

ENVIRONMENTAL MANAGEMENT

Paper 8291/01

Paper 1

General comments

With an entry that has almost doubled, a wide variation in standards was to be expected. The vast majority of candidates engaged well with this paper. Most used their time well and gave each section of the paper an equal amount of time. There were very few rubric errors that involved answering more than one question from **Section B**. Performances across the paper were variable with many candidates achieving much better marks in one section than in the other. Strong papers were strong in both sections.

The data and information provided in both sections of the paper seemed well received, if not always correctly interpreted, and although the quality of essays varied considerably in both length and quality, most candidates tried to satisfy the question requirements. In terms of the use of the data, a noticeable trend and issue within this session was the inability of a large number of candidates to follow the question instructions.

Where a precise instruction was given to refer to, or use, the information or prompt material, many answers gave a general discussion not related to the table, graph or photograph.

Comments on specific questions

Section A

This part of the examination requires candidates to answer both questions: one topic based on the lithosphere and the other on the atmosphere. These questions require the analysis of information derived from each topic.

Question 1

Marks for this soils-based question ranged from 3 to 20. The question was in three parts:

(a) - a research technique involving soil texture

(b) - the analysis of a soil profile and how it might change

(c) - the causes of soil erosion and how it might be managed

(a) For most candidates this proved to be the weakest part of **Question 1**. Only 50% of the entry seemed to know that soil texture refers to the feel of a soil, mainly according to its grain size and shape. Other factors, such as moisture content and organic composition, were not mentioned. Most candidates achieved one mark for describing the passage of soil through each mesh. However, dry soil will only pass through the apparatus if it is shaken. Very few candidates obtained full marks for parts **(iii)** and **(iv)**. Although the majority positioned their **X** correctly, very few could identify the positions of sand (bottom right) and clay (at the top) within the triangle. It was surprising that even though the question required the labels to be placed within the triangle, most candidates wrote 'sand' and 'clay' at various positions outside.

(b) This was much better answered. Even though many did not understand soil profile, the diagram proved to be a suitable prompt for a description of a humus rich but eluviated **A** horizon and an illuviated moisture and nutrient rich **B** horizon. In the second part, most candidates obtained some credit for correctly assuming that removal of the vegetation cover would deprive the soil of organic nutrients and expose it to erosion. Not many mentioned the possible hardening of the soil surface.

- (c) Most candidates coped reasonably well with the photograph and made a good attempt at describing the clearance of woodland and subsequent erosion. Deforestation and agriculture were most often quoted as causes, and erosion in terms of wind and water. Many candidates were unclear about why surface runoff and gullying would occur. The most popular strategies to enable recovery were afforestation and improved farming techniques.

Question 2

It is a pity that many candidates find questions on the atmosphere and weather difficult. It is worth noting that although the topics that are likely to come up in an examination are listed in the syllabus, it is very difficult to utilise the local data that would satisfy all candidates from Argentina, North America, Europe and Southern Asia. This question was mainly concerned with the weather characteristics of temperate and tropical cyclones.

- (a) About half of the candidates coped reasonably well with the weather chart and most were able to correctly position at least two of the features. Wind direction and the cyclone were generally located correctly, but there was less certainty about the cold front and anticyclone. Parts (iii) and (iv) derived from a correct interpretation of the chart with **X** receiving its weather from the warm front, **Y** from the anticyclone and **Z** from the approaching depression or cyclonic system.
- (b) Unfortunately it seems that very few candidates used Fig. 2.2, and many candidates expressed little understanding of one of nature's most powerful mechanisms.

Parts (i) and (ii) were concerned with the processes that transform a tropical storm into a hurricane and why wind speeds in excess of 100 km/hour occur. A storm having formed, the developing hurricane moves across an expanse of warm (>27 °C) smooth ocean water from which it gains energy. Strong winds are derived from the intensity of the low pressure system, thereby forming a very steep pressure gradient. Strong winds are also caused by the air spiralling into a vortex, the system becomes self-generating.

Parts (iii) and (iv) examined two characteristic features of a hurricane, namely the eye and a storm surge. With so many candidates living in hurricane prone regions there was a surprising lack of understanding of the two features. Most omissions occurred in the description of a storm surge. Most mentioned strong winds driving waves onshore, but few mentioned the effects of low pressure almost lifting sea water. In various ways, most mentioned flooding and flood damage.

- (c) Although many ignored the need to elaborate upon one strategy, there were some good answers to this question. Early warning systems using satellite tracking drew the best answers, whilst those opting for evacuation plans and building barriers sometimes wandered off the topic.

Section B

Questions 3, 4 and 5 were of equal popularity and answers of quite varied quality. High quality answers were associated with candidates who had apportioned sufficient time and set about planning their essays. Occasionally, spending too much time on the 10 mark structured question had a detrimental effect on the second part of the question.

Question 3

Overall this proved to be the weakest of the three questions in this section.

- (a) It was unfortunate that most candidates outlined causes of urban pollution without any direct reference to Fig. 3.1. Thus relevance to the question was often implicit rather than stated. This aerial view across central Buenos Aires contained variations in road width, traffic, building density and size, as well as open land. Using these areas, it should have been possible to locate variations in noise, traffic pollution, relatively clean air and domestic pollution. The background to the photograph contained some evidence of industrial activity.

- (b) Answers to this question on reducing atmospheric pollution in urban areas were much better answered. The best essays focused on named urban areas and evaluated methods such as traffic reduction, alternative energy, fuel pollution measures and creating green areas in cities. The weakest answers occasionally ignored the need to refer to urban areas or briefly outlined one or two methods of reducing traffic congestion.

Question 4

This proved to be the best of the three questions answered in **Section B**.

- (a) Most candidates responded well to the information provided in Fig. 4.1. High quality answers clearly identified country groups **A**, **B** and **C**, as LEDCs, Newly Industrialised Countries (NICs) and MEDCs respectively. These answers moved beyond a simplistic linkage between wealth and energy and for each of **A**, **B** and **C**, elaborated upon two or three characteristics of energy utilisation. The weakest answers wrote rather simplistically about **A** and **C** (usually labelled as poor and rich) and ignored the middle group of countries which does in fact include China and India.
- (b) There were some very good assessments of attitudes towards the sustainable use of fossil fuels. These answers reviewed the different priorities of LEDCs and MEDCs towards their current use of fossil fuels and the factors that would influence future energy policies. Clarity of expression was needed for this analysis as such priorities are not clear-cut. For infrastructural and economic reasons, some MEDCs fully intend to continue to use fossil fuel, whilst many LEDCs have developed alternative energy sources (biofuels, HEP and geothermal energy) and can therefore conserve what fossil fuels they have. At the same time, some LEDCs will continue to exploit and use their fossil fuels in order to develop.

Weaker answers sometimes adopted a very simplistic view of MEDCs and LEDCs, or were quite simply incorrect about the judgements they made about countries in each group. For most developing countries it is incorrect to assume that poverty dictates that they are more concerned about energy conservation, or that MEDCs do not really care about conserving fossil fuels because they are wealthy enough to do as they please.

Question 5

This proved to be quite a popular question in which parts (a) and (b) were generally adequately answered. In contrast to **Question 4** there were few really excellent answers.

- (a) Seismic zonation is an accepted way of both illustrating and predicting the effects of earthquakes.
- Candidates did give the map of San Francisco detailed attention and most were able to link levels of seismic activity with the underlying sediments, rubble or rocks. Occasionally the importance of proximity to the active fault lines was ignored and some candidates failed to say why loose sediments were unstable and igneous rocks stable. A small number of candidates did mention liquefaction.
- (b) This question suddenly became extremely topical and some candidates had the wit and initiative to utilise media reports of recent events. The question was concerned with how to limit the damaging effects of earthquakes in urban areas. This involves preventative measures such as building design, earthquake monitoring etc. and post-event strategies such as rescue and aid. However, the focus should really be on the former. The better essays drew contrasts between the impact of the San Francisco earthquake and mostly the Armenian and Kashmir earthquakes. Weaker answers were unclear about how MEDC's and LEDC's plan for such contingencies and these essays frequently lacked the balance required.

Conclusion

Like any examination session, Centres should use this year's results as a platform for the future. If candidates have done well, what contributed to this success and what needs to be revised? Where candidates have been less successful, what needs to be the focus of next years teaching? I suggest the following as priorities.

- A detailed reference to the syllabus content to establish teaching plans that incorporate all elements.
- Relevant and imaginative use of case studies.
- Giving all candidates ample practice in presenting their work in continuous prose. Within the course, some of this may well be word-processed but there is also a place for traditional writing skills. It is important that many candidates are taught to carefully detail the components of a question and to structure their answers accordingly. The 30 mark essay in this paper should have occupied 30 to 35 minutes in which it is possible to write between 400 and 600 words of detailed prose (some do much more).
- Our environment is dynamic and it is important that through use of the media, Internet, etc. teachers and their candidates utilise current information.

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Paper 2

General comments

The level of performance in Paper 2 was similar to that in Paper 1. Again, most candidates used their time well with the input into **Section A** being similar to **Section B**. Additionally, as in previous sessions a significant number of candidates found the more structured questions in **Section A** posed more difficulties than the essays in **Section B**. Perhaps this is because the essay topics offer candidates the freedom to develop elements of environmental management with which they have some immediate affinity. There were no rubric errors.

The data and information provided for questions in both sections seemed well received and there were few instances of this material being ignored. As with Paper 1, the quality of answers to both sections were varied, both within and between Centres.

Comments on specific questions

Section A

Question 1

The theme for this question was concerned with the characteristics of food webs and how elements of their stability might be threatened. The savanna biome was used as an illustrative example. Candidates have traditionally performed well in questions concerning the biosphere and, with a few exceptions, this year was no different.

- (a) The food web of the savanna proved to be an interesting departure from biomes used in previous sessions. Although responses across the six parts in (a) were varied, (ii), (iv) and (vi) were better answered than (i), (ii) and (v).
- Defining or describing the characteristics of a food web once again proved to be difficult for some candidates. Many only described a system which revealed the eating habits of various consumers rather than relating the interaction of food chains and flow of energy through trophic levels.
 - The only problem with the identification of a primary consumer was that a small number of candidates misinterpreted the term 'primary consumer' and gave the Lion as their example.
 - The climatic chart used the same format as is used in text books and atlases, in which temperatures are shown in a line graph and rainfall as bars. Good answers correctly interpreted the chart and linked the April temperature peak with the end of a seven month dry period, along with the coincidence of rain and high temperatures from May to September.
 - There were few difficulties experienced with part (iv), the savanna grass being consumed by large herds of herbivores.
 - Relatively few candidates explained that the predators at the top of the food web achieved their niche through their particular skills in obtaining food, e.g. lions hunt in organised packs; hyenas and vultures are scavengers.
 - There were some excellent references to how aridity would reduce the producer level with a negative knock-on effect through each trophic level.
- (b) A significant number of candidates either misread this question or failed to fully develop their answer. Fig. 1.2 contained data on the number of endangered species in three continental areas and did therefore imply variations in biodiversity. A large number of answers were only concerned with reasons for differences in biodiversity rather than stating that large numbers of endangered species might be a product of greater biodiversity and vice versa. Good quality answers accompanied a recognition of the need to give three reasons for the regional differences and there

were some effective references to poaching and hunting, climatic change and conservation in Europe.

Question 2

In most instances part **(a)**, which was concerned with global water stores, was better answered than **(b)** and **(c)**, which attempted to apply the concept of water balance in two different situations.

- (a)** In most cases this section was quite well answered. There seemed to be some encouraging understanding of the nature and location of water stores as well as the possible effects of increases in temperature as accompanied global warming. The only major issue with responses to part **(a)** occurred in **(ii)** where some candidates thought a decrease in temperature would result in the melting of ice-caps and a rising sea level.
- (b)** Here candidates were required to describe the balance of inputs and outputs into a woodland area. Important to this question is the balance between inputs and outputs, i.e. inputs = outputs. Most marks were obtained through implicit descriptions of the water cycle in a woodland area.
- (c)** This formed the weakest part of **Question 2**. Fig. 2.3 showed the soil moisture balance for Cuddalore. In these graphs the rates for evaporation and transpiration remain fairly constant whilst the precipitation varies. For this reason, a reduction in precipitation would mean there is less water available for plants in the critical period between May and October. There is already a soil moisture deficit during the remainder of the year. This summer reduction in water has a detrimental effect upon agriculture unless farmers can find alternative sources of water.

Section B

As with Paper 1, there was a fairly even spread of options for **Questions 3, 4 and 5**. In this paper, however, most candidates gave more attention to the balance of 10 marks for part **(a)** and 30 marks for part **(b)**.

Question 3

Responses to this question on water supply were sometimes of high quality and occasionally very disappointing.

- (a)** The pie chart conveyed information on safe water supply within four continental areas. In this context 'safe' refers to both quality and quantity. Good answers identified three distinct reasons and used the regions to illustrate variations. These answers used differences in national wealth to describe water scarcity, water quality and investment. These points were frequently linked to population size and demand for water.

Weaker answers lacked organisation and were less clear about giving three distinct reasons. Some weaker answers described three regions but used the same general reason for each.

- (b)** Answers were quite varied in quality, with marks ranging from 3 to 30. The question contained the following key elements which, if adhered to, should enable a good quality answer: choosing examples from **either** LEDCs **or** MEDCs; description and **evaluation**; satisfying an **increasing** demand for water.

Most high quality answers satisfied each of the emboldened points. These answers built on issues such as climatic change and drought with how water is currently conserved. Satisfying increased demand involved reference to projects such as reservoirs, increased use of ground water and, where appropriate, desalinisation.

A significant number of candidates utilised their local knowledge of water conservation with reference to such measures as restrictions on domestic water usage, current methods of water extraction and conservation, but did not mention the longer term issue of meeting increased demand. These essays were weakened by this omission.

Question 4

Although marginally the least popular question in this section, it did elicit some very good answers. Perhaps the requirements to omit human activity and describe how the ecological stability of a forest is maintained, put candidates off this question. This was unfortunate because the second part of the question followed a well-trodden path, i.e. human impact on a selected ecosystem.

- (a) By selecting temperature, moisture, soil and nutrient exchanges, the majority of answers had the balance of biotic and abiotic factors needed to explain how ecological stability would be maintained. Variations in the quality of these descriptions was determined by the extent to which the factor was developed, e.g. rainfall alone would warrant 1 mark; further information on the role of water in photosynthesis and plant growth achieving the needed elaboration.
- (b) Although, as expected, tropical rain forests were a popular choice, it was pleasing to read about the effect of human activity on relatively small scale and local ecosystems. There were some very competent and sometimes passionate analyses of the effects of exploitation of parts of the Florida Everglades and how management and conservation is helping to restore the region. Strong answers took up all components of the question and, most importantly, high quality essays contained a strong element of assessment.

Question 5

Although the second part of this question was quite challenging, it seems that many candidates were attracted by part (a), and **Question 5** became the most popular question in **Section B**.

- (a) This required the selection of three current issues that impact upon the global environment. Fortunately there were few instances of more than three being selected. Nearly all answers elaborated upon the nature of the issue. The single factor that differentiated between good and weak answers was whether or not the candidate mentioned how the issue exerted pressures on the environment.
- (b) This was quite a challenging question, particularly as there is a need to focus upon the biosphere. Most candidates referred to the Kyoto and Montreal protocols that were mainly concerned with greenhouse gas emissions and ozone depletion. Unfortunately, by developing this focus, some candidates lost sight of the need to manage the biosphere. It would have been better to have described the objectives of the 1992 Rio conference which dealt specifically with global warming, wilderness and habitat preservation, biodiversity and preservation.

It was quite refreshing to read some essays that moved away from Rio, Kyoto and Montreal, etc. and considered the value of groups from different nations agreeing to conserve areas such as wetlands, oceans, coral reefs and woodlands. In this context the influence of pressure groups such as Greenpeace and various NGOs could be considered.

Conclusion

The concluding points to the report on Paper 1 also apply to this paper. However, as many candidates submit very successful research projects based on the biosphere or hydrosphere it is worthwhile stressing that this work should, where appropriate, be utilised in the written examination. Many questions begin with the statement 'with reference to examples with which you are familiar', thus using personal field work or the local environment can provide the exemplar material needed for a high quality answer.

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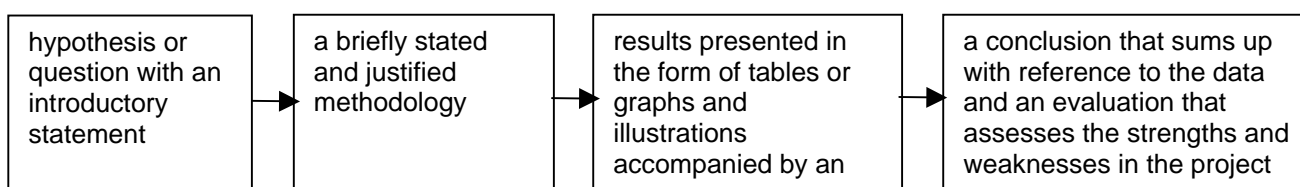
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School Based Assessment

General comments

This year has seen the entry almost double, and with it the variety of research reports. Overall the quality of these reports was of a high standard. Although it is still the case that higher quality reports can be derived from primary research, a significant number of candidates do rely on secondary data, invariably obtained from the Internet. In these cases, care should be taken to avoid plagiarism as well as blatant copying and pasting. Fortunately, the latter only applied to a small number of entries.

It is important that candidates are made fully aware of the requirements of this school-based assessment. Written reports should be between 1500 and 2000 words in length, ideally structured into four stages:



This structure is suggested to candidates and Centres, as it encourages more succinct reports that comply with the assessment criteria. Obviously, such a structure is not compulsory but could have been utilised in the majority of topics that were sent to the board for moderation. Whilst many projects exceeded the 1500 to 2000 word limit, (some over 4000 words), there were also a significant number with less than 1000 words. Reports of between 1500 and 2000 words can achieve full marks, but very short reports lose marks due to inadequacy. A structure conforming to scientific method invariably achieves the right length.

There is also a strong case for some Centres to give their candidates more advice on the topic and title. Media prominent topics such as global warming, ozone depletion and global ecology often elicited very general reports that were nothing more than extended essays, frequently lacking research data and sometimes copied from texts or the Internet. However, where local environmental issues such as loss of biodiversity, local landslips or local pollution issues were investigated, the final reports containing primary data, had a much better focus.

Unusually, this year there are some concerns relating to assessment and administration:

- It is important that marks are only awarded for criteria actually present within the report. This particularly applies to skills C1 (a, c and d) C2 (e) and C3 (c).
- This year some Centres did not submit their MS1 form with their sample of projects.
- It is occasionally difficult to marry a Centre-moderated mark, out of 40, with the initial assessment, marked out of 20.

Comments on skills C1, C2 and C3

Skill C1

It was pleasing that most reports began with a clear statement of intent, either with a hypothesis or a question. This is important as it gives the report a focus right at the beginning and should form an identifiable strand throughout. An explanation of the hypothesis with some background information should then form the introduction. Overall this part need not exceed 600 words. It would be beneficial for some Centres to advise a shortening of this part, i.e. a preamble of 1000-1500 words is excessive.

Although most candidates provided an outline of methods to be used in the research, it was quite rare for full marks to be achieved and in a significant number of reports it was difficult to see how the developed plan

would be effective at testing the hypothesis. High quality reports were not too lengthy and drew together how their field/laboratory techniques would be used and hopefully yield valid results. Some of the weakest reports were very brief and almost dismissive of the need for amplification with statements such as "I shall use the Internet and texts to obtain the necessary data".

The assessment guidelines in the syllabus "appropriate methods clearly explained" and "developed plan is effective at testing the hypothesis" should be taken up by all of the entry.

Skill C2

For the majority of the reports sampled this formed the best part. Very few reports suffered from poor organisation and the quality of written English was generally of a very high standard. In the main, data was presented through tables, graphs and illustrations. The strongest reports contained data collected by the candidate that had then been collated and converted into graphs and tables. Weaker reports invariably contained data that had been copied from various Internet sites.

Skill area 'e' is still a weakness in many reports. It requires a statistical tool that has been used in the analysis of the data. This could be in the form of a correlation or, in the case of sampled information, a standard statistical test. In the past some candidates have successfully utilised a statistical test in order to verify or otherwise their hypothesis.

However, it is easy to be critical. This year, the vast majority of sampled projects had been well-developed and were interesting to read. It is very pleasing that so many candidates seem to find this aspect of the Environmental Management syllabus both enjoyable and rewarding.

Skill C3

For a significant number of candidates this proved to be the weakest element in their work. Very few seemed to interpret conclusion and evaluation in terms of the descriptors in the syllabus. A conclusion should comprise a summing up that draws upon data used in the report. In future it might be advisable for candidates to cross-reference back to data mentioned earlier in their work. This year there were very few evaluations that actually assessed the strengths and weaknesses in the candidates' own work. This form of self-assessment can be a mechanism for introducing a feedback loop into the four stages of scientific method.

Conclusion

After four years with this syllabus, the majority of Centres seem to be comfortable with the requirements of the research report. Probably the most important requisite for future sessions is that candidates are made fully aware of the syllabus requirements and select topics that have specific reference to an element of Environmental Management, preferably of a local nature. As stated earlier, the fundamental problem with a very general topic title, e.g. "Global Warming" or "Volcanoes", is that the final report frequently becomes an extended essay based entirely on secondary information.