

# ENVIRONMENTAL MANAGEMENT

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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. In particular questions worth between 4 and 8 marks will necessarily require more than one piece of information and some supporting details.
- It is important that instructions are followed carefully. A better understanding of the differences between the different command words would be valuable.

## 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. In this session, more 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) Few difficulties were encountered with the majority of candidates able to provide the correct type of plate boundary.
- (ii) Good answers were able to refer to the subduction of the Indo-Australian plate and the subsequent pressure changes leading to the eruption. In general this question was quite well answered. A common error missed the melting or referred to magma rather than describing its creation.
- (iii) This was not well understood by candidates. Some realised that it was linked to viscosity and hence movement but were less able to elaborate. Some inaccurately referred to the subduction slope shown in Fig. 1.1.
- (iv) Good answers were characterised by developed examples. The most popular of which was the mineral-rich soil for agriculture. Some candidates erroneously referred to the creation of new land or the proximity of the ocean as a factor.
- (b) Good answers were characterised by the use of contrasting outcomes between the farmers and the inhabitants of the city rather than simply lifting examples from the diagram. It was the identification of consequences such as loss of crops, livelihood, risk of breathing problems, death, and destruction of property that was required.
- (c) Candidates demonstrated a good understanding between short and long-term responses as well as between countries with differing levels of economic development. A small number of candidates opted to answer the question as though it were an economic question and not in any way related to natural hazards. A wide range of possible responses were provided with some answers being quite evaluative. Common examples were provision of emergency services, medical equipment, search

and rescue, and rebuilding; especially with earthquake proofing and provision of evacuation plans and routes. More successful answers referred to the table to make their comparisons.

### Question 2

- (a) (i) Generally well answered. A common mistake was to get the answers the wrong way round.
- (ii) Candidates needed to better understand the types of weather associated with different pressure systems. They should better apply descriptions to the different factors, for example, strong wind rather than just wind or windy; heavy or torrential rain rather than just rain. More successful answers referred to the rain, wind, storm effects and cloud levels with appropriate descriptions.
- (iii) Some candidates were able to refer to the Coriolis Effect but were unable to explain it successfully.
- (iv) More successful answers correctly identified a hazard and suggested the appropriate atmospheric processes. Common misunderstandings were to suggest monsoons, tropical cyclones or hurricanes were the hazard.
- (b) This question was well answered in general with candidates able to suggest both suitable information about the Tropical Cyclone Yasi and also appropriate responses for the people of the region to prepare. Weaker answers would say 'to allow people to prepare' without providing any suggestions, and as this was in the stem of the question it was not a marking point. It is important for candidates to realise that if 8 marks are available then their answer should include several points and/or developed points.

### Section B

**Questions 3 and 4** were almost equally popular while **Question 5** 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 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 this session have been much better at providing examples from case studies.

### Question 3

- (a) Candidates were in general able to provide descriptions of the information from Fig. 3.1. but did not provide supporting statements or additional detail to explain how these things would impact on the area. The tendency was to make generalisations or somewhat sweeping absolutes, such as extinction of species. Some misunderstandings were evident about the nature of the flora and fauna of this area, which inevitably led to erroneous comments regarding the impact of the gas and oil industries. Successful answers provided developed explanations of the various impacts and different consequences for each.
- (b) Candidates generally provided a description of how a conservation area or national park is managed and how they bring about protection of elements of the biosphere. Fewer candidates were able to apply these points to the preservation of the lithosphere, e.g. controls over extraction including mining, quarrying and drilling for oil and gas. Many candidates were able to cite examples of different, named, national parks and the conservation work occurring there but again sometimes these were restricted to biosphere and in some cases hydrosphere examples.

### Question 4

- (a) Candidates demonstrated the ability to interpret Fig. 4.1. and state the sequence of events. More successful answers were able to provide much more detailed explanations of the processes occurring, which lead to the production of acid rain including named acids and processes. The weakest answers simply stated the release of pollutants into the air cause them to come down again as acid rain.
- (b) Comparisons between LEDCs and MEDCs were common and well made with named examples from studies provided. In order to gain high marks candidates needed to accompany these by describing a range of air pollution examples and the strategies that could be used to control them, such as traffic regulations, car pooling and the use of clean burn technology and industrial

scrubbers. Candidates could have assessed the effectiveness of such strategies and referred to the various international protocols such as Kyoto, Montreal etc. and then evaluated their relative impacts. The least successful answers simply stated that pollution was a problem and needed to be controlled but did not provide any of the details to support this statement beyond citing economic differences between countries.

#### Question 5

- (a) This was the least popular choice and this section proved the most challenging to candidates. Some were able to describe a named soil but were unable to link the characteristics to the flow chart in Fig. 5.1. More successful answers made the links from the flow chart to the development of the soil and its characteristics. Some candidates referred to the soil by its location rather than name.
- (b) The effects of deforestation were generally well understood and explained. More successful answers were able to describe in detail the effects and refer to examples. Various techniques for sustainable management were mentioned but only the most successful answers developed and explained these methods in detail.

# ENVIRONMENTAL MANAGEMENT

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Paper 8291/12

Paper 12

## 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. In particular questions worth between 4 and 8 marks will necessarily require more than one piece of information and some supporting details.
- It is important that instructions are followed carefully. A better understanding of the differences between the different command words would be valuable.

## 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. In this session, more 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) This question was generally well answered with candidates able to correctly describe the processes leading to earthquakes.
- (ii) Some candidates proved unable to spot the table of dates and see the developing pattern. More successful candidates spotted the fact that an earthquake was overdue and suggested that the increase in pressure would be continuing.
- (iii) The question was generally well answered by candidates who demonstrated understanding of the methods used to measure the magnitude of an earthquake. There was some confusion between the terms seismograph and seismometer.
- (b) (i) This question was generally well answered with candidates able to make intelligent suggestions from the information given in Fig. 1.2. More successful answers gave four possible effects and detailed how they might affect the population.
- (ii) Again this was generally well answered and candidates showed a good knowledge and understanding of the plans which could be put in place. Points were developed and many detailed responses scored well. Weaker answers were limited to two or three physical solutions and did not provide solutions such as evacuation plans, information for tourists and training for local tourism workers.

#### **Question 2**

- (a) (i) Some candidates were unable to distinguish between ground level ozone and the ozone layer. There were some erroneous descriptions of global warming and thinning of the ozone layer. The

successful candidates recognised the interaction between the various wastes from combustion of hydrocarbons in the presence of sunlight to form ozone.

- (ii) Candidates need to make a distinction between the two harmful effects given. Often the second mark was missed because the candidate provided a developed version of the first example. Weaker responses would refer to absolutes, such as it kills plants rather than specifics such as affecting crop yields.
  - (iii) In general this was not well answered. The key being the still weather, due to lack of wind, and high levels of sunlight.
  - (iv) Generally this was well answered with most able to make the connection to the wind despite in many cases not being able to describe the conditions in (iii). Some weaker answers erroneously suggested a link to acid rain formation.
- (b) Despite the information in Fig. 2.2, candidates found it difficult to outline the two natural conditions. Weaker answers resorted to descriptions of global scenarios such as global warming, acid rain and ozone depletion rather than using the information from the figure. Successful answers referred to the mountain basin and the onshore winds clearly represented on Fig. 2.2.
- (c) Candidates were able to provide a wide range of measures but were less able to access all the credit available because they did not evaluate the likely success of these measures. Weaker answers tended to provide the same evaluative point for each method rather than providing a reasoned and detailed evaluation of each one as seen in the more successful answers.

### **Section B**

**Questions 3 and 4** were almost equally popular while **Question 5** 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**. Candidates this session have been much better at providing examples from case studies.

### **Question 3**

- (a) Many candidates were able to provide descriptions of the different events leading to the accumulation of debris at the foot of the illustrated slope. The correct terminology was used regularly and detailed answers supplied.
- (b) A lot of candidates provided the information about human activity and produced relevant examples to support their points. This subject was clearly understood by a lot of candidates and the various methods of control and prevention were described in depth with some evaluative comments. Weaker answers described the human actions but were less clear about the effects and the possible solutions. Candidates need to explore such links in more detail to enable them to access all the available marks.

#### Question 4

- (a) The more successful answers here referred to the issues of political disagreements and possible terrorist attacks as well as the loss of power during transmission across such large distances. In general the advantages were better understood than the disadvantages.
- (b) Candidates demonstrated a good understanding of the need to use fossil fuels and demonstrated understanding of the effect of economic development level on a country and its ability to use renewable energy sources. Some candidates saw this as an opportunity to supply an essay on global warming or the advantages of renewable energy forms, which meant they were unable to access the full mark range.

#### Question 5

- (a) The more successful answers made clear and accurate descriptions of the data and referred to the location of Lagos in relation to the Equator. Lower marks were achieved by simple description and no analysis of the information being suggested. Some weaker candidates were unable to relate the information to an equatorial climate and others made some inaccurate statements about the graphs.
- (b) This was generally not well answered. Answers mainly consisted of the economic differences between LEDCs and MEDCs with undeveloped comments such as LEDCs cannot afford to prevent drought. The causes of drought were often limited and the effect of climate change on drought-affected areas limited to the increased temperature making it worse. The more successful answers were able to consider the implications of climate change, such as loss of fertility in soils and increasing desertification.



# ENVIRONMENTAL MANAGEMENT

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Paper 8291/21

Paper 21

## Key Messages

- In **Section A**, in data response questions there should be a careful consideration of the information contained in a graph or diagram to ensure that data is used accurately and appropriately to support answers.
- In **Section B** candidates should ensure that all elements of the question are covered and include specific examples and evaluative statements in answers.
- Candidates should try to include definitions of key terms in their answers.

## General Comments

There was a good response to all questions on this paper. Approximately half the candidates performed better in **Section A** than in **Section B**. For the majority of candidates there was equivalence of performance in **Question 1** and **Question 2** of **Section A**.

## Comments on Specific Questions

### **Section A**

#### **Question 1**

- (a) (i) Some candidates selected confined or perched aquifers for the unconfined aquifer.
- (ii) The misidentification aquifers in part (i) did not prevent access to credit here as it was still possible to describe the characteristics of aquifers A, B and C, in Fig. 1.1. Good answers demonstrated effective use of information to identify distinguishing features of each aquifer. For example, showing an understanding of the position within a permeable layer relative to the water table. In weaker answers characteristics were less specific and could be applied to any of the aquifer types and often the terms permeable and impermeable were used incorrectly. Some candidates focused on how the water in the aquifers could be used. Some mentioned the wells in the figure rather than the natural features and compared how water could be extracted from wells. This information was more appropriate in part (iii) of the question.
- (iii) This question was answered well by the vast majority. Very good answers explained benefits of extracting water that could apply to both aquifers while others referred to each location in turn.
- (b) (i) This was reasonably well answered with most candidates achieving at least partial credit. Good answers stressed how the groundwater store was replenished from precipitation and the terms percolation, infiltration or groundwater flow were used. There was clear reference to the water cycle in these answers. Less specific answers referred to any surface water seeping into the groundwater store.
- (ii) There were some excellent answers that made effective use of the information, including analysis of data from Fig. 1.2. These answers were illustrated with examples of losses and gains and effectively accounted for the overall loss. These answers also included a conclusion based upon an evaluation of the evidence, such as the rate of extraction is greater than rate of natural recharge hence there is an overall depletion of the groundwater reserves. In good answers natural losses through evaporation and in particular losses due to extraction were described with some support of data from Fig. 1.2. Sometimes the question was answered without the use of data to show overall



calculations. Less successful answers focused on water quality as a result of contamination and pollution rather than quantity of water in the groundwater store.

## Question 2

- (a) (i) Most candidates were able to give a correct example of a food chain. There were some incorrect food chains created from information in Fig. 2.1 where the arrows linking organisms in food chains were disregarded. Other examples were oversimplified, these did not give the specific correct information required to gain credit. General terms such as primary consumer, secondary consumer, tertiary consumers or herbivore, carnivores, predator were occasionally used instead of using organisms from the food web. Sometimes a mixture of general and specific terms was seen.
- (ii) The most effective answers were from those candidates who understood the terms habitat and niche and were able to use Fig. 2.1 and 2.2 effectively to illustrate these ideas using examples. Although candidates could distinguish between habitat and niche, most found the habitat easier to define. Niche proved to be more difficult to explain and the concept of organisms occupying the same habitat but a different niche was rarely expressed clearly.
- (iii) Those candidates that recognised the interaction between the terrestrial and aquatic environments in the ecology of the coastal area usually scored highly. Candidates used the feeding link between the marine iguana and the coastal water organisms as an example to exemplify the relationship between the land and sea and how the stability of the entire food web on land could be affected.
- (b) (i) This question was answered well and all candidates could discuss some way tourism can affect the islands. Good answers considered the human impact of tourism specifically on the actual species and threat and effect, e.g. the use of insect repellent may affect the food supply for insectivorous animals. Others mentioned that tourists may introduce invasive species that compete with the native species for resources. There was a tendency to list a number of different ways rather than elaborate one idea.
- (ii) Candidates used Fig. 2.3 effectively, to describe the zoning management plan, most candidates made a balanced answer that mentioned all the zones and used some data. Some candidates used the data in a more creative way discussing proportions of the map and using the scale to consider distances. Some candidates linked the data to the previous resources in the section and commented on the role of the research station in conservation. Well-organised answers proceeded methodically through the zones of the island and evaluated the need for each one. Those who attempted this question usually achieved half of the credit or more. Less effective answers did not refer to the zones or did not say where the vulnerable species were located.

## Section B

**Question 4** was the most popular question in **Section B**, completed by approximately 50% of the candidates, with **Question 3** and **Question 4** each completed by 25%.

## Question 3

- (a) The candidates who did well were the ones who proved they could correctly interpret the data provided in Fig. 3.1. High-quality answers were those in which regions and categories were compared and contrasted. The descriptions of regions and categories were usually appropriate although in some answers there was only reference to general threats rather than the individual categories. Many candidates limited their mark by not using the data with care. In some answers the data was misread. This demonstrates that graphs need to be carefully inspected to extract information correctly. Some candidates discussed the reasons for the number of vulnerable, endangered and critical species in a particular area rather than describing the differences. This information regarding the actual threats was required in part (b).
- (b) Candidates answered this question well and gave some well-developed answers that included specific and relevant details on the case studies they were using. Candidates gave a wide range of threats and discussed how they affected the ecosystems and then went on to discuss detailed management plans, which included local and national strategies. The one area which was often missing in good answers was the evaluation of the management strategies. Most candidates identified a biome with forest, gave some detail of the characteristic features of the forest, most often the tropical rainforest. Many candidates used the Amazon rainforest as a case study and



discussed logging and farming and strategies for managing this land use. These answers often lacked named species and specific examples for threats and management strategies. A small number of candidates answered this question very generally without mentioning a forest ecosystem within a biome. In general the threats to forest ecosystems were better described and were not balanced with the solutions. The measures described were not wide ranging, thus many essays had limited evaluation, at least in part because they did not give many measures.

#### Question 4

- (a) Effective use of the information characterised good answers, which included detail as outlined in the mark scheme. Very few candidates achieved high marks because, although there was a general understanding of the process of eutrophication, the sequence of events was often out of order or significant stages were omitted when describing the process. Often answers went straight from algae growing to all the plants and animals dying in the water. The idea of the algal mat blocking the light for underwater plants was often not included. The role of bacteria as decomposers, in the decay of the dead plants and dead algae using up oxygen in respiration and depleting the oxygen concentration of the water was frequently omitted.
- (b) Candidates were familiar with sources of nutrient enrichment. In good answers candidates were able to identify a river or water course and refer to the sources of nutrient enrichment in the specific river, often referring to both point and non-point sources. A variety of pertinent measures specifically linked to the example of the river and the specific problem sources were evident in very good answers. The answers usually included suitable examples that the candidate had studied and some sensible measures with evaluation. In several answers, there was no named river example, these answers lacked specifics and more often general pollutants not necessarily linked to nutrient enrichment were described.

#### Question 5

- (a) Overall this question was not well answered and only the better candidates answered it fully. Few candidates defined net primary productivity NPP and only a small number of candidates identified the key factors. Very good candidates referred to limiting factors and linked the variation in NPP to examples. In many answers the factors chosen were not always the most appropriate. Fig. 5.1 was not always interpreted and there was often with no reference to the range of ecosystems or the relative data for NPP. Very few candidates used actual figures from Fig. 5.1 to support their answer. A significant number answered in terms of human influences and discussed agricultural production, often without comparison to the natural systems.
- (b) Candidates approached this question in many different ways; some compared two countries while others compared many more. There was effective use of Fig. 5.2 with data quoted in answers and examples used to provide a comparison of countries at different levels of economic development. In general there were more difficulties encountered when it came to assessing the use of sustainable resources to help solve issues arising from the increasing demands of populations. Many were unable to state sustainable actions and balance their essays with suggestions for how these issues could be addressed by sustainable development and instead of sustainable environmental strategies wrote generally about vague economic ideas. A number of candidates did not really understand what the data meant and discussed that using more land per person was more sustainable than using less. Whilst there were some answers that only addressed the question at a very superficial level, there were a good number who clearly understood the significance of the data presented.

# ENVIRONMENTAL MANAGEMENT

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Paper 8291/22

Paper 22

## Key Messages

- In **Section A**, in data response questions there should be a careful consideration of the information contained in a graph or diagram to ensure that data is used accurately and appropriately to support answers.
- In **Section B** candidates should ensure that all elements of the question are covered and include specific examples and evaluative statements in answers.
- Candidates should try to include definitions of key terms in their answers.

## General Comments

Candidates performed equally well in both sections of the paper and within **Section A** in both **Question 1** and **Question 2**.

## Comments on Specific Questions

### **Section A**

#### **Question 1**

- (a) (i) In very good answers the flows and stores were clearly identified and the relationship between these described as part of a local water cycle of the river valley. Many answers included comparative statements contrasting, for example, less surface flow before urbanisation and more after urbanisation but these did not stress the flows or stores or how these component parts were linked in a local water cycle. Weaker answers focused specifically on the river channel itself rather than the river valley. These offered less scope to describe the variety of water stores and flows.
- (ii) This was well answered with many candidates scoring credit for a sequence of related events linked to urbanisation-induced flooding as detailed in the mark scheme. Candidates may not have identified flows in part (i) of the question but many effectively linked the required information in this part of the question.
- (iii) This was accessed by most candidates with reference to measures that prevent water extending onto the floodplain or those that allowed more water to flow in the river channel.
- (b) (i) This was generally well answered with good use made of Fig. 1.2. Very good answers considered the overall benefits of the barrage as a water store, referred to the urban catchment area and distinguished between the prevention of flooding in the two scenarios. In weaker answers there was no distinction between the response to the different situations shown in B and C. The use of the barrage gate was correctly explained in answers, although the use of the pump was often less appropriately applied. This demonstrates where careful analysis and of all the information in diagrams is required.
- (ii) Most candidates were able to state a disadvantage of the barrage, most often the effect upon habitats due to changes in the salinity and the environmental gradient from freshwater to sea water and the disruption to breeding and migratory patterns of fish.

## Question 2

- (a) (i) In **Question 2** a succinct definition of succession was required. The best answers referred to the seral stages of succession with the different communities through pioneer to climax and the gradual changes in the environment, the microclimate and soil over a period of time. Occasionally answers highlighted a misunderstanding of the term succession and did not stress the changes in the community over time. These answers either described a change in the same vegetation over a period of time or they referred to very gradual changes in plant structure over a much longer period time through evolution and adaptation to the environment.
- (ii) Few candidates used the term plagioclimax.
- (iii) Excellent answers referred to the use of fertilisers, herbicides, grazing or burning regimes. The effect of these ways in selectively affecting the community of plants present so that succession is arrested, halted in progress and prevented from continuing through subsequent seral stages, for example by cattle grazing, consuming small shrubs and maintaining a grassland ecosystem.
- (iv) The majority of candidates achieved credit for a suggesting an event and impact.
- (v) In very good answers there was recognition of the progression of a secondary succession from grassland proceeding through to the climax. These explained the changes in both abiotic and biotic factors with increasing diversity, biomass and net primary productivity leading eventually to stable ecosystem. Less impressive answers described without explanation.
- (b) Effective answers demonstrated that managing the ecosystem with many different successional stages present at the same time would create the widest variety of habitats, both aquatic and terrestrial. These answers were illustrated with examples of organisms from suitable similar ecosystems with which candidates were familiar. Less successful approaches simply listed the variety of habits visible without using appropriate ecological terms or defining biological diversity.

## Section B

There was a balance in the number of responses to these questions. The three questions were almost of equal popularity. **Question 3** and **Question 5** were frequently of higher quality than **Question 4**.

## Question 3

- (a) The majority of candidates made a good interpretation of Fig. 3.1. Most gave a clear analysis of the data across the full range, including the areas where consumption is greater than recharge and better answers offered valid reasons for the differences in withdrawal.
- (b) There were some excellent answers to this question. Most candidates expressed a good understanding of the issues associated with the risks of depletion of groundwater stores due to increasing demand. The increased extraction for water in all sectors industrial, agricultural and domestic was well documented. A range of well-evaluated measures characterised good answers. Weaker answers were generally poorly balanced and considered depletion more than degradation, or included less exemplar material.

## Question 4

- (a) Answers related areas of high oxygen concentration to areas where more fish were caught and some identified a trend of increasing oxygen concentration and numbers of fish caught. In very good answers this relationship was linked to varying levels of pollution in the water and the diluting effect of the water as the pollutant diffused downstream. There was some misinterpretation of the data and some candidates struggled to identify a pattern in the data. These answers were often purely descriptive of the data and did not offer any reasons for the variation in data.
- (b) Very good answers chose an appropriate ecosystem, for example a coral reef, and named a specific location. In these answers the characteristics of the ecosystem were described, the pollution problem outlined and measures appropriate to the ecosystem were developed. Weaker candidates did not mention a specific ecosystem, pollution was very general and this made it difficult to evaluate the effectiveness of any general measures.

**Question 5**

- (a) High marks were obtained by candidates who showed how the two aspects of the graph were interrelated and in very good answers the carrying capacity was also clearly defined. In these very good answers scenarios were suggested which could explain a sequence of events to match the changes illustrated in Fig. 5.1. Many referred to excessive demands being placed upon resources as being unsustainable with a subsequent lowering of the carrying capacity. Discerning candidates however stated that lowering of the carrying capacity is debateable as governments have proven capable of slowing population growth and the carrying capacity may respond positively as a result of sustainable and more efficient methods of resource usage being developed. Less effective answers were descriptive and lacked an explanation of the changes shown.
- (b) Very good essays included well-chosen examples from both MEDCs and LEDCs to illustrate a range of policies aimed at achieving a balanced population. These included examples of both overpopulated and underpopulated countries and included both policies aimed at population control and resource utilisation. The weakest answers lacked balance, with population policies only being considered or with little evaluation.

# ENVIRONMENTAL MANAGEMENT

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Paper 8291/03

School Based Assessment

## General Comments

Summer 2015 has seen the entry increase further. Although many Centres enter a small number of candidates, the trend towards large entries from individual Centres continues. It is pleasing that with such a large increase in the entry the number of administrative and assessment issues are quite small. The vast majority of Centres are to be congratulated on the quality of their work.

- The candidates in most Centres of less than 15 candidates found little difficulty in selecting original and different topics. However, with a large entry there are often several candidates with a similar project topic.
- With large Centres it is almost inevitable that some candidates select similar titles. Fortunately most candidates heeded the advice given on the project proposal form and worked independently of each other.
- Many Centres met the deadlines for submitting their project samples to Cambridge. It seems that in some cases, although the internally awarded marks are submitted by the deadline, there is a delay in dispatching the work to Cambridge.
- Some Centres failed to include their MS1 (attendance and final mark register) with their project sample. The entry on the MS1 must contain the internally assessed mark out of 40; not 20.
- Although not entirely a reflection of the increased entry, this session has seen a trend towards assessment leniency. Particularly in assessment criteria: C2(a), (b) and (e); C3(a), (b) and (c). Either 2 marks are being awarded when 1 is better or sometimes credit is being given for criteria not actually present in the report. Credit cannot be given for use of a statistical tool when one has not been used, nor can 2 marks be given for conclusions that do not relate back to the data.

Overall this session's project reports were generally of equivalence to 2014 with the nearly all achieving marks in the 16 to 36 range. As most reports did not contain a clear evaluation or a statistical tool, very few candidates achieved marks in the range 36 to 40. It is still the case that the best reports derive from the collection and collation of primary data obtained from either field investigations or laboratory work. A significant number of candidates rely on secondary data, invariably obtained from the Internet.

Finally as stated in the Moderator's report of last summer, 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 use these stages as section or chapter headings. Some research reports were limited by being nothing more than an extended essay with few indications of original research.

As stated in previous reports 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 the results and analyses fully representative of the methods referred to 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**

Most candidates performed well in this skill area.

Either as the project title or as part of an introduction, hypotheses or questions were stated by most candidates. These were frequently but not always accompanied by a clear explanation of its underpinning principles. The outlining of the methodology was in the main adequate. Good quality research requires the formulation of a plan, detailing research sites, equipment, expected data and how it will be collated and presented. Although most candidates included a methodology, it was often a brief list without any explanation or justification. As a consequence it was often difficult to judge whether or not their developed plan would be effective in testing a hypothesis or answering a question.

Needless to say, the better projects achieved these goals, whilst weaker reports did not specify the details of their topic and were unclear about how it should be investigated.

### **Skill C2**

Achievement in C2 was very similar to previous sessions. There were a significant number of high quality research reports that did very well in this section. These made excellent use of relevant collected data which were presented in a variety of ways including graphs, tables diagrams and photographs; invariably integrated into an analysis through the use of figure references.

For remaining candidates there was quite 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. Those projects that were more like extended essays had very little data presented in the form of graphs and/or tables. As a consequence it was difficult to achieve marks in any criteria that required reference to data; also negating use of a statistical tool.

A disappointing feature of some reports 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 were present, they became decorative and were not referred to in the analysis or description. Some candidates undertake a desktop research project often including questionnaire responses but fail to present the data in a clear format.

The use of a statistical tool continues to be a weakness. There is a difference between statistical methods that are used to describe data and statistical tools that are used to analyse data. The former might include bar charts or line graphs whilst the latter would include correlation, chi squared, t test etc. Unfortunately some Centres award this mark when there is no evidence at all of statistical data in the report.

The majority of candidates achieved credit for the general organisation of their work and the quality of written communication.

### **Skill C3**

It is a pity that this important skill frequently forms the weakest part of a candidate's work. The main weakness in C3(a), the conclusion, lies in a lack of reference to the data presented in the report. C3(b) was much weaker this year as only a small number referred to related environmental management principles; yet the full 2 marks were sometimes given when 1 mark was appropriate.

It seems that despite advice being given in previous reports a significant number still do not understand what is expected of an evaluation. This needs to be a brief survey of those things that went well and not so well i.e. success and limitations. Many confused an evaluation with a conclusion and a significant number did not write an evaluation. Candidates need to be aware of these expectations; as with all assessment criteria.

**Concluding comments**

It is a positive that Centres and their candidates continue to engage enthusiastically with this element of the Environmental Management examination with the majority welcoming the opportunity to research a topic of their own choice. As in previous sessions the better topics and final reports are derived from locally based research and utilise primary data. We would 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.