

# ENVIRONMENTAL MANAGEMENT

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Paper 8291/11  
Lithosphere and  
Atmosphere

## Key Messages

- Candidates need to be aware of the equal balance between **Section A** and **Section B** of the paper and plan their time accordingly.
- In **Section A**, candidates should note the number of marks available for each part question and compose their answers accordingly. In particular questions worth between 4 and 8 marks will necessarily require more than one piece of information and often some supporting details.
- It is important that instructions are followed carefully. An understanding of the differences between the command words state/explain/suggest/describe/outline/evaluate/assess would help candidates to focus their answers more successfully, especially in **Section A**.

## General Comments

There was a reasonably good response to all questions on this paper. Some candidates found **Question 1** (weather) more challenging than **Question 2** (plate tectonics).

Many answers showed a good understanding of terms and attention to detail, with effective use of exemplar material.

In this session, more successful answers were enhanced by effective use of appropriate examples to illustrate key points and the provision of supporting details using appropriate terminology.

## Comments on Specific Questions

### **Section A**

#### **Question 1**

- (a) (i) The naming of winds from their direction of origin was well understood by some candidates. Some candidates correctly identified the trade winds but other references suggested that this knowledge was not clear.
- (ii) Candidates were familiar with the factors and in general provided quite good descriptions. The factors of pressure and Coriolis Force were familiar and more successful answers named and then described the factors. Less successful answers focussed on ocean currents.
- (iii) Candidates showed a good understanding of cloud formation. Less successful answers showed confusion with regard to the influence of air pressure differences bringing rain in from other areas.
- (iv) The reason for the drought-prone areas was less well understood in general. Most candidates referred to heat evaporating the moisture or the effect of air pressure differences causing winds to move away carrying the moisture. Reference to Hadley cell circulation was rare. More successful answers understood the sinking of the air and the subsequent loss of moisture leading to the drought conditions of hot and dry.

- (b) (i) More successful answers correctly described the trends in the two graphs and supported their answers with correct data. However, the graph proved challenging for some candidates. Often their answers quoted the data incorrectly and in some cases the two sets of figures were freely intermingled.
- (ii) A minority of candidates misread the question and answered the question “how does human activity affect the climate” rather than “how does the climate affect human activity” and as a result described global warming and acid rain formation. The majority of answers tended to refer to agriculture and fishing though the stronger ones discussed travel, transport and tourism.

## Question 2

- (a) (i/ii) These terms were generally well understood.
- (iii) The processes involved in subduction and subsequent volcanic activity were generally well given with the most successful answers describing the processes in detail using the appropriate terminology. Less successful answers tended to lack key ideas such as friction and melting.
- (b) (i) The term was in general very well understood.
- (ii) Most candidates were able to successfully make the link between the position of the Solomon Islands and the proximity of the plate boundary and its movement.
- (iii) Candidates were well versed in the likely problems and showed a strong understanding of short and long-term effects. The most successful answers were detailed with developed points. However, some candidates resorted to lists and these tended to be limited.
- (iv) This was generally well answered with candidates assessing as well as supplying a wide range of examples whilst making relevant value judgements as to their effectiveness.

## Section B

**Questions 3 and 4** were almost equally popular while **Question 5** was the least popular. Both (a) and (b) were equally well tackled with only a minority not completing both parts. Candidates should remember that this section carries equal weighting to **Section A**, and they should plan their time and work accordingly. They should also realise that 10 mark answers require detailed and full answers and that the 30 mark answer requires a detailed and structured essay. Candidates were strong in providing examples from case studies and the quality of the written work was good in many answers.

## Question 3

- (a) Despite asking for the pattern of noise only some candidates referred to the linear and radiating patterns shown on the map. Most referred to the labels on the diagram of major roads, city centre and open spaces.
- (b) The effects of noise were not well understood and often less successful answers ignored that part of the question entirely. Better answers discussed examples such as deafness, stress and difficulty concentrating. Strategies for reducing noise tended to be limited to traffic management examples including increased public transport, cycle lanes and traffic reduction based on number plates/alternate days. Stronger answers included examples such as silencers, improved engine technology, double glazing and soundproofing.

## Question 4

- (a) A number of candidates answered this question by turning the labels of the diagram into sentences without any additional information. Stronger candidates provided additional information or provided details of the three storage methods.
- (b) Some candidates did not answer this question in terms of LEDC and MEDC countries but rather talked about global warming, climate change and acid rain. Some candidates persist in referring, incorrectly, to ozone depletion when discussing carbon dioxide emissions. The more successful answers used specific issues relating to the human population such as the effect of rising sea

levels, the problem of salinisation affecting agriculture and the disruption of economic activity. The effects on the natural environment were not generally dealt with by candidates.

#### Question 5

- (a) This was the least popular question. However, candidates who attempted it did reasonably well. The distribution was described quite well though not all candidates referred to the elevation or suggested the link to population size. Coastal distribution and the position of the tectonic plates were also described.
- (b) This was generally well answered and candidates demonstrated a good understanding of the strategies used to manage slopes to prevent movement, and were familiar with a range of examples from around the world. The more successful answers provided some measure of evaluation of the different strategies.

# ENVIRONMENTAL MANAGEMENT

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Paper 8291/12  
Lithosphere and  
Atmosphere

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In this session, more successful answers were enhanced by effective use of appropriate examples to illustrate key points and the provision of supporting details using appropriate terminology.

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- (iii) Candidates were well versed in the likely problems and showed a strong understanding of short and long-term effects. The most successful answers were detailed with developed points. However, some candidates resorted to lists and these tended to be limited.
- (iv) This was generally well answered with candidates assessing as well as supplying a wide range of examples whilst making relevant value judgements as to their effectiveness.

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levels, the problem of salinisation affecting agriculture and the disruption of economic activity. The effects on the natural environment were not generally dealt with by candidates.

#### Question 5

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- (b) This was generally well answered and candidates demonstrated a good understanding of the strategies used to manage slopes to prevent movement, and were familiar with a range of examples from around the world. The more successful answers provided some measure of evaluation of the different strategies.

# ENVIRONMENTAL MANAGEMENT

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Paper 8291/21  
Hydrosphere and  
Biosphere

## Key Messages

- Where a question states 'with reference' to a table or figure, appropriate data and information should be carefully selected and used in answers.
- In **Section B** candidates should consider using definitions of key terms and specific examples.
- In calculations, candidates should show their working out in the space provided on the answer paper and should also check units.

## General Comments

Candidates performed equally well in both questions in **Section A**. In **Section B** essays were generally of a good quality and a significant proportion of candidates performed better here than in **Section A**.

## Comments on Specific Questions

### **Section A**

#### **Question 1**

- (a) In (i) biomass was often defined as the total mass of living organisms calculated in dry mass for a given area and full credit was given unless there was a reference to an abiotic component of the ecosystem.

In (ii), successful answers were those in which the correct ecosystem was stated and supported with biomass data from **Table 1.1**. In the best answers, data was manipulated to reveal more information. For example, the average biomass of the forest is 14 800 times greater than the biomass of the ocean per unit area. In less effective answers a statement about biomass may have been unsupported with data or alternatively data may have been quoted without a concluding statement as to which biomass was greater. Occasionally, the difference in the size area of the ecosystem was considered without reference to the biomass. This illustrates where selection of appropriate data and information is important.

- (b) Food chains were mostly correct in (i). Answers were illustrated with a food chain relating to **Fig. 1.1** for example, phytoplankton → shrimp → crab or with an appropriate example from **Fig. 1.1**. Common errors included arrows being the wrong direction, or the producer organism missing from the start of the food chain. In other food chains, soil or sediment were included rather than suitable organisms such as a decomposer.

Few difficulties were encountered with (ii) and (iii).

In (iv) most answers contained a reference to the process of photosynthesis. In good answers both trees and phytoplankton were recognised as autotrophs carrying out this process and some details such as the role of chlorophyll, the transfer of energy from light energy, to chemical energy in glucose and the basic requirements of carbon dioxide and water were included in answers. In some answers the process of photosynthesis was confused with respiration, while others referred to nutrient cycles and energy flow to herbivores.

In **(v)**, there was good interpretation of **Fig. 1.1** and in very good answers three differences in the two ecosystems in terms of energy flow were identified and described. Many answers contained qualitative descriptions of the differences and some assessment of the relative differences. In less effective answers there was a tendency to generalise and to describe energy flow rather than the differences between the two ecosystems.

In **(vi)** there was a range of ideas which often focused on the biodiversity of the oceans and the size of the organisms involved. In very good answers the suggestions were based on an understanding of energy flow and the ecological efficiency with which energy is transferred between trophic levels in a food chain.

## Question 2

- (a)** Both **(i)** and **(ii)** illustrate, that it is important to select relevant data from information provided, to check units and to show working out in calculations. Good answers were those in which data had been carefully selected from **Table 2.1** and accurate calculations were shown by a variety of suitable methods. In **(i)** some errors were made in the selection of data, for example selecting data only from the freshwater column thus omitting the saline groundwater. In **(ii)** a common error was to add all the data for percentages from the freshwater column and to give answer of 100% instead of selecting the appropriate data from the percentages of the total water.

The majority of candidates answered **(iii)** well. A variety of processes linking movement between water stores were described.

**(iv)** proved challenging for many candidates. The question was about the change in volume of the water stores. Only a minority referred to the volumes in **Table 2.1**. Many referred to the melting of the ice caps and a rise in sea level rather than a change in the volume of the water store.

- (b)** In good answers there was reference to **Fig. 2.1** and the extent of the area affected by the a rise in sea level, the inundation of sea water and the land permanently flooded together with effects upon the urban population and the urban area in the long term. Occasionally the question was misinterpreted and an emergency response to a short-term flooding event was considered rather than a long term rise in sea level over a period of time.

## Section B

### Question 3

- (a)** Strong answers described the key points concerning the limited distribution of the giant panda population and the low population numbers. The distribution of the panda in terms of the number of areas, the extent and the proximity of the low or isolated populations to the denser network of roads and to the surrounding settlements was emphasised. The areas with very small isolated populations were linked to the low rate of reproduction and the low numbers to fragmentation of the habitat. Other good answers detailed reasons relating to the impact of human activity resulting in a loss of panda habitat and bamboo food supply as a result of conversion of land to agriculture. Other suggestions included poaching, pollution and climate change. Less effective responses made no reference to the different population numbers and just referred to the roads and settlements linked to habitat destruction.
- (b)** Very good essays were characterised by the use of specific named examples of both areas and species. These considered both the conservation of habitats in, for example, national parks, conservation areas, game reserves and nature reserves together with the specific conservation of species in wildlife sanctuaries, breeding centres, and in zoos. These different approaches were well evaluated and in some answers, examples of increasing population numbers as evidence of the success of the conservation measures were cited. Less well balanced essays used examples but tended to focus either on habitats or species or did not differentiate between different approaches. These essays often had brief evaluation. Weaker essays had no examples of species or national parks and included very general points on conservation.



#### Question 4

- (a) Good answers described the increasing water consumption in the different regions using data from **Fig. 4.1** and the differences in the overall trends. Three reasons for the increasing water consumption were outlined emphasising differences in the rate of increase in regions, comparing regions with a steady increase, with the increasing rate of increase in Asia. Relatively few quoted data from the graph to quantify the differences in the increasing demand between regions although three reasons were effectively outlined in most answers.
- (b) This question elicited some high-quality answers in which different methods such as desalination and groundwater extraction were evaluated in terms of economic costs and environmental impact. Different examples of local and regional supply were used. The extent to which these methods can continue to meet increasing demand were well assessed and took into account increasing consumption for reasons as outlined in the first part of the question and diminishing supplies of in some water stores due over extraction and/or climate change. This assessment was missing in some essays, while very weak essays lacked detail and made no evaluation or reference to increasing demand in the future. A limited use of examples characterised these essays.

#### Question 5

- (a) Interpretations of the graph were quite varied. In good answers there was reference to all three population projections. Data from the graph was quoted and used to compare population growth rates and changes in the global population size between 1950 and 2015 and in each of the three projections between 2015 and 2100. The interactions between birth rate and death rate were used to effectively explain the increasing, decreasing and stabilising populations. Factors affecting birth rates and death rates were suggested to account for the different outcomes for the global population. In less effective answers there was reference to the three projections and a description of changes in the rate of growth and changes in population sizes, linked to changes in birth rates without any explanation of how birth rate and death rate interacted to account for the different rates of growth. Weaker answers lacked reference to the population projections. In these answers data was often absent with only brief comments on birth rate or death rate or changes in population size.
- (b) Higher quality essays were characterised by a range of policies, accurate detail of the stated policies, and the use of examples together with effective evaluation. The very best considered both policies aimed at decreasing birth rates to address the problems of overpopulation and to encourage an increase in birth rates in countries in response to an aging population structure. These assessed the extent to which population was managed by these policies and this was balanced with a discussion of the impact of other factors. In less effective essays sometimes countries chosen as examples did not provide sufficient contrast in the level of economic development and therefore the range of policies that could be considered. On occasion there was a lack of accurate policy detail or there were only policies relating to the decreasing birth rate. These included some evaluation of the effectiveness of the policy in managing the country's population but no assessment of extent.

# ENVIRONMENTAL MANAGEMENT

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Paper 8291/22  
Hydrosphere and  
Biosphere

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## Comments on Specific Questions

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# ENVIRONMENTAL MANAGEMENT

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**Paper 8291/03**  
**Centre-based Assessment**

## General Comments

The majority of Centres this session were very experienced in the requirements of 8291/03 and there were very few assessment and administrative issues. Most candidates found little difficulty in selecting original and different topics.

Overall this session's project reports were of a similar standard to previous sessions. The majority of reports contained data derived from primary sources, often involving either field investigations or laboratory work. Others utilised secondary sources, such as the Internet. A number of candidates failed to include a clear evaluation or a statistical tool.

As stated in previous reports, it is important that candidates are made fully aware of the requirements of this assessment. Written reports should be of approximately 2000 words in length, ideally structured into the four stages of scientific method, i.e. introduction, methods (justified), results and analysis, conclusion and evaluation. This model of scientific method can be used to provide a check on how well the project is progressing. The better reports used these stages as section or chapter headings. Some research reports were limited to being nothing more than an extended essay with few indications of original research.

Candidates should be asking themselves the questions below:

- 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

Dependent upon the ability and commitment to a well-structured report, candidates performed confidently and quite well in this skill area.

Most stated a clear hypothesis or question, which was accompanied by an explanation of its underpinning principles. Outlining a methodology was usually satisfactory. Quality research requires the formulation of a plan that details research sites, equipment, expected data and how it will be collated and presented. Most candidates included a methodology that was supported by an explanation or justification. The weaker reports lacked this detail and justification.

### Skill C2

Achievement in C2 was very similar to previous sessions. A significant number of quality research reports did very well in this section by making excellent use of relevant data. This was presented in a variety of ways including graphs, tables, diagrams and photographs. Often these were integrated into an analysis through the use of figure references.

Weaker reports did not have an adequate display of graphs, tables and photographic evidence to warrant full credit for each of assessment criteria C2(a) and C2(b). This is the one area in which there has been a

tendency towards pictures and graphs pasted from Internet sources. Fortunately in this session this was at a minimum. It is worth noting the best reports contain data presented in a format that directly relates to the topic and its stated methodology.

The use of a statistical tool is still a weakness for many reports. There is a difference between statistical methods that are used to describe data and statistical tools that are used to analyse and determine the significance of data. The former might include bar charts or line graphs whilst the latter would include correlation analysis, chi squared, t tests etc. The majority of candidates achieved credit for the general organisation of their work and the quality of written communication.

### **Skill C3**

This important skill was frequently a weaker part of reports. This was often because there was not any reference to the data presented in the earlier parts of the report. C3(b) was also weakened by a lack of reference to environmental management principles in some cases.

Although about a third of the entry provided an adequate self-evaluation, some still either ignored this element or confused it with a conclusion. It should be a brief survey of those things that went well and those that did not go as well, i.e. successes and limitations.

### **Concluding Comments**

It is pleasing that candidates continue to engage enthusiastically with this element of the Environmental Management examination as it gives candidates the opportunity to demonstrate their research in a topic of their own choice. As in previous sessions the better topics and final reports are derived from locally-based research and utilised primary data.