

ENVIRONMENTAL MANAGEMENT

Paper 8291/01

Paper 1

Key Messages

Read the questions carefully. In **section A**, questions follow in linked sets, so failing to read one may affect others. In **section B**, failing to read one question can result in loss of up to 30 marks.

Candidates should be prepared for papers that test both knowledge and the ability to analyse a wide variety of data.

Candidates should use familiarity with specific local examples and case studies where these are appropriate as these provide a good context to develop appropriate environmental management strategies.

Information from diagrams and photographs can be used to support answers and this helps to apply knowledge to a perhaps unfamiliar context. It is therefore important that observational skills are developed in addition to receiving practice in answering data response questions.

General comments

Good performances in **section A Question 1** were frequently counterbalanced with less effective **Question 2** answers. In **section B**, although **Question 4** attracted most candidates, for many it proved to be difficult to achieve large amounts of credit. This was often due to candidates failing to read the question clearly; a factor that also applies to some of the short answer questions.

Candidates clearly used their time well as the input into **sections A** and **B** were similar and there was no evidence that candidates were short of time. All candidates did the required one question in **section B**.

Question 1

This question was well answered. Candidates responded well to the data and were clearly well acquainted with the topic.

- (a) (i) There were no major issues as most candidates placed the energy source in the correct category.
 - (ii) In various ways most candidates provided two reasons for the dominance of fossil fuels with access, cost and current widespread commitment being the most common selections.
 - (iii) Although less well answered than the other parts of part (a), most candidates achieved at least partial credit. For HEP, rivers and lakes, rainfall and gradient were seen to be important physical controls. Recent events prompted many candidates to mention the dangers of nuclear energy. The economic constraint of cost featured in many answers even though traditional thermal power stations are equally expensive. The important factor here is that the thermal power stations are already running whilst new HEP and Nuclear Power stations would prove an additional expense.
 - (iv) There were no major issues with this question. The vast majority of candidates clearly justified the replacement of fossil fuels with renewable energy.
- (b) Only a very small number of candidates failed to mention solar panels. Nearly all provided clear descriptions of the advantages and disadvantages of developing solar energy. Many candidates incorrectly thought that solar panels will only operate with direct sunlight.

Question 2

- (a) (i) In various ways correct locations for cities **A** and **B** were identified by most candidates.
- (ii) Most candidates recognised the need to overcome anomalous weather but many failed to state that averaging over 25 years produced more representative or reliable data, gaining only partial credit.
- (iii) The similarities between the cities were recognised by some candidates. Other candidates referred to difference and rainfall which did not form part of this question and gained no credit.
- (iv) Differences were easier to identify. Some candidates recognised two differences for full credit. Most candidates mentioned different hemispheres, gaining partial credit.
- (b)(i) Only a small number of candidates recognised and described the aggregated nature of cumulative data. A detailed study of the graph should have suggested that the monthly rainfall figures were added together month on month. Most candidates gained little or no credit for vague descriptions about monthly rainfall, made mostly without reference to Fig. 2.2.
- (ii) Some candidates outlined the possible effects of drought. Some outlined desertification but very few mentioned ecological effects, so partial credit was usual.
- (iii) Most answers dwelt on the need for more data, from the years stated plus additional years. A small number of candidates mentioned ecological indicators, gaining more credit.

Section B

There were many very well written essays, gaining significant credit.

Question 3

- (a) The map of road pollution levels in Bristol (UK) proved to be a useful prompt and most candidates described very clearly the spread of noise from the highest levels near to motorways to minimum levels in rural areas. Some explanations were less clear, gaining only partial credit.
- (b) Most answers gained credit by recognising the causes and scale of noise in urban areas. Most candidates were able to attach strategies to the stated issues and candidates who gave high quality of explanation or justification gained most credit.

Question 4

- (a) Although Fig. 4.1 clearly showed the percentage deaths from natural hazards and the question stated that three reasons were needed, many candidates did not get much credit here. Some answers contained relevant detail, gaining credit, others were rambling descriptions of deaths from natural hazards, rather than three distinct reasons, gaining less credit. Other answers concentrated on deaths from geophysical events without any contrast with the high percentages, gaining little credit.
- (b) Many candidates failed to fully read the question. The requirement was to assess either a LEDC or a MEDC for its vulnerability to natural hazards. Some candidates described in great detail one (mostly tectonic) event; mostly the Kobe Earthquake or the Haiti earthquake rather than the range of natural hazards that could affect a country, thus gaining limited credit. Other candidates wrote a comparison between LEDCs and MEDCs in very general terms, gaining little or no credit. The candidates who read and responded to the question properly gave a description of either a LEDC or a MEDC and made clear assessments of vulnerability through reference to a range of relevant natural hazards and how socio-economic factors enabled a nation to cope with the issue, gaining far more credit than the other answers.

Question 5

- (a) Most credit was given to answers that recognised that whilst marine erosion processes are important, it was the rise in sea level that accelerated the rate of erosion. The base of the cliff becomes more prone to wave attack thereby steepening the cliff profile. Many answers dwelt on marine processes rather than sea level rise, gaining less credit. Not many candidates made reference to Fig. 5.1.
- (b) Mass wasting is a topic which most candidates have studied and have seen in previous examinations. Here the requirement was to firstly describe the cause and effects of mass wasting in studied urban areas and then link them with measures that aim to reduce the problem. Some answers achieved this objective and achieved much credit. However, some answers either dwelt on rural areas or, in simple terms, described some measures that help to reduce mass wasting, gaining far less credit.

Some candidates used Hong Kong or Rio de Janeiro but most others made little use of studied examples.

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Paper 2

Key Messages

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Candidates should be prepared for papers that test both knowledge and the ability to analyse a wide variety of data.

Candidates should use familiarity with specific local examples and case studies where these are appropriate as these provide a good context to develop appropriate environmental management strategies.

Information from diagrams and photographs can be used to support answers and this helps to apply knowledge to a perhaps unfamiliar context. It is therefore important that observational skills are developed in addition to receiving practice in answering data response questions.

General Comments

Effective data response skills were demonstrated throughout the paper.

Candidates clearly used their time well as the input into **sections A** and **B** were similar and there was no evidence that candidates were short of time. All candidates did the required one question in **section B**.

Many credit-worthy answers included knowledge acquired through first-hand experience and used specific examples from case studies to enhance content and allow for a pertinent assessment of management strategies.

Comments on Specific Questions

Section A

Question 1

Hydrological terms are often less well defined lacking precision and being so generalised that they could relate to and encompass a wide range of ideas. The instruction to use Fig. 1.1 was applied in only some aspects. This often resulted in generalised explanations which sometimes did not relate to the specific set of conditions in the context of the question.

- (a) Most candidates received partial credit. Impermeable was most often correctly defined with some precise credit-worthy responses with reference to the shale or granite rock together with a comment on the non-porosity. A few answers made a basic statement, does not allow water through, not enough to earn credit. A definition of water table was generally less well expressed, requiring some implication of an upper water level or the highest point of underground water storage, between the saturated below and unsaturated above. Many candidates incorrectly referred to this as a zone or a layer of underground storage gaining no credit. A good definition of submarine springs was rare as candidates attempted a definition without reference to Fig. 1.1; referring only to water from underground storage or the aquifer being released and omitting that this was taking place underwater on the sea bed.
- (b) This was very well answered by candidates with many achieving most or all of the credit. Some answers demonstrated excellent understating of the science involved in a change in state of water. Answers included different examples of the different states of water from Fig. 1.1 together the

different processes involved in a change of state. Evaporation/transpiration and condensation were commonly mentioned with freezing/melting less frequent. There was an occasional reference to sublimation. Answers gaining less credit made reference to the different states within the water cycle but not the actual change from one state to another.

- (c) Some very good answers referred to the band of permeable rock the sandstone, the confined aquifer and the impermeable the shale and granite together with the relevance of the recharge area. When there was no reference to Fig. 1.1, geological detail was omitted and less credit could be gained. In the some answers there was a suggestion of what an aquifer is but not how the aquifer was achieved in this context, earning little or no credit.
- (d) This question required candidates to observe the arrows in Fig. 1.1 which indicated that significant amounts of water could move through to the aquifer. The circumstances in which the water from the aquifer could reach the surface, resulting in the high water table and consequently a saturated soil and swampy conditions could be observed. Many candidates referred to a lack of percolation or infiltration due to impermeable rock below, an answer more appropriate in (e).
- (e) There were some very good answers achieving most or all of the credit, focused on the specific set of circumstances from Fig. 1.1 which could explain the flooding of the low lying land, while others referred to actual examples of flooding in coastal regions. These had appropriate links with the detail as outlined in the mark scheme and were tackled better than when the attempt at explanation resulted from a sequence of events not linked to the context.

Question 2

- (a) In part (i) the definition of the term biome was often inaccurately expressed; although many candidates had the idea of a global scale ecosystem there were no distinguishing features relating to climate, soil and dominant vegetation emphasised. The notion of a broad classification of vegetation type and climate could all be deduced from Figs. 2.1 and 2.2 although to simply name one of the given biome examples was insufficient to gain credit.

Good answers in part (ii) recognised patterns of distribution in the information and used this effectively in answers referring to the northern hemisphere. Some answers attempted to cover this by naming all the countries in the northern region area. The description of the pattern for deserts was found to be more difficult, few deserts areas were named. Simply naming countries across the globe did not elicit any pattern of distribution. Few candidates scored full credit although many achieved partial credit. Information from Fig. 2.2 was sometimes used by mistake.

Good answers in part (iii) achieved full credit when data was read from the graph accurately for the correct biome. Some misinterpretations of the graph resulted when an error was made selecting the biome and in the reading the data range for both temperature and rainfall.

In part (iv) there were some excellent answers which demonstrated understanding through use of an appropriate example and a description of a transition zones for example from savanna to desert, gaining full credit. However, most candidates gained only partial credit at best.

- (b) Part (i) of this question was concerned with the characteristics of the ecosystem on a smaller scale, specifically of a mangrove ecosystem. It was not expected for candidates to know specialist terms. It was anticipated that through observation of the photograph and diagram Figs. 2.3 and 2.4 that an appreciation of the ecology and some understanding of the plants living partly submerged and adapted to an environment with varying salinity and water levels due to the tidal ingress could be developed. This is one of the questions which demonstrate the need for good observational skills in order to apply knowledge to an unfamiliar context. Some candidates highlighted the distinctive protruding, arching roots as an important feature, the densely packed vegetation, the shallow water providing a rich biodiversity of species and the possibility of a breeding ground for bird populations, maximising the credit gained.

Part (ii) of the question focused on the particular threats to the mangrove wetlands from human activity although as the question referred to marine ecosystem; it was permitted to refer to other marine ecosystems for example coral reefs. In good answers both the threats and reasons for conservation were pertinent to the specific ecosystem for example the mangrove protecting the coast from erosion and storm damage. Other less credit-worthy general answers lacked a focus on the conservation specific to the ecosystem. A balance between the two elements - threats and the

conservation - was expected for maximum credit. Threats tended to be considered in the answers too narrowly focused on a detailed description of the effect of a pollutant on water quality rather than on the actual human activity.

Section B

Question 3

- (a) There was usually an attempt to interpret Fig. 5.1, comparing the destruction by deforestation and the restoration through afforestation in different regions, with credit-worthy answers including a clear analysis of the data and offering valid reasons. In less credit-worthy answers explanations were weakly linked to the data as there was a tendency to just to describe each continent in order, rather than to effectively analyse and look for overall patterns and trends both within the time period and between the continents.
- (b) Essays gaining most credit were characterised by effective use of a local examples. Such essays considered the threats to the ecosystem together with a description and evaluation of measures being undertaken to achieve conservation and contrasted these with the less effective larger scale projects. This question gave candidates an ideal opportunity to focus on and use knowledge and experience gained through study of their own locality. This explains why local conservation schemes dominated the essays. Few actual measures were considered at the national or international level. Answers that omitted specific examples gained less credit.

Question 4

- (a) Credit-worthy answers analysed the data effectively, identified trends and patterns and correlated reasons to a set of conditions particularly in newly industrialised countries. Some answers which gained less credit focused on reasons relating population growth, increased agricultural demand and industrial expansion and were limited on the use of data; just quoting countries as examples rather than showing how the data supported the example.
- (b) Answers that made good use of exemplar material in identifying some similarities of methods and considered the difference in the scale of the methods gained most credit. Such answers often demonstrated a good understanding of the issues and the reasons for the differences in provision of water supply in terms of economic development, wealth and availability of technology. There was greater emphasis placed on differences which naturally led into different types of supply being described for LEDCs and MEDCs. Other answers considered a narrow range of methods and a limited use of examples which may not have included both LEDCs and MEDCs, gaining more limited credit.

Question 5

- (a) Limited use of the photographs in Fig. 5.1 was demonstrated in most of the answers. Biological quality was considered most effectively with chemical and physical quality being less well developed by most candidates.
- (b) This was well answered as the question allowed a variety of different approaches. It was impressive that many candidates chose a local area with which they had some familiarity and the pollution had a local context particularly when the river had been studied at first hand. An equally successful approach used an appropriate case study. These high quality answers were characterised by developed account of good range of methods which could be directly linked to the example and the different types of pollution and sources which need to be managed by the methods. These essays scored much credit as the answers were also able to assess the degree of success or failure of the measures linked specifically to the examples and often taking into consideration local economic and cultural factors. Where there were general measures with brief detail or measures were not tailored to the example, evaluation was less successful, earning less credit. Answers that lacked both a river example and evaluation gained little credit.

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Coursework

General comments

Generally the research reports were of a high standard and candidates clearly see this element of the Environmental Management Syllabus as both valuable and enjoyable. For the most part the research reports were accurately assessed and the comments made on the candidate report card were extremely valuable

A small number of issues have carried through to the November examination:

- A small number of candidates continue to plagiarise and copy/paste from the Internet. This practice is not permitted and where this occurs a report form has to be completed for consideration by CIE.
- Sometimes there is a tendency for the staff to be too lenient or occasionally too severe in the assessment of their candidates work.
- Some Centres are still awarding credit for criteria not actually present in the written report. This particularly applies to the use of a statistical tool, a clear evaluation and within the conclusion no reference to the data contained in the report.
- It is still the case that the better reports are derived from field work involving the collection, collation and presentation of primary data.

It is important that candidates are made fully aware of the requirements of this School based assessment. Although advice is always given on the need to refer to the syllabus for information on project design and assessment, it is seemingly frequently ignored. 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. The better reports use these stages as section or chapter headings. This model, based on 'scientific method' can be used by candidates and teachers to provide a check on how well the project is progressing. All 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

The advice given in previous reports seems to have been taken into account and the vast majority of candidates performed well in this skill area.

Most reports contained a clearly stated title accompanied by well developed hypothesis and short introductory statement.

The introduction leads into the methods section of the report. Good quality research requires the initial formulation of a plan detailing research sites, equipment, expected data and how it will be collated and presented. Many projects achieved these goals. This was sometimes the weakest part of Skill C1 as although a methodology was written it was frequently a brief list without any explanation or justification. Many such candidates did not assess whether or not their developed plan will be effective in testing their

hypothesis or answering their question. Such reports did not specify the details of their topography, and were unclear about how it should be investigated.

Skill C2

This important skill proved to be more varied than in previous sessions. Whilst there were a significant number of high quality research reports that did very well in this section, making excellent use of relevant collected data presented as graphs, tables, diagrams and photographs, a significant number fell short of this target.

On this occasion a significant number of candidates offered very limited evidence of data collection; sometimes amounting to a few photographs. There was often a mismatch between the stated methodology and the presentation of related results: the methods stated in C1 did not yield related graphs, tables and photographs. Sometimes although diagrammatic or pictorial material such as photographs were present, these were primarily decorative and were not referred to in the analysis or description.

The use of a statistical tool is still a weakness. There is a difference between statistical methods that are used to describe data and statistical tools that are used to analyse data. Statistical tools would include correlation coefficients, chi squared tests, t-tests or other statistical tests. Statistical tools do **not** include graphs and charts. Sometimes credit was wrongly awarded for this when there is no evidence at all of statistics.

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

Skill C3

This final skill area is an important feature of almost any scientific investigation and unfortunately this November a significant number underachieved in each of the assessment criteria. As usual high quality reports contained a detailed summative conclusion that utilised results to assess the original hypothesis. However many candidates failed to refer to their data and therefore could only score limited credit. Likewise, although most reports contained references to environmental and management principals they were not used to explain trends and patterns derived from results contained in the body of the report, limiting credit.

Some candidates attempted an evaluative assessment of their work. This needs to be a brief survey of the extent to which the investigation achieved the aims it set out to, for example, the effectiveness of data gathering processes, or the extent to which primary data was used to underpin the conclusions drawn. Such an evaluation should look at what parts of the investigation were successful and what parts act as limitations. Many candidates still confuse an evaluation with a conclusion.

Concluding comments

Candidates and their teachers continue to engage enthusiastically with this element of the Environmental Management examination. The opportunity for candidates to research an environmental issue of their own choice seems to be a very popular and successful part of the examination. As in previous sessions the better topics and final reports are derived from locally based research utilising primary data.

Those candidates who rely on secondary data, particularly the Internet, still need to take care. Surfing the World Wide Web often results in rambling reports without structure. Furthermore this can lead to copying and pasting data and text. It should be noted that whilst Internet data can be utilised to produce graphs and tables, these should be of the candidates own construction. Plagiarism and copy/pasting are not permitted and could invalidate the research project; in these cases a report is submitted to CIE to assess the viability of the candidates report. It is very easy for CIE to identify plagiarism of this kind. Such plagiarism will not be tolerated.

There were very few administrative errors this time but there is still a need for all Centres to be fully aware of the assessment and recording procedures. The main issues continue to be:

- some Centres still fail to return the MS1 form
- only whole numbers should be recorded on the various assessment form and some Centres still put half marks on the candidate record card then transfer them MS1

- credit is often given for elements not present in the research report, particularly for criteria C3c

Although these comments refer to a small number of Centres it is important that the boards' moderation procedures are efficiently undertaken for the benefit of Centres and their candidates.

All teachers and assessors concerned with this examination deserve thanks for the hard work that so obviously takes place in order to satisfy the needs of this section of the AS Environmental Management assessment.

