



# CONTENTS

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<b>ENVIRONMENTAL MANAGEMENT .....</b>	<b>1</b>
<b>GCE Advanced Subsidiary Level .....</b>	<b>1</b>
Paper 8291/01 Paper 1 .....	1
Paper 8291/02 Paper 2 .....	4
Paper 8291/03 School Based Assessment .....	7

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## FOREWORD

This booklet contains reports written by Examiners on the work of candidates in certain papers. **Its contents are primarily for the information of the subject teachers concerned.**

# ENVIRONMENTAL MANAGEMENT

## GCE Advanced Subsidiary Level

Grade thresholds taken for Syllabus 8291 (Environmental Management) in the November 2005 examination.

	maximum mark available	minimum mark required for grade:		
		A	B	E
Component 1	80	56	48	32
Component 2	80	57	49	33
Component 3	40	32	26	16

The thresholds (minimum marks) for Grades C and D are normally set by dividing the mark range between the B and the E thresholds into three. For example, if the difference between the B and the E threshold is 24 marks, the C threshold is set 8 marks below the B threshold and the D threshold is set another 8 marks down. If dividing the interval by three results in a fraction of a mark, then the threshold is normally rounded down.

Grade Thresholds are published for all GCE A/AS and IGCSE subjects where a corresponding mark scheme is available.

**Paper 8291/01**

**Paper 1**

### General comments

The November 2005 session attracted fewer candidates than the previous session. The entry comprised Centres from a wide global area and the broad range of ability produced a good spread of marks.

The new syllabus has evolved out of the former Environmental Science and although it contains much of its content, the structure of the examination paper is different. Candidate performance in the compulsory **Section A** with its structured questions has shown some improvement upon the former paper and it is pleasing that Centres and their candidates have welcomed the opportunity to develop longer discussions of environmental management issues. These discursive essays in **Section B** are proving to be an interesting challenge for many candidates.

The ensuing question analysis will outline the major features of candidate performance and the mark scheme should be consulted for more detailed guidelines to the content of each answer.

**Comments on specific questions****Section A****Question 1**

This question took up the theme of the causes, effects, and management of mass movements on slopes with a case study taken from Sarno in Italy. The majority of candidates coped quite well with the more theoretical start to this question and responded well to the photographic data provided in **Section B**. Better marks were obtained by those candidates who made direct reference to the data; however weaker candidates often gave the information a cursory scan prior to wandering into answers that were either too general or not directly related to the newspaper report and photograph of the Sarno mudslides.

- (a) Fig. 1.1 provided a framework for classifying and describing mass movements and formed the central source of data for this section.

Parts (i) and (ii) were generally well answered with few obvious difficulties in locating mudflows, landslides and soil creep. A significant error for a small number of candidates was to position the labels outside the triangle. The role of water in lubricating soil and weathered debris was clearly explained.

Part (iii) proved to be more difficult with many answers getting as far as flows being wet and slides dry whilst ignoring the simple mechanics of the debris movement. In part (iv) most answers went as far as stating that the clearing of slopes of the vegetation cover would produce landslides but did not link this with the rapid movement of rocks overcoming the frictional forces operating on steep slopes.

- (b) This contained a news extract and photograph of the Sarno mudslides of 1998.

Part (i) was quite well answered with the majority of candidates recognising that mudslides were masses of highly lubricated sediment capable of moving on both steep and gentle slopes. Few went as far as stating that this enabled fine sediment to overcome the slopes frictional forces.

Part (ii) descriptions of the sequence of events that led to the Sarno mudslides were often of a high quality with an ordered sequence of events from fire removing vegetation from the slopes through to the movements of the lubricated mass. Weaker answers recognised some information from the picture but contained little from the news caption; thus these answers were either incorrect or confused about the removal of vegetation and the impact of the subsequent torrential rainfall.

In part (iii) the better answers on the management of such disasters contained a relevant balance of references to the prevention of damage to buildings, loss of life and slope management strategies. Weaker answers were less well balanced and covered one strategy.

**Question 2**

This question combined aspects of the composition and structure of the atmosphere with the earth's energy budget linked to how changes in the quantity of carbon dioxide and methane might disturb the balance between inputs and outputs of energy. It was pleasing that answers on the atmosphere showed an improvement upon previous sessions.

- (a) There were very few problems with identifying: the troposphere, the stratosphere and tropopause.

Parts (ii) and (iii) proved to be more difficult. Approximately 50% of answers correctly stated that the higher density of atmospheric gases including water vapour enabled long-wave radiation to be used in creating pressure differences, air movement and the weather conditions we experience. This should have provided some guidance to outlining why atmospheric temperatures decreased with altitude. Whilst most answers were quite clear about the lower atmosphere being closer to the long-wave heat sources very few stated that in the upper atmosphere there are fewer molecules to absorb and retain energy.

Part (iv) on the importance of stratospheric ozone was well answered with most answers stating that by filtering out uv radiation fauna and flora on earth were protected from cancers, lower rates of photosynthesis etc.

- (b) Fig. 2.2 of the Earth's energy budget proved to be a useful data source and most candidates achieved between 3 and 4 marks for this part. For many this involved repeating information from the model and the major omission for a significant number was to distinguish between inputs and outputs.

It was surprising that only a small number of candidates recognised that part (ii) was concerned with how increases in carbon dioxide and methane might lead to global warming. Such answers omitted the contribution the variable gases such as carbon dioxide and methane can make to: trapping long-wave radiation, reducing losses to space thereby increasing surface temperatures.

### Section B

Whilst **Questions 3** and **5** proved to be the more popular choice they showed a wide variation in quality. In contrast, **Question 4** attracted fewer candidates and most answers were of a high quality. This might be because the popular and topical nature of natural disasters and atmospheric pollution diverted attention away from the apparently specialised nature of local weather conditions and weather forecasting.

#### Question 3

This proved to be the most popular question, answered by about 50% of the entry. It was not however a question that candidates found easy and significantly it elicited a wider range of marks than **Questions 4** and **5**. Whilst there were some excellent answers, some candidates were not able to identify distinct trends in the statistical data and a significant number of candidates did not select an example of a climatic or tectonic event.

- (a) Candidates were expected to identify trends in the data contained in Table 3.1. Stronger answers achieving 7 or more marks generally focused on: a reduction in deaths with time; differences between MEDC's and LEDC's and variations in population density. Some confusion arose where candidates attempted to describe trends according to the nature of the event and ignored multiple event disasters e.g. earthquakes and landslips, cyclones and storm surges. The weakest answers simply repeated the data in the table without any reference to pattern or statistical trends.
- (b) Although there were a small number of high quality responses the majority of essays were a little disappointing. Far too many candidates ignored the requirement for a studied climatic or tectonic event and as a result their essays became a general and often brief survey of plate tectonics and the impact of shock waves. Better Band 1 or Band 2 essays (refer to the generic descriptors in the mark scheme) selected a case study and were therefore able to satisfy all of the question requirements: there were some excellent references to Hurricane Katrina and the 2004 Indonesian earthquake.

#### Question 4

Although the least popular **Section B** question, most of the responses were of a high quality with good part (a)'s followed by essays that were wide ranging, relevant and evaluative. It is a pity that a significant number of candidates seem to have an aversion to studies of the atmosphere.

- (a) Here the concern was with the passage of initially moist air across a hilly or mountainous region. Within the three sites it brought together: for site A cooling air, condensation and relief rainfall; for site C descending and drying air in a rain shadow; and for site B hill/mountain top conditions with increased wind speed, cloud and precipitation. Most answers to this section made this clear division into sites A, B and C and with some variation, included the relevant detail.
- (b) Responses to this question on weather forecasting were generally good and within Bands 1 to 3. These answers displayed a good understanding of weather development and applied this knowledge to forecasting. Most answers focused on weather observations to make short-term forecasts and historic record for long-term forecasts; a notable omission from nearly all answers was the use of weather maps and satellite images.

Perhaps a reflection of recent weather events, there was a noticeable emphasis on extreme weather conditions such as hurricanes rather than the normal day to day conditions. This meant that descriptions of the importance of weather forecasting focused on the eventuality of natural disasters rather than the use that farmers, travellers, shipping and motorists make of accurate forecasts. Thus evaluative statements were concerned the extreme events rather than day-to-day conditions. Few answers questioned the accuracy of weather forecasting.

### Question 5

This formed the second most popular question and many answers to both parts were of quite a high standard.

- (a) Few difficulties were encountered in stating the meaning of the term *acid rain*. References to emissions of sulphur dioxide and nitrous oxide mixing with condensation particles to produce acid rain with pH levels as low as 1.5 and 2.0 were common. The second part of this question was moderately well answered with the majority going as far as a good description of the pattern on the map. Explanations were less clear with most candidates failing to link the pattern of decreasing pH values with prevailing winds. This factor explains the low pH values across Southern Sweden and the Baltic.
- (b) Candidates approached this topic with some level of confidence and there were some good well balanced answers. The main factor discriminating between strong and weak answers was the depth of analysis rather than essay structure. Analyses of the effects of acid rain upon urban and rural areas tended to receive superficial coverage with brief statements about corroded buildings and badly affected crops.

The strength of most answers lay in the analysis and evaluation of the variety of measures that have been undertaken to manage pollution from acid rain.

### Further general comments

Overall the successful start to the new examination seems to have continued. The data response questions in **Section A** are beginning to show a considerable improvement upon similar questions set in the former Environmental Science examination. It is pleasing that the opportunity of a choice of essay based on environmental management issues has met with a positive response. It is now important that candidates manage their time so that an equal amount of time is spent on each section of the examination paper. It is important that teachers acquaint their candidates with assessment objectives contained in the generic mark scheme and above all provide them with the opportunity to practice writing essays.

Paper 8291/02

Paper 2

### General comments

This paper covered the syllabus components, Hydrosphere and Biosphere was slightly less well answered than Paper 1 and in **Section B** answers were more polarised. **Section A** answers were invariably completed by all candidates with **Question 1** less well answered than **Question 2**. In **Section B**, **Question 3** attracted about 50% of the candidates, **Question 5** about 30% with **Question 4** being the least popular. Whilst **Question 3** elicited the widest range of marks, responses to **Questions 4** and **5** were of a higher average standard.

Although most candidates timed their work reasonably well, some did spend too long on **Section A** resulting in very brief **Section B** essays. Careful attention was given to the rubric instructions and there were no instances of candidates either omitting or answering too many questions.

## Comments on specific questions

### **Section A**

#### **Question 1**

Responses to this question proved to be a little disappointing, as candidates did not respond well to the data. Part (b) received the strongest answers whilst the data presented in part (a) and on the Colorado Basin in part (c) were found to be difficult to manage.

- (a) This question required candidates to describe water usage in three continental areas in terms of relationship between total withdrawals in cubic km as a percentage of the total volume available within that region. Thus Asia uses 1700 cubic km which forms 17% of its potential. A significant number of candidates repeated from the graph without giving it any interpretation. There were some good descriptions of the data either in accordance with the aforementioned points or through a comparative analysis of the three continents.
- (b) For most candidates this formed the strongest part of their **Question 1** answer. Most candidates contrasted water provision in developed countries with less developed countries and drew out the difference between dry and wet regions. The best answers also reviewed variations in how well water supply met the demands of various parts of the world.
- (c) There was quite a large variation in quality to this part and most candidates produced better answers to part (ii). It seems that for part (i) many candidates did not read the question correctly and instead of concerning themselves with a description of the pattern of water management, they focused entirely on its effects on discharge and suspended sediment. This meant that in part (ii) points were often repeated. However to a variable extent most candidates did focus on relevant information for part (ii) and achieved a satisfactory standard.

#### **Question 2**

This question was well answered and for many candidates, their best answer with marks ranging from 10 to 20.

- (a) Photosynthesis in terms of the process and its role is a well-rehearsed topic and few candidates achieved less than the eight marks available.
- (b) There was more of a variation in the quality of answers to each of the issues relating to deforestation. Full marks were awarded for each of the issues on the basis of a well justified single point or two brief valid points. The weakest explanations were for how deforestation produced climatic change and affected aquatic ecosystems; a common error was to ignore the need for an explanation and write a description instead.

### **Section B**

#### **Question 3**

- (a) The majority of answers obtained marks of between 5 and 10 for this part. The need for three different ways was invariably recognised with most answers focusing upon: the oceans as a store of water and/or species, the regulation of climates, and the economic importance of fishing. Answers varied in quality according to the depth of analysis rather than misinterpretations of the question.
- (b) There was quite a wide variation in quality for this 30-mark essay, ranging from weak Band 4 responses to top quality Band 1 answers. Strong essays took up all elements of the question in well balanced descriptions of the sources and effects of marine pollution followed by evaluative accounts of the measures aimed at reducing pollution. Moderately good answers suffered from a lack of balance in which good accounts of the sources and effects of marine pollution were followed by very short and superficial references to pollution reduction measures. The weakest answers sometimes achieving as little as 3-5 marks were either weak in both parts of the essay or ignored any assessment of measures.



**Question 4**

It is a pity that so many candidates seemingly ignored this question as the small number of responses of a high quality and in the past examinations the topic has been very popular.

- (a) This description of three aspects of problems caused by the intensification of agriculture was a straightforward data response question. Moderate marks of between 4 and 6 were obtained by following three separate routes and using the reasons given in Fig. 4.1; good quality answers added some explanatory comments for each route.
- (b) As with part (a) this was well answered by a small number of candidates with some particularly good answers from candidates who have access to local conservation areas. It was both pleasing and interesting to read detailed, relevant and evaluative essays on areas within Africa and South America with which the candidates obviously have some affection and affinity. It is only necessary to add that questions of this nature are set with the intention of giving candidates the opportunity to utilise their local knowledge.

**Question 5**

This formed a moderately popular question within which the part (a) answers were of much higher quality than part (b).

- (a) This question offered candidates the opportunity to make judgements on the pessimistic Malthusian model and the optimistic model of Boserop. The majority of answers followed the question instructions reasonably closely and differences between strong and weak answers were a product of variations in depth of analysis rather than degrees of relevance. The only weakness with the Fig. 5.1 descriptions was that having described exponential population growth up to the carrying capacity some answers came to an end and ignored further population fluctuations.

The descriptions of the Boserop model were good with nearly all candidates elaborating upon 'necessity being the mother of invention'.

- (b) Candidates did not find this an easy question and although marks were mainly in the Band 2/3 area, some struggled to produce a structured and coherent essay. Some answers dwelt upon localised features relating to sustaining the environment rather than the broader picture of economic and technological development. Other answers only focused upon managing population growth (mainly in China) and ignored all aspects of sustainable development.

There were a small number of high quality answers in which candidates began with a clear selection of a country and then reviewed and assessed its policies and priorities.

**Conclusion**

In the main, candidates and their Centres are to be congratulated on the transition they have made from the highly structured Environmental Science examination to this new paper.

This session's data response questions covering the Lithosphere, Atmosphere and Biosphere were of a high quality but it seems that candidates need practice handling information presented within maps: this year's question on water resources in the Colorado Basin was quite poorly answered. The majority of candidates are coping quite well with the essays set in **Section B**. There is a need for these essays to receive a little planning rather than wading straight in. This can be achieved by allocating a couple of minutes to listing some relevant points or constructing a spider diagram prior to writing. Returning to an earlier point this does mean that candidates should time themselves more carefully, so that 45 minutes is spent on each section.

Many thanks to candidates for an interesting set of papers.

<p><b>Paper 8291/03</b> <b>School Based Assessment</b></p>
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### **General comments**

November 2005 saw the second submission of research reports using the revised assessment criteria. Like the written examination papers the Individual Research Report has seen some changes; mainly to its length and the weightings given to the assessment criteria. It is pleasing that we are successfully making the transition to the new requirements of the Individual Research Report. Although some attention needs to be given to the structure, content and length of the research reports, the submissions of this November were generally of a high quality.

The general standard of the research reports was quite high and the majority of Centres adhered to the new assessment criteria; notably that of length. As with the previous examination and reflecting the international entry into the examination there were a wide variety of topics. These ranged from localised studies of water pollution, urban environments and ecological studies. Once again where a local topic was taken up the report proved to be more succinct, used primary data and often achieved high marks.

The majority of Centres are to be congratulated on their internal assessment of reports. Careful use was made of the new assessment criteria and any adjustments following external moderation were to produce a commonality of standards. This is easily achieved when Centres assess their candidate's work accurately and consistently. Examiners only concern was that occasionally marks were added up incorrectly and the total out of 20 doubled incorrectly. Surprisingly errors such as these can generate a lot of extra administration.

### **Comments on specific assessment criteria**

#### **Skill C1: Research and Planning**

There was quite a wide variation in the quality of assessment criteria C1 with about half the entry fulfilling the four features of research and planning. Whilst the majority of candidates satisfied Skills (a) and (b), some failed to provide the clear methodology that would be effective in testing their hypothesis.

Once the question or hypothesis is established the remainder of C1 should follow on. It is important that candidates present a clear methodology that is not over complicated and provide information on relevant field and/or laboratory techniques, the data that will be collected and how it will be presented and analysed. Topics involving field study should use appropriate equipment and not ignore the need for accurate recording and the allocation of time to obtain results and complete the work. Examiners wonder how many candidates give their research methods a trial run prior to beginning the detailed work. The explanation and justification of the methods need not be lengthy and should provide the basis for the collection and presentation of data; sometimes it is worthwhile writing a draft of this section prior to starting the research; it can always be modified at a later date.

#### **Skill C2: Data collection and presentation**

To varying degrees the criteria contained within C2 were generally reasonably well covered. If the methodology is clear and accurately carried out candidates should be in possession of a valid and usable set of data. Skill areas (a), (b) and (d) were generally of a high standard with research data mainly presented in the form of graphs, tables and photographs. Unlike previous sessions there were very few reports that were solely of written description and devoid of any researched data. Although Internet sources were often used it was also significant and important that plagiarism and direct copying seemed to be a rare occurrence.

There is a case for candidates to avoid using their conclusions (Skill C3) for the descriptions and explanation of their data. If careful use is made of figure references the analysis of the data can be incorporated into a section or chapter titled 'Results and Analysis'. The use of statements such as 'reference to Fig. 1 shows that...' or 'the data in Fig. 1 can be explained by...', often results in a succinct written report that is economical in its use of words. This can also have the effect of making the conclusion more of a summing up in which verification or otherwise of the initial hypothesis is stated.



### Skill C3: Conclusions and evaluation

This forms a vital ingredient of any research report in enabling a rounding up of the work accompanied by a critical assessment of the work. Most candidates were able to produce valid conclusions to their work. For a small number of candidates, the most serious omission being a reference to their data. Some candidates sought to use the conclusion as an avenue to explaining their results rather than drawing such data and explanations together in the form of a final summary of the findings of their research.

An impressive feature of the reports this summer was the quality of Skill (b). There were some excellent appraisals of environmental and management principles and these were used to explain trends and patterns in the candidate's results.

The final evaluation of the whole project was less well done and absent in a significant number of reports. Candidates invariably find it easy to fault their work but more difficult to praise it; limitations and areas of success should be briefly mentioned and justified.

### Concluding remarks

For most Centres it is a matter of developing that which has been achieved this year. There is a need for some Centres to pay closer attention to the assessment criteria and to make certain their candidates are fully aware of how their work will be assessed. This syllabus does permit teachers to guide their candidates through the project without doing it for them. Examiners believe that an important feature of this Environmental Management Syllabus is the encouragement it gives to review local issues and the opportunity to undertake some local field-work.

A positive feature of this year's research reports has been the use that candidates make of a local project with which the school or college has close contact. An environmental monitoring project on the River Plate in Argentina and a college managed conservation area in Zimbabwe are good examples of where candidates have successfully developed their work.

As we move away from the Environmental Science mindset it is to be hoped that issues that have an environmental management emphasis will come to the fore with topics chosen from each of the syllabus modules. Whilst topics selected from the biosphere and hydrosphere feature are the more popular choice it would be pleasant to see the atmosphere and lithosphere featuring more strongly.

Finally it is worthwhile reminding Centres that a simple structure for these written reports is summed up in a standard model for scientific research.

