.

[2]

Source of energy	Advantage	Disadvantage
Fossil Fuel
Renewable

- (e) Explain how the projected change in demand for nuclear energy over the period shown in **Figure 3** demonstrates the change in the value of a resource over time.

[3]

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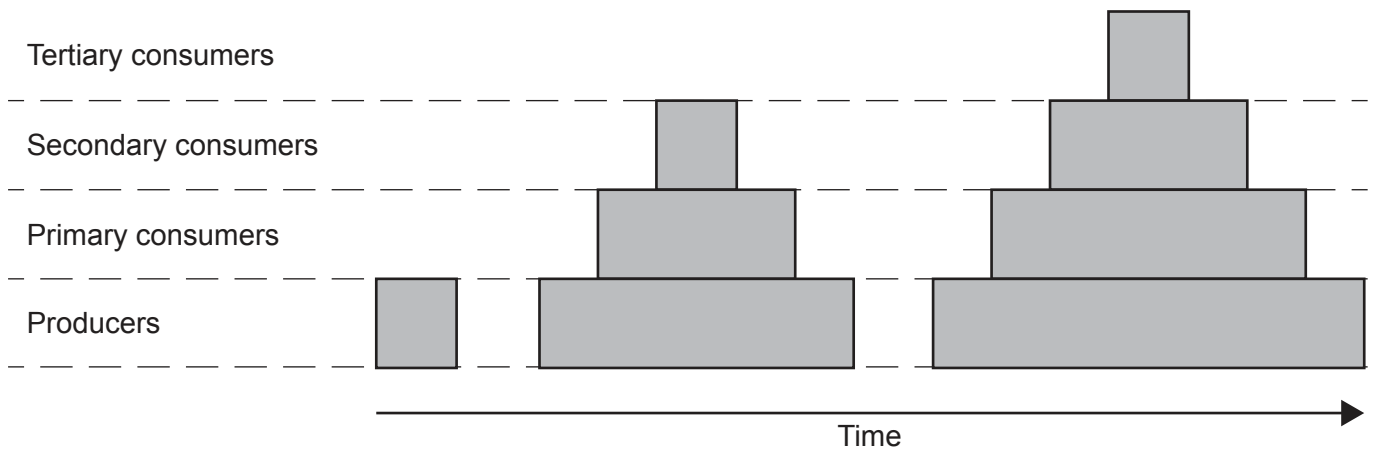
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3. **Figure 4:** Representation of the pyramids of biomass for communities at the same location at different stages of succession.

Figure 4



- (a) Identify **two** reasons why biomass tends to be smaller at higher trophic levels. [2]

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- (b) Describe **one** method for estimating the biomass of primary producers. [3]

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(Question 3 continued)

- (c) Explain how the process of succession might lead to changes in the productivity of trophic levels in this system.

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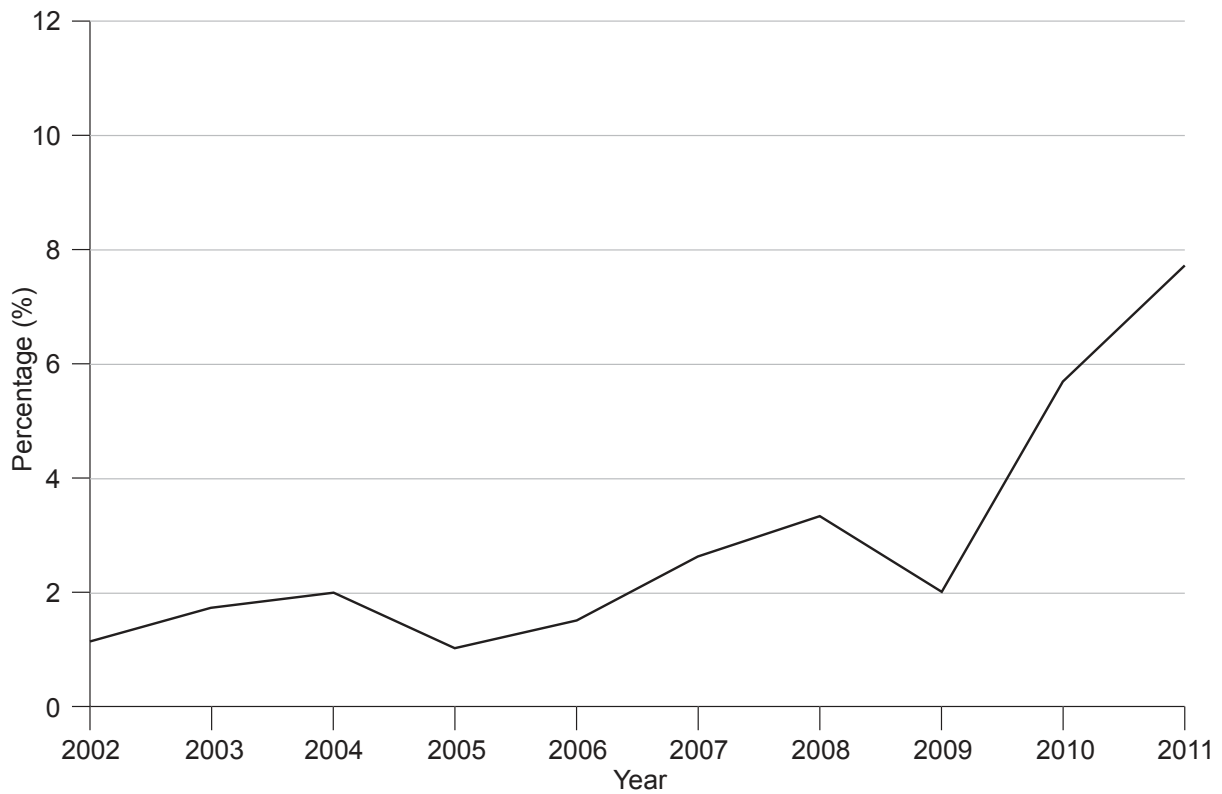


16EP09

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4. **Figure 5:** Changes in the percentage of total elephant population illegally killed in Africa between 2002 and 2011.

Figure 5



[Source: GRID-Arendal (www.grida.no)]

- (a) Using **Figure 5**, calculate the change in the percentage of elephants killed illegally between 2002 and 2011.

[1]

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- (b) Suggest **one** reason for the change in the number of elephants illegally killed over this time period.

[1]

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16EP10

(Question 4 continued)

- (c) Identify **one** way in which populations of elephants may be determined. [1]

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- (d) In the IUCN red list the level of threat to the African elephant has been reduced from “endangered” to “vulnerable” status since 2004. Identify **two** possible factors that may have led to this change of status. [2]

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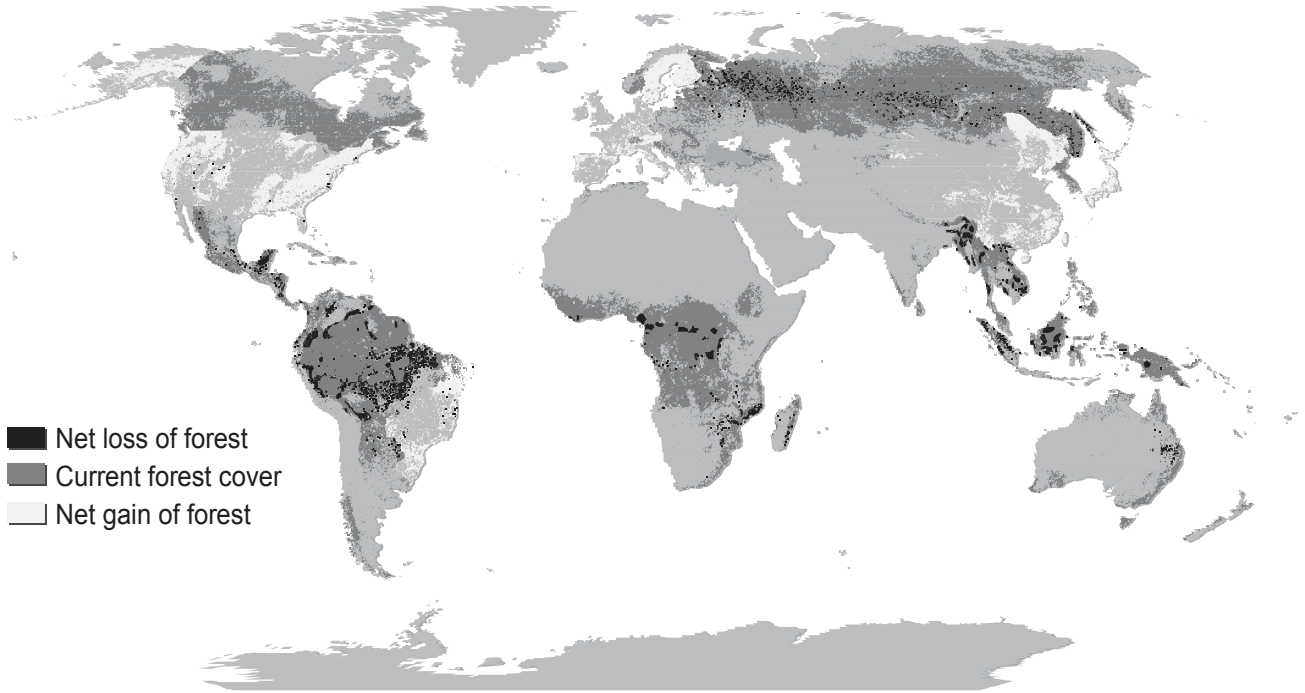
- (e) “The extinction of one large animal species is not a significant loss to the whole biosphere.” With reference to the African elephant, justify your viewpoint on this statement. [3]

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5. **Figure 6:** Changes in forest cover between 1990 and 2000.

Figure 6



[Source: GRID-Arendal (www.grida.no)]

(a) State **two** ways in which the impacts of economic development may lead to net loss of forests. [2]

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(b) Suggest **two** reasons for the net gains in forest area. [2]

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16EP12

(Question 5 continued)

(c) Describe how net loss of forests may lead to an increase in soil degradation. [3]

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(d) Identify **two** natural services provided by forest. [2]

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