ENVIRONMENTAL MANAGEMENT

Paper 8291/03
Centre-based Assessment

General comments

There was a wide range of performance on this component with some very strong work produced.

Most candidates engaged enthusiastically with this element of the Environmental Management syllabus, in which candidates are given the opportunity to research a topic of their choice. This year the selection of topics included some very key and current environmental issues. Candidates must however be given close guidance in respect of their project title as a significant number try to review global data, which is extremely challenging given the assessment criteria and word count. Sometimes the title was too broad in scope and some Centres should provide closer guidance at the project proposal stage. The better topics and final reports are derived from locally based research and utilised primary data. The majority of candidates had structured their reports in the logical order of: introduction, methods (justified), results and analysis, conclusion and evaluation. Many candidates used these stages as section or chapter headings. It is important that candidates recognise the difference between a research report and an extended essay, given the assessment criteria C2 (c).

Candidates could be reminded to check the following:

- 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 previously?
- 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 and considered what can be done to improve my work?

Some reports did not contain a clear evaluation or a statistical tool, in these cases candidates were not able to access the full mark range. The best reports tended to derive from the collection and collation of primary data obtained from either field investigations or laboratory work. Some of the higher achieving candidates clearly demonstrated the use of combining relevant secondary data with their primary data, thus producing a rigorous report. These candidates had usually also submitted detailed sources of information in support of their environmental proposals.

A number of administrative and assessment areas require attention in some centres:

- There was evidence of some leniency, particularly in assessment criteria C2 (a), (b) and (e) as well as C3 (a) and (b).
- Credit was awarded for criteria not actually present in some project reports. For example, no credit can 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.

Comments on assessment criteria

Skill C1

Most candidates performed well in this skill area. Hypotheses or questions were stated by most candidates either as the project title or as part of an introduction. Frequently, but not always, this was accompanied by a clear explanation of its underpinning principles. In stronger work the hypothesis was clearly written and not simply implicit to the introduction. This was important as some weaker candidates concluded that their hypothesis was correct, yet there was no evidence given to support this.

Stating and justifying a methodology was generally adequate. Good quality research requires the formulation of a plan, detailing research sites, equipment, expected data and how it will be collated and presented. Weaker reports often had a methodology which was a brief list without any explanation or justification. As a consequence it was often difficult to judge whether or not their methodology would be effective in testing their hypothesis or answering their question.

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

A significant number of high quality research reports did very well in this section. They typically made excellent use of relevant collected data, which was presented in a variety of ways including graphs, tables, diagrams and photographs. Sometimes these were integrated into an analysis through the use of figure references.

Some candidates presented graphs and tables poorly. Graphs were sometimes inappropriate for the type of data to be represented. Graphs should have axes containing labelled units and both lines and bars should be easily interpreted. Some reports might have been described as extended essays and had very little data presented in the form of graphs and/or tables. As a consequence it was difficult for these candidates to gain credit in any criteria that required reference to data.

Some reports were heavily reliant upon photographic evidence with a limited amount of quantitative data. It is often better if photographic evidence supplements other forms of information.

The use of a statistical tool is a weakness in many reports. 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 awarded credit when there was no evidence at all of statistics being used.

The majority of candidates organised their work well and the quality of written communication was high.

Skill C3

This important skill was often the weakest part of a candidate's work. The main weakness in C3 (a), the conclusion, was a lack of reference to the data presented in the report. C3 (b) was also often very limited, as only some candidates referred to related environmental management principles. This element also needed reference to data within the report.

Candidates should be reminded that the evaluation needs to be a brief summary of those things that went well and not so well, e.g. successes and limitations. There was some confusion between an evaluation and a conclusion. Some candidates appeared to evaluate their secondary data instead of appraising their own methodology. A small number did not include an evaluation.

ENVIRONMENTAL MANAGEMENT

> **Paper 8291/11**
> **Paper 1**

Key messages

- In **Section A**, candidates should note the number of marks available for each part question and write their answers accordingly. This will give them an indication of the amount of content and detail expected.

- It is important that instructions are followed carefully. Teachers can help candidates by making sure they are clear about the differences in meaning of command words such as state, outline, suggest, explain, describe and evaluate.

General comments

There was a reasonably good response to all questions on this paper though in some cases performance was uneven across the two sections of the paper. Some candidates found **Question 1** (weather) less demanding than **Question 2** (structure of the Earth). Topics which were most challenging were the methods of collecting information about the weather, plate tectonics and seismic waves.

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

In this session, the more successful answers included effective use of appropriate examples to illustrate key points along with supporting details using appropriate terminology.

Comments on specific questions

Section A

Question 1

(a) (i) Most candidates were successful. Some candidates did not use the key effectively.

(ii) The circular/concentric pattern was only described by the stronger candidates. The compass points were often not referred to. Weaker answers described the weather and listed the surface area pressure readings.

(iii) Candidates often successfully identified a low pressure system. Stronger answers provided good explanations of the formation of rain clouds in an area of low pressure.

(iv) The completion of the table was generally done well.

(v) This was generally well answered and candidates were able to describe the changes of weather as an area of low pressure moves across Barcelona.

(b) Strong answers showed a good understanding of two of the methods used to collect information about the weather. The best candidates were able to suggest how this could contribute to weather forecasting. Weather satellites, balloons, ground stations and aircraft were the most common examples given and the functions and uses of these were well understood. Weather ships, buoys and radar were less well understood and in the case of radar there was often little understanding of how it was used in gathering weather information.

Question 2

(a) (i) Candidates made good use of the stimulus material in stating the differences between the crust and the mantle and this question was usually well answered.

(ii) This was generally well answered. Stronger answers calculated the thickness of the outer core from the diagram as well as providing a good range of characteristics. Weaker answers referred to the depth rather than the thickness.

(iii) Only stronger candidates were able to demonstrate an understanding of the processes within the mantle which are responsible for movements in the Earth's crust. These answers referred to the heat from the core, convection currents and the movement of the tectonic plates. Very few answers mentioned radioactivity. Weaker answers gave descriptions of plates pushing against each other or a list of the three main types of tectonic plate movement without the underlying processes being explained.

(iv) This question proved challenging for some candidates. Many were aware of P and S waves and could explain the differences. However, this was often not translated into how they provided information about the structure of the Earth. Some candidates were able to describe the shadow zone but few answers referred to the travel times, refraction and reflection of the waves. Weaker answers referred to earthquakes and plate movement but were unable to provide greater detail.

(b) (i) This was generally well answered. Weaker answers described the oceanic plate as being covered in water and flat compared to the continental plate which was covered in mountains. These candidates did not make good use of the diagram and often incorrectly described the relative thicknesses. There was confusion between the terms density and weight. Stronger answers correctly described the differences in density, rock type and mineral content.

(ii) This was generally answered well with candidates demonstrating a good understanding of the hazards found in this coastal environment. Weaker answers appeared to misunderstand the phrase human habitation. Stronger answers provided a lot of detail about the hazards including strong descriptions of volcanic activity and the effects of these on human activities.

Section B

Question 3

(a) Stronger candidates referred to the concentric and circular patterns shown on the map. Most referred to the patterns prompted by the labels on the key. The most successful answers considered detailed causes, including the extra volume of traffic connected to the CBD. However, few candidates made use of the compass points. Some weaker answers referred to deforestation and agricultural practices at the outskirts of Greater London.

(b) There was good understanding of types of air pollution and the movement across international boundaries. Many candidates made good use of examples but weaker candidates tended to provide too much detail about global warming and did not include other aspects. Most candidates were unable to name examples of international agreements and protocols and referred to generalised laws instead. However, stronger candidates gave detailed descriptions of named protocols and evaluated their outcomes.

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Question 4

(a)   This was generally well answered with candidates showing a good understanding of afforestation and how it leads to an improvement in soil quality. Weaker answers focused too much on the text from the stimulus material and did not give explanations of the effects on the soil.

(b)   The issues of rising population and the growing demand for food were well understood. However, only the strongest answers made the link to the world's soils and dealt with issues of soil fertility and possible solutions such as aquaculture, hydroponics and agricultural technology. Weaker answers focused on population and population control and did not link this to soils.

Question 5

(a)   Most candidates made good use of the data and effectively compared the main parts of the graph. However, few candidates attempted data manipulation in descriptions. Stronger answers were able to explain the implications while weaker answers just described the data.

(b)   Most candidates focused on food and did not discuss soils, water and fuels in their answers to this question. The strongest answers discussed these and offered solutions such as renewable energy sources.

ENVIRONMENTAL MANAGEMENT

Key messages

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(b)   Most candidates focused on food and did not discuss soils, water and fuels in their answers to this question. The strongest answers discussed these and offered solutions such as renewable energy sources.

ENVIRONMENTAL MANAGEMENT

Key messages

- In **Section A**, when considering source material candidates should analyse and use the information to support statements made in answers.

- Care should be taken when reading data from graphs.

- In **Section B**, candidates should use examples from specific locations to allow for relevant evaluations of strategies and methods used in environmental management.

General comments

In **Section A**, most candidates performed equally well in **Question 1** and **Question 2**. Candidates made particularly good use of maps and diagrams in **Section A** and showed skill in selecting the relevant information. There were many examples of effective planning for essays in **Section B**.

Comments on specific questions

Section A

Question 1

(a) (i) In the most effective answers, the extent of sea ice for the different years was correctly described from the map and either particular areas of the map were referenced or the difference in extent estimated in quantitative terms. No explanation was required in this question although some answers contained an explanation of global warming.

(ii) Excellent answers suggested the data indicated that a line of best fit drawn on the graph would show an increasing trend. These answers were supported with data to a suitable level of accuracy. Less effective answers referred to overall fluctuations and the lowest and highest points on the graph were chosen to show a difference in melt area without highlighting an upward trend. Other answers contained insufficient data to illustrate a trend. These answers referred to only one year, rather than comparing at least two points on the graph and often omitted data on the actual melt area.

(iii) The most effective answers referred to the main storage zones of water, the oceans and ice shown in **Fig. 1.1**. In these answers the melting of ice in terms of the change in state, from solid ice to liquid water and the mixing of the melted fresh water, with saline water in oceans was explained. Changes in the percentages of fresh water in ice stores and saline ocean stores as a result of increased melting of ice were emphasised. The increase in temperature was linked to thermal expansion of sea-water or the increased melting of the glaciers to a rise in sea level. Supporting evidence from the increased melting of the Greenland ice sheet in **Fig. 1.2** and seas in **Fig. 1.1** was used effectively, to emphasise the increase in the volume of the saline water store. Less strong answers linked a temperature rise to increased melting or glacier melting to increased sea level but omitted some detail of the changes in the water stores. The cause of the temperature rise and a description the greenhouse effect were not required.

(b)(i) Good answers emphasised the unpredictability of the closures of the Thames Barrier and the inconsistency of the data between 1983 and 2012. Broad patterns in the data were described by dividing the recorded data into sections, which typified particular periods of changes for example, the minimal number of closures between 1983 and 1989. Weaker answers did not utilise the full range of data to identify changes over the timescale.

(ii) This was well answered. Disadvantages and advantages were outlined. In addition to providing a balanced assessment, the most successful answers also referenced information from **Fig. 1.3** and also offered some evaluative points from **Fig. 1.4**. Weaker answers were limited to generalised points, for example by stating economic loss without exemplification.

Question 2

(a)(i) In excellent answers succession was succinctly defined and related to the pioneer community of the lichen, changing with time, to the climax community of the deciduous mixed woodland in **Fig. 2.1**.

(ii) Answers to this question were variable. Good answers included aspects of explanation relating to both biomass and biodiversity. Changes from the harsh conditions of the early succession stages, towards a more favourable environment with greater variety and larger organisms was explained. Weaker answers omitted an explanation. Changes in biomass and biodiversity were described without emphasising the differences.

(iii) This question proved challenging. In some good answers, the high number of herbaceous plants was linked to a high rate of photosynthesis and the energy available from primary production for growth and increasing biomass.

(b)(i) This was well answered. A variety of reasons were suggested.

(ii) This was often very well answered. An understanding of the role of national parks was clearly demonstrated for example in protecting endemic species, restricting unauthorised activities, while allowing visitors, education and research. Statements were exemplified with evidence from **Fig. 2.3**. In weaker answers and statements were made without exemplification and without reference to the Vesuvius National Park.

Section B

Question 3

(a) In the best answers the graph was used to calculate percentages and similar. This was used to highlight the differences between regions. Variation in the size of regions, the water available through precipitation and the quantity of water lost due to evaporation were considered in these responses together with the interaction between factors such as temperature, precipitation, evapotranspiration, vegetation and topography on the availability of surface water. In less effective answers data was simply quoted from **Fig. 3.1**. These answers were more descriptive and reasons for the differences between regions were not considered.

(b) Good answers examined whether with increasing population and increasing demand, water resources would be depleted. A range of ways of managing water resources were exemplified through contrasting examples from more and less economically developed countries. Weaker responses lacked examples of water resource management from specific countries and referred generally to MEDCs and LEDCs. Ways of supplying water were examined, although an assessment of the impact of an increasing population on water resources was not adequately addressed.

Question 4

(a)   This was generally well answered. **Fig. 4.1** provided information which was used effectively to produce some good answers in which the global distribution of biodiversity was described and the relationship between the biodiversity and broad vegetation zones or biomes was recognised. Some of the biomes were located and the distribution of biomes such as desert, tundra, tropical rainforest, and grassland were described. Biodiversity was clearly linked to suitable factors; high biodiversity to a favourable climate, with suitable temperatures, availability of water and the conditions for growth contrasted with low biodiversity at the poles and deserts and unfavourable climate and conditions for growth. Weaker answers made no mention of biomes. Regions or countries were listed for each biodiversity zone and there was no identifiable pattern of distribution evident and few reasons for the variation in biodiversity were stated.

(b)   The most successful answers examined methods in ecosystem management, in specific examples and with relevant evaluation for example in Amazonia, the Galapagos Islands, the Great Barrier Reef or the Kruger National Park. Factors affecting the ecosystems were also linked to the specific examples. Methods depended on the example but included the designation of world heritage sites, marine parks, protected zones and nature reserves. Good answers were characterised by a discussion of how human factors can be mitigated through ecosystem management. Weaker responses were characterised by methods being considered without reference to examples thus making an evaluation difficult. These answers made no reference to human and natural factors affecting ecosystems.

Question 5

(a)   The most effective answers explained how sources linked to human activity caused water pollution and included explanation of how this leads to a 'dead zone'. These answers linked pollution, such as fertilisers from the agricultural run-off, to eutrophication and the resulting enhanced algal growth, subsequent decomposition and eventual oxygen depletion. A discharge of sewage was linked to an increase in organic matter, an increase in bacteria and increased oxygen demand, reducing the oxygen concentration in the water. In less effective answers pollutants were linked only to the algal bloom. There was some uncertainty in answers of the link to oxygen depletion and the death of aquatic organisms.

(b)   Sources of pollution from both land and marine sources were chosen in successful answers. Pollution from the land was often divided into point and non-point sources. Sources reaching the sea from rivers or sources directly discharging into marine environments were also differentiated. There was effective use of well-chosen examples of marine environments, illustrating the sources of pollutants with strategies pertinent to the specific pollutants evaluated. Strategies linked specifically to the type of pollutant were most successfully evaluated. Weaker responses omitted sources of pollution from within the marine environment and focused only on those from the land. Strategies were outlined but were often generalised and not linked to specific pollutants or to examples.

ENVIRONMENTAL MANAGEMENT

Paper 8291/22
Paper 2

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