

# ENVIRONMENTAL MANAGEMENT

Paper 8291/11

Paper 11

## Key Messages

- Candidates need to be aware of the equal balance between **Section A** and **Section B** of the paper and plan their time and answers accordingly.
- In **Section A** candidates should note the number of marks available for each part question and compose their answers accordingly.
- It is important that instructions are followed carefully. An understanding of the differences between the phrases outline, explain, describe, assess and give reasons would be valuable to some candidates.
- Candidates should also check their work thoroughly if they have time left at the end of the examination.

## General Comments

There was a reasonably good response to all questions on this paper, though in some cases there was a lack of equivalence of performance between **Section A** and **Section B** of the paper.

Many answers showed a good understanding of terms and attention to detail, with effective use of exemplar material. The more successful answers were enhanced by effective use of appropriate examples to illustrate key points and the incorporation of precise definitions of terms.

## Comments on Specific Questions

### **Section A**

#### **Question 1**

- (a) (i) Some difficulties were encountered with candidates being unable to correctly name the type of mass movement. A small number confused the chalk in the picture with snow and ice.
- (ii) This question was generally well answered, with candidates able to identify and explain the two pieces of evidence for the mass movement being a recent event.
- (iii) The subject of this question was well understood by candidates.
- (iv) Good answers were characterised by developed examples. The most popular of which was the weather with supporting explanations. Successful examples included well described freeze/thaw, hydrolysis and carbonation. Less successful answers did not develop their chosen example.
- (b) (i) Good answers were characterised by the use of the correct terminology throughout the response with the examples of human activity on slope stability being well supported by descriptions of the effects.
- (ii) This question was less well answered by candidates because some did not develop and explain their chosen examples, or they provided a lot of detail for a single example. Candidates who directly quoted their examples from Fig. 1.2 were often those who did not develop their answers suggesting an insecure understanding of the topic.

#### **Question 2**

- (a) (i) Some candidates did not include the ocean as part of the Earth's surface. More successful answers included the use of the figures related to billion tonnes of carbon and also calculated differences where appropriate.
- (ii) Most candidates were able to correctly calculate the answer.
- (iii) Candidates were generally able to describe two ways in which land use might change but weaker answers did not supply convincing explanations for the chosen changes. More successful answers developed the argument from the chosen change to describe in detail how the amount of carbon dioxide might increase.
- (iv) This question was generally well answered by a majority of candidates with good knowledge of the effects of burning fossil fuels on climate. Weaker answers still refer to CFCs and the loss of ozone. Few candidates thought to venture beyond the increase in temperature and so many missed discussing increased frequency of tropical storms and alike. Candidates must be aware of the difference between changes in global climate and effects of these changes such as ice melt and sea level changes.
- (b) (i) Most candidates understood the difference in emissions per person and the difference between the two population sizes. Few made the connection between the much larger population generating more emissions in total. The differences between the two populations were generally well understood and explained.
- (ii) Candidates provided a lot of successful answers which gained full credit. There was a high level of understanding of the ideas behind the question. Some candidates need to remember that Africa and Europe are continents made up of many countries and not a single uniform entity.

### Section B

**Question 3** and **Question 5** were almost equally popular while **Question 4** was the least popular. Both parts (a) and (b) were equally well tackled with only a minority not completing both parts. Candidates must understand that this section carries equal weighting to **Section A**, and should plan their time and work in the exam accordingly.

#### Question 3

- (a) Whilst most candidates were able to identify the information from the figure and to see the value for governments, they were not always successful in translating this into relevant planning responses. Good answers covered a wide range of possible planning scenarios and linked these to the information provided by the figure.
- (b) Candidates generally provided good answers to this question. There was a good use of named examples and candidates demonstrated a good understanding of the differences between LEDCs and MEDCs in terms of their ability to respond to natural disasters such as earthquakes and volcanoes. Successful answers provided a balanced case for each and contained an element of evaluation.

#### Question 4

- (a) This was less popular with candidates. A minority of candidates did not understand what the table was showing them. More successful answers were those which correctly identified the differences and were able to explain in terms of development, population levels etc., the difference between Europe and the other parts of the world.

- (b) Comparisons between LEDCs and MEDCs were well made with named examples from the text provided. In order to gain high marks candidates needed to describe a range of resources in the lithosphere and how these are at risk from urban expansion as well as how they could be sustainably managed. This was not well understood in many cases and a lot of answers were able to refer to water. Less successful answers did not provide strong comparisons between LEDCs and MEDCs and consequently lacked detail and often did not provide evaluation.

**Question 5**

- (a) The more successful answers made clear and accurate descriptions of the relationship between incoming and outgoing radiation and were able to describe the need for these to be balanced. Less successful answers were simply phrases lifted from the text in the figure.
- (b) This question was quite well answered and a range of alternative sources of energy were provided. More successful answers were balanced and provided evaluation of a range of alternative sources of energy. Some less successful answers provided detailed descriptions of the greenhouse effect and ozone depletion but did not offer sufficient details about the alternative sources of energy supplied, or how these might ameliorate the effects of atmospheric pollution.

# ENVIRONMENTAL MANAGEMENT

Paper 8291/12

Paper 12

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Many answers showed a good understanding of terms and attention to detail, with effective use of exemplar material. The more successful answers were enhanced by effective use of appropriate examples to illustrate key points and the incorporation of precise definitions of terms.

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#### Question 4

- (a) This was less popular with candidates. A minority of candidates did not understand what the table was showing them. More successful answers were those which correctly identified the differences and were able to explain in terms of development, population levels etc., the difference between Europe and the other parts of the world.

- (b) Comparisons between LEDCs and MEDCs were well made with named examples from the text provided. In order to gain high marks candidates needed to describe a range of resources in the lithosphere and how these are at risk from urban expansion as well as how they could be sustainably managed. This was not well understood in many cases and a lot of answers were able to refer to water. Less successful answers did not provide strong comparisons between LEDCs and MEDCs and consequently lacked detail and often did not provide evaluation.

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# ENVIRONMENTAL MANAGEMENT

Paper 8291/21

Paper 21

## Key Messages

- In data response questions candidates should select and use relevant information from resources. They should read labels on graph axes and in keys to diagrams carefully in order to accurately interpret the data.
- In the analysis of data questions it is advisable to observe trends, patterns, variations and time scale; for example when describing a change, state the time period over which the change has occurred.
- In **Section B** questions, consider all elements of the question. In part **(b)** the use of examples is one element of the question requirement and when the word assess is used in the question the answer should contain relevant evaluative statements.

## General Comments

Marks ranged widely and a significant number of candidates achieved marks in the 40 to 59 range. Candidate performance for each of the two sections of the paper showed a slight imbalance with responses to **Section A** better than **Section B**. Overall there was good use of time, with sufficient time being allocated to both sections of the paper. One exception was a disproportionate amount of time spent on part **(a)** of **Section B** where only 10 marks are available, in contrast to part **(b)** where 30 marks are available.

## Comments on Specific Questions

### **Section A**

#### **Question 1**

The central theme of this question was the characteristics of forest biomes in Costa Rica and conservation through forest restoration. The majority of candidates engaged well with both questions in this section.

- (a) (i)** Good marks were achieved, as candidates only had to describe the characteristics of vegetation, the skill being to observe the different features visible in the photographs from Costa Rica or alternatively to deduce from the information provided the adaptations that would be expected in the vegetation found in such biomes. The majority of candidates achieved at least partial credit. Sometimes characteristics of the climate were described instead of the characteristics of the vegetation. Another error was when biomes A and C were confused, probably as a result of misreading Fig. 1.1, this illustrates the need to carefully consider the information in diagrams.
- (ii)** In good answers the conditions of high temperature and high rainfall in the tropical lowlands together with the transition to the cloud forest enveloped in a visible mist of cloud were described. In weaker answers there was often no reference to the information from Fig. 1.1 or reference to all three biomes rather than only A and B as requested in the question.
- (iii)** This part of the question posed more difficulty and was less well answered. Analysis of the temperature and rainfall data, together with an assessment of the impact of these variables upon the vegetation growth were both required. This was achieved in good quality answers. Weaker answers were typified by a simple description of the each line of the graph without reference to their impact in either positively or negatively affecting growth rates. Occasionally an error was made, confusing the data for temperature and rainfall. This illustrates that it is important to pay close attention to the labels on graph axes.

- (b) Responses to this question were quite varied and included the range of measures relating to conservation and detail as outlined in the mark scheme. The difference in the quality of answers was linked to the aspect of sustainability. This important aspect of the management was often poorly covered or absent in the weakest answers.

### Question 2

The theme of this question was to consider the impact of an increased demand for water resources on the Aral Sea. Part (a) of the question in this section was quite well answered. The quality of part (b) answers depended upon a correct interpretation of the resources and for some candidates this posed problems in terms of the graph interpretation.

- (a) (i) The majority of candidates were able to compare the extent of the sea and gain credit for observing the reduction in size. There was opportunity to also refer to the satellite images showing a progressive reduction in the extent. Good answers estimated percentage changes to the area but sometimes there was no mention of the time scale involved.
- (ii) Many candidates achieved full credit, making good use of the resource to identify a rising demand reducing the flow of water entering the Aral Sea.
- (iii) Whilst most candidates stated that the reduction in the extent of the Aral Sea would result in a decrease in aquatic species and possible extinction. Many were unable to explain these in ecological terms. Some candidates described the effect of pollution upon the water and the process of eutrophication resulting in an increase in algae rather than a decline in aquatic species due to loss of habitat as a result of decreasing water levels and increasing salinity.
- (iv) There were some excellent answers which focused on the negative effects resulting from a demise of the fishing industry and other water-related activities as the Aral Sea decreased in extent.
- (b) (i) There were few good answers in this part of the question. These described the different trends shown and used the data to calculate the increased volume of water extracted between 1970 and 1990, followed by a decrease to 2010. Although the question referred to the extraction of water, many candidates referred only to the total runoff. Other candidates ignored the time frame required in question and instead described each of the two graphs.
- (ii) High marks were obtained by those candidates who showed how the pieces of information are interwoven to affect the size of the Aral Sea. These answers linked the rising demand to increased extraction, reduced runoff and supply of water to the Aral Sea resulting in a drying up completely of the remaining sea or a possible recharge of the sea in the stable demand scenario. Some discerning candidates recognised the possible consequence of climate change negatively impacting the sea through increased evaporation, even if demand stabilises. Weaker answers were typified by simple descriptions of the two graphs in terms of the effect of rising demand and stable demand upon the use of water but without reference to the effect upon runoff into the Aral sea or subsequent impact upon the sea.

### Section B

### Question 3

The central theme of this essay was the conservation of species habitats and ecosystems and, particularly in part (b), how wildlife management strategies can aim to achieve the objectives of maintaining biodiversity. Many essays showed effective analytical skills in part (a) and good use of exemplar material in (b).

- (a) The map was well interpreted. Excellent answers scrutinised the information and recognised the variety of habitats and the ways in which tourism would affect ecosystems through increased pressures and conflicts of interest. The second part was slightly less well answered as many candidates only quoted the final number of tourists instead of analysing the detail in terms of the rate of increase and the timescale. The majority of candidates outlined a wide range of ideas relating to conservation.
- (b) Very good answers addressed all components of the question and there were some excellent descriptions of named conservation areas. Good use was made of a range of examples and candidates were clear on the objectives and were therefore in a position to be able to assess the



effectiveness of the method of conservation relating to wildlife management, such as capture, captivity and release into the wild in order to increase the population size of an endangered species. In other answers one example of an ecosystem may have been used with reference to how a range of general conservation methods were employed to achieve the objectives. These answers often suffered from being overgeneralised and lacked a focus on specific management of the wildlife.

#### Question 4

Many candidates were successful in this question, which concerned how a river is polluted by considering the distribution of industrial pollutants along a river profile in part (a) and, in part (b), other forms of pollution together with the overall management of river pollution.

- (a) The majority of candidates made an adequate to good interpretation of Fig. 4.1 and there was in general good linkage between key points. Most candidates divided their answer into sections. Many obtained described the trends and illustrated answers with data from the graph of the different levels at each point, indicating how this point related to the overall pattern and referring to the increased industrial activity. Suggesting reasons for the overall distribution proved to be more difficult for some candidates. Weak answers were mainly descriptive or focused only on the altitude and horizontal distance giving data on these variables at each point instead of the concentration of industrial pollutants. Although this question referred to the River Ganges unfortunately some candidates focused only on air pollution and discussed the transfer and dispersal of air pollution from the industrial area.
- (b) There were some excellent answers which achieved a balance of detail through reference to a good range of sources of pollutants, combined with distinct methods of pollution control that were clearly described and assessed. Very good answers used a range of examples. Some used several rivers or focused on one particular river system and outlined how the pollution varied through different stages of the river system. Some excellent answers charted the different sources of river pollution in their local area and specifically linked a range of pollution control measures to aspects of the chosen example. Weaknesses in answers often occurred in the evaluation of management strategies, particularly when a range of measures were not necessarily related to the chosen examples.

#### Question 5

Although chosen by fewer candidates there were some excellent responses to both parts of the question.

- (a) The majority of candidates displayed a good understanding of desalination there were some excellent descriptions and explanations of the process explained in terms of the scientific principles involved. The only weakness in some answers resulted from not thoroughly reading the question and listing as many advantages and disadvantages as possible with each point undeveloped rather than two well-developed points.
- (b) In high quality answers the assessment of extent was achieved through a direct comparison and contrast of well-chosen examples. These highlighted similarities and differences and drew conclusions. Weaker answers lacked balance between less and more economically developed countries. Some only considered the means by which a country attempted to cope with the management of water supply.

# ENVIRONMENTAL MANAGEMENT

Paper 8291/22

Paper 22

## Key Messages

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# ENVIRONMENTAL MANAGEMENT

Paper 8291/03  
Individual Research Report

## General Comments

The high standards of previous sessions have been maintained.

The quality of internal assessment was similar to previous years. It seems that some Centres continue to assess accurately and some inaccurately. In the latter case more attention should be given to the assessment criteria contained in the syllabus. As in previous years a significant number of Centres gave credit for assessment criteria not present in their candidates research reports; notably the need for a statistical tool, and in C3 the need for reference to data and an evaluation that refers to strengths and weaknesses in the project. In a small number of research projects more attention needs to be given to the adviser comments given in the initial proposal.

The best reports derive from the candidates who pay attention to the advice given, conduct primary research and submit reports of the correct length with a chapter division into: introduction and hypothesis, fully justified methods, results and analysis, conclusion and self-evaluation. Fortunately, where secondary data was needed there were only a few examples of plagiarism and internet copying/pasting.

This session saw very few internal administrative errors. Only one Centre incorrectly used half marks and their final marks had to be adjusted.

It is relevant to repeat some points in previous reports. It is very important that candidates are made fully aware of the requirements of this school-based assessment. Written reports should be of approximately 2000 words in length and ideally structured into the four stages of scientific method, i.e. introduction, methods (justified), results and analysis, conclusion and evaluation. The better reports tend to use these stages as section or chapter headings. This model of scientific method should be used to provide a check on how well the project is progressing. Candidates should be asking of themselves:

- Will my hypothesis or question actually yield viable results?
- Are my methods realistic, practical and relevant; do they include data recording, collation and presentational techniques?
- Are my results and analyses fully representative of the methods referred to in the previous section?
- Does my conclusion, sum up and relate my results to the original hypothesis or question?
- Have I evaluated my work in terms of both its successful features and its limitations?
- What can be done to improve my work?

## Comments on Assessment Criteria

### Skill C1

Generally, hypotheses or questions were stated by most candidates, mostly supported with a full introductory statement. Nearly all candidates included a methodology but it was sometimes just a brief list without any explanation or justification. Only a small number of candidates assessed whether or not their developed plan would be effective in testing their hypothesis or answering their question. Good quality research requires the formulation of a plan detailing research sites, equipment, expected data and how it will be collated and presented. Needless to say, the better projects achieved these goals, whilst weaker reports did not specify the details of their topic and were seemingly unclear about how it should be investigated.

## **Skill C2**

A significant number of high quality research reports did very well in this section. However, not all candidates achieved the full credit available and in a small number of Centres little credit could be given. Most excellent use was made of relevant collected data, which was presented in a variety of ways, including graphs, tables, diagrams and photographs, most often integrated into an analysis. However, very few reports contained a statistical tool to assess the significance of the data. This could involve the use of correlation, chi squared, t test, etc. It is important that the statistical tool is seen to be used. Unfortunately, some Centres award this mark when there is no evidence at all of this skill.

Weaker projects generally exhibited a wide variation across the five criteria in this section with the main weaknesses being within data collection / presentation and the use of a statistical tool. A small number of candidates offered very limited evidence of data collection. In weak reports there was a mismatch between the stated methodology and the presentation of related results. In these instances the methods stated in C1 did not yield related graphs, tables and photographs. On other occasions collected data was submerged within a mass of descriptive text. Sometimes, although diagrammatic or pictorial material was present, it became decorative and was not referred to in the analysis or description.

The majority of candidates deserve credit for the logical organisation of their work and the high quality of written communication.

## **Skill C3**

This final skill area is an important feature of almost any scientific investigation. Unfortunately, it is where a lot of candidates lose marks.

Whilst the better reports contained a detailed summative conclusion that utilised data to assess the original hypothesis, many candidates failed to refer to their data and only limited credit could be awarded. Significantly, some Centres awarded full marks for weak conclusions that did not contain any reference to the data in the report. Similarly, although most reports contained references to environmental and management principals they were not used to explain trends and patterns derived from results contained in the body of the report.

Very few candidates attempted an evaluative assessment of their work. This needs to include a brief survey of those things that went well and not so well, i.e. successes and limitations. Many still confuse an evaluation with a conclusion.

## **Concluding Comments**

It is pleasing that Centres and their candidates still engage enthusiastically with this element of the Environmental Management examination. This element of the examination gives candidates the opportunity to develop a topic of their choice and concern. The better reports are derived from locally-based research utilising primary data whilst weaker reports derive their data from secondary sources.

A majority of Centres worked closely with the requirement contained in the syllabus.

I would personally like to thank all teachers and assessors concerned with this examination for the hard work that so obviously takes place in order to satisfy the needs of this section of the Environmental Management examination.