ENVIRONMENTAL MANAGEMENT

| Paper 8291/11 |
| Paper 11 |

General comments

Paper 8291/11 was taken by candidates covering the whole range of grades. As with previous sessions performances in *section A* were, for a significant number of candidates, weaker than *section B*. The paper clearly differentiated between strong and weak candidates; generally strong candidates performed well in both sections.

It seems that although topics on the Lithosphere are popular, candidates find questions on this topic difficult. Questions on the atmosphere still form the weakest element of this syllabus. It is important that candidates develop a thorough understanding of terms, learn how to handle data presented in a variety of forms, and in particular not only read the questions thoroughly but make certain their answers are completely relevant.

In *section B*, **Question 4** was overwhelmingly popular with **Questions 3** and **5** being very unpopular; obviously energy provision and related global issues are topical and form a centrepiece of School curricula. The three questions in *section B* were of an equivalent level of difficulty and the small number of candidates answering **Questions 3** and **5** achieved similar standards to those answering **Question 4**.

There were 6 scripts with rubric errors in which candidates answered all questions in *section B*; it is worth reminding candidates that this is self penalising and their time is better spent on the one question. Of some concern this session was the apparent inability of a significant number of candidates to follow the question instructions. Many ignored the need to use examples, descriptions were sometimes given instead of explanations and 'either/or' instructions were often ignored with both aspects covered.

Comments on specific questions

Section A

Question 1

This environmental hazards question was moderately well answered with most marks in the 8 to 15 mark range with parts **(a)** and **(b)** better answered than *c*.

(a) These questions targeted the factors that contribute to the relative severity or impact of 6 major natural hazards; combining lithosphere and atmosphere. Candidates were expected to interpret a table and express knowledge and understanding of the effects of the stated hazards.

(i) Although most answers were brief most candidates achieved either 1 or 2 marks. The most common omissions were the absence of reference to the movement of crustal blocks or of a statement about the components that define climate (average weather or temperature and rainfall characteristics).

(ii) Table 1.1 graded 6 hazards according to the severity of their characteristics. Answers need to balance the detail of Table 1.1. Marks were awarded on the basis of a balance between correctly extracting information from Table 1.1 and providing some justification. Thus 'droughts have long term effects in terms of impact and loss of life due to long term aridity preventing the production of crops and causing ecological damage' achieved two marks.
Most candidates achieved at least two marks by covering one component for each of droughts and tropical cyclones. The weakest answers repeated the column titles without reference to scale or duration.

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(iii) Candidates clearly had a better understanding of tornadoes and landslides and most wrote clear descriptions of each, in terms of Table 1.1, along with the nature of each hazard event.

(b) This was quite well answered with most candidates achieving 2 sometimes 3 marks. In achieving the 3 marks there had to be some reference to the perceived hazard occurring and becoming a disaster. It was disappointing that some candidates viewed a natural hazard as having greater impact on MEDCs as they have more to lose, when LEDCs actually suffer much more in terms of the percentage loss related to possessions and life.

(c) The quality of responses to the management of risk model was rather disappointing. The small number of good answers selected an example e.g. Hurricane Katrina, Tornado Alley, Haiti's earthquake, and applied with actual details of the hazard event, the stages in the model. However, most answers only repeated the wording of the model without use of an example. Clearly if attention had been given to 'an example' and 'you have studied', these candidates would have achieved more marks

Question 2

Despite being clearly stated in the syllabus and examined on a number of occasions, this question was very poorly answered; some parts being ignored and other parts lacking understanding. I suggest Centres use the question with the mark scheme in assisting the teaching of this element.

(a) The vast majority of answers either described the Earth's tilt on its axis or the differences in distance from the Sun. Some candidates thought it was due to the Earth's orbit around the Sun with one answer describing the Sun's orbit around the Earth. Other answers went no further than stating 'because it is warmer at the equator (or c)'.

Some candidates got part way there by stating that it was due to the curvature of the Earth but only a very small number mentioned the angle of incidence of the Sun's rays (energy) and consequent differences in the concentration of energy per unit area at A, B and C.

(b) This section was clearly a case for reading the question, particularly as most of i, ii and iii can be obtained from the table. Unfortunately some thought budget referred to cost or finance.

(i) All this required was that the Earth's Energy Budget is obtained by subtraction of outgoing radiation from incoming radiation.

(ii) For most there were two easy marks here. As most made accurate calculations it is even more surprising that such a large number failed to give the correct definition needed in i. The most common error was to omit the minus from -55 Wm^{-2}.

(iii) Surprisingly, despite radiated energy being nearly the same for each latitude and absorbed energy varying, most selected incorrectly and rejected absorbed radiation.

(iv) The key to this question was to recognise that whilst radiation reradiated showed only a small variation, the amount of energy absorbed decreased from 327 Wm^{-2} at the equator to 98 Wm^{-2} at the North Pole.

(v) By ignoring the statement in the question 'other than energy received' most candidates failed to answer this correctly. Only a small number referred to the reflective snow and ice surfaces at the North Pole and absorbent forest, land and ocean surfaces at the equator.

(c) This section came to the salvation of many candidates as to varying degrees they were able to describe the effects and causes of global warming and climatic change. There were some irrelevant answers that dwelt on the monetary cost of energy and a few chose not to answer this question.

Significantly there is still some confusion about the processes of Ozone Depletion and Global Warming; the former being stratospheric and the latter tropospheric. This indicates a lack of understanding of the difference between short wave radiation and UV and the fact that the effects are different.

Section B

As indicated earlier, **Question 4** was the most popular. About 10% answered **Question 3** and a very small number **Question 5**. Most candidates gave their essays some thought and expressed themselves in clearly written prose. The lack of exemplar material meant that some marks were lost.

Question 3

This question was selected by a small number of candidates who generally performed badly in part **(a)** and reasonably well in part **(b)**.

(a)   Another question where either the question instructions were not understood or ignored. The requirement was to describe the natural processes that contribute to the mass movement shown in Fig. 3.1. These pictures depicted a coastal cliff before and after a slump. The points missed by most candidates were that instability is maintained by wave action at the base of the cliff and that lubrication, weathering and erosion have enabled slumping along a fracture. Most answers were rather brief and superficial, getting no further than 'its caused by weathering and erosion'. The weakest answers dwelt on human factors.

(b)   Although the stronger part of this question some candidates did select both agriculture and building construction rather than one. However the structure of the question guided most candidates towards reasonable to good answers.

          Building construction proved the more popular. Here candidates developed two or more causes of slope instability often followed by two slope stabilisation methods. For agricultural land use forest clearance was the most popular damaging contribution followed by reforestation as the remedial technique; this somewhat limited the answer.

Question 4

This question was answered by 90% of the candidates. The quality of the answers varied according to the ability of the candidates and marks ranged from 5 to 38 out of 40. There was equivalence in standard for each part of the question.

(a)   Nearly all candidates correctly identified the three sources of energy, thereby achieving at least 3 marks. Elaborating upon how they generated electricity was quite varied. Good answers provided excellent detail for each with reference to turbines and generators in HEP and Wind Power and the excitation of electrons in photovoltaic cells. Weaker answers glossed over the details on how each process operated to produce electricity.

(b)   As the requirement was to assess the advantages and disadvantages of each power source candidates had a ready made structure to work to. The best answers not only assessed the relative merits and disadvantages of each source but related these factors to traditional sources of energy from fossil fuels. Weaker answers tended to be superficial and/or poorly balanced. There were some excellent answers that reviewed the three sources of alternative energy in terms of: environment, cost, aesthetics and efficiency.

Question 5

Although topics relating to acid rain have proven popular in the past, this **Question 5** was not attempted by many candidates. It's a pity as the few responses were of fairly good quality.

(a)   Answers to the section were quite thorough with descriptions of the distribution of acid deposition across Europe. The map contained country names and the locations of different levels of pollution. Thus even if the answers was poorly organised there was plenty to describe. Prevailing winds was regarded as the first reason with 'home' based industries a less popular second. The majority of candidates responded well to the data in Fig. 5.1.

(b)   The positive response to the data in part **(a)** provided a good foundation to this essay. Most candidates expressed a good understanding of acid rain and its varied effects upon urban and non-urban environments. Weaker answers were typified by a lack of suitable examples.

Conclusion

Overall this paper proved to be an effective test of a candidate's knowledge and understanding related to the lithosphere and atmosphere. Covering a wide range of ability, I was impressed with the manner in which candidates engaged with the paper.

Aside from effective teaching and examination practice the key issue that needs to be taken on board from this session lies in a candidate's understanding of each question. It is important for candidates to read questions thoroughly, note or underline key elements of a question and revisit the question both during and upon completion.

ENVIRONMENTAL MANAGEMENT

Paper 8291/12
Paper 12

General comments

In general candidates engaged well with the paper with marks ranging from 5 to 69. As with other 8291 papers **section A** answers were generally weaker than **section B**. It seems that despite advice from previous sessions candidates still find data response questions, developed around the environmental science that underpins the management of the environment, difficult. **Section B** answers were generally of a good to high quality and many candidates achieved marks of between 20 and 30 for the part **b** essay. For most candidates the 10 mark part **a** helped to lay the foundation for a high quality long essay.

Although most candidates used their time well it was apparent that some rushed through **section A** and wrote lengthy **section B** essays. There were no rubric errors or spoilt papers.

Comments on specific questions

Section A

It is disappointing that many candidates find this section difficult. It is important to realise that an understanding of environmental management is underpinned by both knowledge of each syllabus component and the ability to manage related data. This data is presented to candidates in the same way in which it is to be found in journals, the media and text books.

Question 1

This tectonics question began with the nature and use of seismic waves in relation to earthquake activity. Thus success in this question requires a knowledge of p and s waves, how seismograms can be used, followed by an understanding of the distribution and prediction of earthquake activity.

(a) (i) Most candidates achieved either 1 or 2 marks for this question. Whilst most described a shock triggered by some form of tectonic activity only a minority referred to the transmission of the shock wave.

(ii) Through references to speed, longitudinal, transverse, primary and secondary, the majority of candidates achieved the full two marks.

(iii) This was less well answered by most and ignored by many. Some candidates resorted to simple descriptions of Fig. 1.1 but did not achieve the explanation needed. Only a small number took up the prompt from part **(ii)** and outlined how s waves dissipate in liquids whilst p waves become refracted at the Gutenberg Discontinuity.

(b) With the clue of having one circle already inserted about half the candidates correctly drew the other two curved lines, positioned the epicentre and realised that 3 curved lines located a point. Unfortunately a significant number did not realise that the circles had to overlap and failed to locate a precise point.

(c) Although a small number of very good candidates achieve the full 6 marks, the majority struggled to reach 3 marks. It seems that many failed to read the question. Describe means the pattern on the map i.e. particular plate boundaries or locations, and explanation needs brief discussion of destructive, constructive and transform boundaries.

(d) This was poorly answered. It was not sufficient to simply say 'by seismographs' as these mainly record the actual event. There was no mention of the minor quakes that sometimes precede a

major earthquake, nor the harmonic tremor prior to a volcanic eruption. Animal activity was quoted by some and received limited credit.

Question 2

Unfortunately questions on the atmosphere continue to be the weakest element of the examination yet it is such an important element of current environmental concerns. Unlike the more discursive aspects of the atmosphere examined in *section B*, it is of necessity that *section A* atmosphere questions are concerned with using data and understanding processes. Examiners suggest that teachers impress on their candidates the content of this element of the syllabus and it will occur as both a compulsory question in *section A* and an optional question in *section B*.

(a) Answers to the interpretation of detail from the southern hemisphere map were generally poor.

  (i) Nearly all positioned 1016 mb correctly and most failed to position 1000 mb. Once it was realised that the isobars were at 4 mb intervals this should have been an easy 2 marks.

  (ii) A substantial number knew that wind moved from high to low pressure but only a small number understood the Coriolis effect- air deflects to the left as you move down the pressure gradient.

  (iii) This was also poorly answered with only the top candidates being able to position a cold front, a cyclone (or low pressure system) and an anticyclone (or high pressure system). These terms are fundamental inclusions in all weather maps.

  (iv) Perhaps it follows that if (iii) was incorrect then the chance of correct descriptions of the weather conditions at the cold front and centre of the cyclone was remote. There were many inaccurate references to hurricanes, tornadoes and high pressure systems which made the reasons incorrect. Some candidates did achieve one or two marks by inadvertently mentioning drizzle and wind.

  (v) There were a few good answers that mentioned how the white areas representing cloud could be used to determine wind direction and predict weather. Unfortunately a large number of candidates only repeated the wording of the question.

(b) This part of land and sea breezes came to the salvation of many candidates. Most knew about air pressure differences that caused air to move either seawards or towards the land. A small number understood the general principles but got them the wrong way round.

Section B

As stated earlier, candidates generally did much better in this part of the paper. **Questions 4** and **5** were the more popular and about 20% answered **Question 3**. As some of the answers were lengthy it is possible that those candidates allocated more time to *section B* than *section A*: a factor that reflects the difficulties some candidates find with short data response questions.

Question 3

Having made their selection, not all candidates found **Question 3** easy and a significant number struggled in both parts. At the same time other candidates produced high quality answers with some excellent exemplar material.

(a) Those candidates who focused on Fig. 3.1 and its temperature and rainfall interactions produced good answers. Far too many candidates, however, either wandered around the model or seemingly completely ignored it; both scenarios yielded weak answers.

(b) This question contained elements, which if adhered to, would produce high quality answers:

  ■ using examples
  ■ describing how human activity contributes to slope instability
  ■ assessing **two** ways in which slope instability might be managed

To varying degrees most candidates managed most of these requirements. The most common errors were to be vague about the contribution of human activity and assessing the selected slope management strategies. In the weakest answers marks were lost by not using suitable examples.

Better answers satisfied all requirements, with effective assessments of afforestation and lowering the angle of the slope.

Question 4

Not only is this a popular topic but urban atmospheric pollution ranks very high in current environmental issues. Generally both parts of this question were well answered and marks were generally in the 20 to 30 range.

(a)   Those candidates who methodically described the cause and effects of each pollutant separately achieved high marks. A significant number did however view this 10 mark question as an excuse to write a lengthy essay on urban atmospheric pollution with lots on global warming and ozone depletion. This had a detrimental effect on the part **b** answer which is worth 30 marks.

(b)   Apart from the issue mentioned for part **a**, this question elicited some very good answers. Strong answers focused on actual examples of urban areas and balanced the relevant types of pollution with both a description and evaluation of a wide range of strategies. Weaker answers did not link the type of pollution to the strategy and invariably did not develop an evaluation.

Question 5

Although a popular question, answers were, in general, not quite up to the standard of **Question 4**. This was due to weaknesses displayed when answering both parts of the question. In fact answers to this question had the widest range of marks from very poor to full marks.

(a)   Here candidates had to refer to how a combination of human and physical factors contributed to the soil erosion show in a photograph. Better answers elaborated how human and physical factors interacted to produce the soil erosion shown. Many weaker answers tended to focus on human activity and achieved up to 5 marks. The weakest answers made no reference at all to Fig. 5.1 and wrote generally about the causes of soil erosion; there were some generic marks for such answers.

(b)   By giving careful attention to the theme of rapid urban development many candidates were able to develop the correct emphasis in their answers. Rapid urban development frequently means that the urban authorities cannot cope with the growth and this causes such problems as shanty towns, traffic congestion, unemployment and poverty and loss of peripheral land due to urban expansion.

High quality answers made effective use of a local example to illustrate such points; in fact some candidates had seen their own home town or city blighted and used this as their example. Such descriptions were then followed by the development of two remedial measures again derived from the candidate's personal experience. The weakest answers often lacked balance and omitted reference to appropriate remedial measures.

General Comments

Overall this paper proved to be an effective test of a candidate's understanding and knowledge of issues relating to the atmosphere and lithosphere. There is a need for Centres to impress on their candidates the importance of *section A*; after all it is compulsory and worth 40 marks. Examiners do continue to be impressed by the way candidates engage with this paper. Their answers generally reflect a good understanding and concern for environmental issues and their management.

ENVIRONMENTAL MANAGEMENT

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ENVIRONMENTAL MANAGEMENT

| Paper 8291/21 |
| Paper 21 |

General comments

There was a slight increase in the entry for this June 8291/21 paper. As in previous sessions candidates generally find questions on the Hydrosphere and Biosphere more to their liking with marks ranging from 10 to the upper 50s. Candidates' answers in *section A* were sometimes weaker than *section B*. It is therefore important that candidates practise answering data response questions. The quality of *section B* answers showed considerable variations with some candidates barely able to construct an essay whilst others wrote with skill and at some length.

It is difficult to make a judgement about whether or not candidates apportioned their time well. Some papers contained very little and it is likely these candidates finished well within the 1 hour and 30 minutes. Frequently brief responses in *section A* were followed by lengthy essays indicating a disproportionate amount of time spent on each section.

Comments on specific questions

Section A

In general candidates found the question on the biosphere more accessible than **Question 2** on water pollution. Some candidates lost marks in this section because they did not seem to have read the questions thoroughly. Very often the photographs and tables were ignored despite the instruction to refer to them.

Another common weakness was the inability to give a clear definition of a term, so frequently a source of some easy marks.

Question 1

The central theme of this question was human influences on the biosphere and sustainable management of woodland. Although there was a moderate range in quality, parts (b) and (c) were better answered than (a) and (d). This question illustrates the need for candidates to pay attention to the detail of questions.

(a) (i) Not many candidates gave precise definitions to the two terms. Invariably plant succession was given a vague description relating to the life cycle of a plant, plants growing or the vegetation in an area. Many candidates had very little idea about climatic climax communities, the focus being on the climate rather than the climax community. However a number of strong candidates had clearly revised the topic and achieved good marks.

(ii) Having not understood part (i), it was perhaps inevitable that part (ii) would prove to be difficult. Despite plagioclimax being a term stated in the syllabus, candidates had very little idea of its meaning. Furthermore many did not give Fig. 1.1 due attention and thus missed the arresting factor in the diagram. Only a small number of candidates answered this question correctly.

(b) This was much better answered. Although a few, having seen a deforested slope, wandered into a description not related to Fig. 1.2, the majority were able to describe and explain at least one effect. References to slope instability, habitat loss, reductions in biodiversity and landslides were common and adequately explained. A small number did try to justify climatic change and global warming as effects but failed to achieve many marks.

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(c) (i) Most candidates were able to compare the losses and gains to the continental areas shown in Fig. 1.3 and the majority achieved 2 or 3 marks.

(ii) Although conservation or planting were the obvious choices some candidates found this question more difficult than (iii). Carrying forward the misunderstanding from (i) some tried to explain what they thought were all the losses as a result of deforestation, thereby failing to achieve any marks. It was apparent that the term ecology was not clearly understood

(iii) There were very few incorrect answers with the need for land for housing, trade in timber and conversion to agricultural land being the most commonly stated economic reasons.

(d) (i) Once again a question that elicited varied responses. As both methods have merits candidates were at liberty to select either. Unfortunately a lot of candidates lost marks by only repeating the information provided in the question. About half the answers were completely relevant and picked up the merits in their choice.

(ii) The prime objective of this question was to make certain that candidates considered both methods thus a reason for the rejection was needed. Generally a correct answer to part (i) was followed by a valid rejection.

Question 2

As stated, parts of this question were found to be difficult. Whilst (a)(i), (b)(i) and (b)(ii) obtained moderately good marks, the remainder of the question was quite poorly answered.

(a) (i) Linking a pollutant with a source should have been an easy task. It was for a small number of candidates, but a significant number failed on two or three of the pollutants; hydrocarbons and sand being the most common errors.

(ii) Whilst most candidates briefly mentioned the washing of pollutants into drains, most failed to state that storm water runoff is high in energy and will transport nearly all roadside pollutants.

(b) (i) Good marks were achieved for this question as candidates only had to describe data from Table 2.2; the only skill being to recognise biological, chemical and physical qualities. Some candidates did not read the key to the table and confused high pH numbers with acidity. Others confused the less than sign with greater than and therefore misinterpreted the legal limit.

(ii) Whilst many candidates pointed out the nature and effects of pollution beneath the pipe a significant number wrote very simplistic answers by only mentioning dirty unhealthy water. The weakest answers describe the quality of water as being high due to being rich in nutrients.

Many candidates did not understand BOD. and therefore did not appreciate how the organic life would suffer as a result of the depleted oxygen concentration as a consequence of the increased numbers of microorganisms carrying out respiration. Some did correctly suggest that fish and other aquatic life would die. Others incorrectly thought that a high BOD meant that there was a high concentration of oxygen available for aquatic life.

(iii) Some candidates expressed an understanding of biological oxygen demand and referred to a higher oxygen content as a result of diffused pollution downstream. Weaker candidates thought it was a healthy condition for plants to demand more oxygen and therefore found an explanation difficult.

(iv) Far too many answers were too simplistic. All that was needed was a brief statement that suspended solids derived from erosion and increased river discharge would accumulate in a downstream direction. Some did refer to the accumulation of suspended solids as a result of the increase in decomposing dead plant and animal material from upstream.

(v) Most pointed out that the river would become progressively more polluted. There were few references to the likelihood of marine pollution. There were few references to increase nutrient levels leading to eutrophication.

Section B

The three questions in **section B** were of nearly equal popularity. Although candidates from a small number of Centres allocated sufficient time to write full and lengthy answers, it is disturbing that the majority followed an adequate part (a)(10 marks) with a very brief part (b)(30 marks). A half page paragraph cannot do justice to the 30 mark essay questions in this examination. Clearly many candidates need to be encouraged, through practice, to write an essay over a 35 minute period, under examination conditions.

Question 3

The central theme of this question was global biodiversity and strategies that target conserving species and maintaining biodiversity.

(a) The graph showing declining trends in terrestrial, marine and freshwater species was quite well interpreted. Most candidates availed themselves of the opportunity to divide their answer into 3 sections. Whilst many obtained up to 5 marks for describing the trends, suggesting a reason proved to be more difficult. Needless to say some candidates did not thoroughly read that question and gave as many reasons as they could muster in the time available; occasionally not linked to a particular trend.

Long answers to part (a) can have a detrimental effect on part (b).

(b) It was hoped that examples such as National Parks, Wildlife Parks, Zoos and local conservation schemes would be used to answer this question. Only a small number of candidates made a clear selection of two strategies and described and assessed the extent to which species were conserved and biodiversity maintained. These essays were a pleasure to read.

Unfortunately a significant number of candidates confined their answer to a single short paragraph with the most basic of detail. Simple statements such as: 'animals are kept in zoos so that they can be protected' rather than elaborating upon the enormous range of functions zoos perform (preservation of species, research, breeding, education etcetera). Unfortunately, very often there was no distinction between species conservation and biodiversity.

Question 4

There was quite a large variation in marks for this question, the range being from 5 to 40. Whilst some answers were well balanced, a significant number of candidates spent too long on **section A** to the detriment of **section B**. A 30 mark essay should be considerably longer than a short 15 line paragraph and reflect at least 35 minutes of detailed writing and certainly not in the form of brief bullet points; these essays are discursive.

(a) Once again the answer to this 10 mark question was sometimes longer than the 30 mark essay in part (b). The expectation of this question was to investigate the interactions between human and physical activity in contributing to annual floods in Bangladesh. Obviously high quality answers achieved this by reviewing how deforestation and soil erosion compound the problems caused by melting snow, monsoons and hurricanes (these almost occur at the same time).

Weaker answers were generally poorly balanced in developing either human or physical factors.

(b) Quite a straightforward question that has, in a different form, been set before. Although the expectation was that answers would integrate a sustainable water supply with flood management, many candidates treated the two items separately. High quality answers were typified by a detailed consideration of river management schemes incorporating the use of dams and reservoirs to regulate river flow, conserve water and provide HEP and water for domestic, industrial and agricultural use. Most importantly these essays possessed a strong emphasis on a sustainable water supply in terms of both quality and quantity.

Weaker answers gave a very brief account of a water conservation scheme, usually a valley dam and related HEP. Unfortunately these essays contained very little assessment and did not emphasise achieving a sustainable water supply for any purpose. Answers of this quality fell into the band 4 and 5 categories (between 0 and 12 marks).

Question 5

The characteristics and workings of food webs and chains form an important element of the biosphere content. The Antarctic Ocean offers an example of over-exploitation at the top and bottom of its food webs. This 10 mark starter leads into a 30 mark essay on the conservation of marine species. The pattern of marks was very similar to **Questions 3** and **4**, with a wide overall range and many candidates writing relatively lengthy 10 mark answers and short 30 mark answers. Again high quality answers contained an input that reflected the mark allocation.

(a)   Candidates were expected to assess how exploitation of whales and krill would affect the food web shown in Fig. 5.1. Good answers dealt with the interactions between both trophic levels with some consideration of possible rising and falling numbers within the web. These answers correctly identified feeding relationships and recognised the consequences of changing one part of the food web upon the rest of the web, resulting in, for example, competition for food.

Some moderately good answers treated the top and bottom of the food web as two separate entities, whilst weaker answers were poorly balanced and only mentioned the effects of exploitation of one level.

Marks for this section were mostly in the range of 5 to 10.

(b)   This question proved to be the most difficult of the three essay questions in **section B**. Whilst most candidates expressed some understanding of how endangered marine species could be conserved they were uncertain about the role of pressure groups and governments. A small number of candidates did pick up the actions of Greenpeace in the southern oceans however this was a rare occurrence. Likewise government action was seen in a very simplistic way and often amounted to very brief statements about governments having the power to do something, rather than assessing, for instance, international agreements, world heritage sites and the imposition of fishing limits.

Conclusion

Overall this paper was an effective test of a candidate's ability to interpret data and express an understanding of the management of the Earth's biosphere and hydrosphere. It is important that all Centres thoroughly prepare their candidates for both data response questions and essays that should in 30 to 40 minutes involve two to three pages of written prose. Above all, when candidates practise answering examination questions they must be encouraged to carefully read each question and to underline its key components.

ENVIRONMENTAL MANAGEMENT

General comments

As in previous examination sessions, candidates found this hydrosphere and biosphere paper slightly more to their liking than paper 1. Although this year's range of marks from 10 to 72 is wider than previous years a larger number of candidates achieved within the 40 to 55 range. Like paper 1, candidates found the data response questions in **section A** difficult and most performed better in **section B**. As stated in my paper 1 report, these data response questions examine the environmental science that underpins the management of the environment.

Comments on specific questions

Section A

Questions 1 and **2** showed very little difference in the quality of answers. It was disappointing that although there were a small number of very good answers, the majority were in the range 3 to 12. Once again it is necessary to have candidates practice sample questions that involve interpreting data presented in the form of graphs, tables, maps and photographs. On a positive note, most candidates coped well with the definition of terms and the more discursive elements of each question.

Question 1

This biosphere question moved from the understanding and characteristics of biomes into the topic of sustainable agriculture within temperate grassland.

(a)   Most candidates coped quite well with giving the meaning of the terms biome, NPP and biomass. The major omission from these definitions being losses due to respiration for NPP and dry weight in the biomass definition.

(b) (i)   About half the entry identified all three correctly. Surprisingly a significant number thought deserts were typified by hot and moist conditions in every month and that hot summer and warm winters were a characteristic of tundra or temperate grasslands.

(ii)   This was very poorly answered. Most candidates ignored the requirement to give reasons for the distribution of deserts. Instead they stated that deserts were the result of hot dry conditions; but where? And why? Only a few candidates mentioned air descending in the tropical high pressure zone and the presence of deserts in tropical west coast regions where there are cold ocean currents. The worst answers located deserts in equatorial zones. Clearly little attention had been given to the map (Fig. 1.1).

(iii)   Most candidates achieved 2 marks by linking climatic conditions to two or three of the biomes. Only a small number of candidates, however, developed the interactions of high/low temperature and rainfall with for instance reference to tropical rainforest, deserts, tundra and temperate grassland.

(c)   This part used a photograph and climatic chart of the prairies to develop a question on sustainable farming in a marginal climatic region.

(i)   Despite 'semi-arid' being used in the question most candidates failed to gain more than 1 mark. The requirement was to simply identify the moderate dryness of the region and point out that most rain occurred when temperatures were high and there are losses due to evaporation.

(ii)   There was quite a mixture of plausible points relating to the unsustainability of farming in the prairies or pampas. Most mentioned how intensive mechanised farming might eventually lead to soil erosion; very few referred to the links between monoculture, semi-aridity and soil exhaustion.

(iii)   Approximately half the candidates identified a reliable water supply as being a prime requirement. Other answers dwelt on improvements that could be derived from a host of farming techniques such as crop rotation, multiple cropping, using fertilisers etc. Unfortunately observation of the detail of the photograph would indicate that many of the possible improvements were impractical.

Question 2

This question on water pollution received quite a mixture of responses.   In general (a)(i) and (b) were moderately well done and (a) (ii & iii) proved to be difficult.

(a) (i)   As long as candidates identified a type of pollutant rather than the source then they received full credit.

(ii)   Here marks were frequently lost through not reading the question thoroughly: the requirement being to outline how sewage and wastewater affect human health and freshwater ecosystems. There were few difficulties with effects on health but freshwater ecosystems were replaced with marine ecosystems plus a limited range of irrelevant environments. Common relevant inclusions were eutrophication and disruptions to food chains.

(iii)   Here candidates needed to avoid repeating part (**ii**) material on freshwater ecosystems and discharge from rivers, and focus on shipping or marine installations dumping at sea. Oil, waste from ships and non-biodegradable items were the most common relevant examples. When these were selected it became fairly straightforward to describe an appropriate effect.

(b)   The model of a pollution prevention hierarchy proved to be quite thought provoking. High quality answers used one of the examples (usually household waste) with relevant detail for each stage e.g. using less non-biodegradables and separating food from paper etc.; recycling separated materials such as glass, paper and food; treating waste such a sewage and food and finally disposing of a reduced volume of waste material or returning clean water to rivers.
Many candidates lost marks by repeating the content of the model without any application.

Section B

Questions 3, 4 and **5** were of almost equal popularity. The most important discriminator between strong and weak performances lay in the candidate's ability to read the questions and follow instructions. Marks for these 40 mark questions were generally much better than the **section A** marks.

Question 3

(a)   This 10 mark question sought to test a candidate's ability to identify some conflicts of interest that might affect an area of outstanding natural beauty (AONB). The map positioned a number of possible pressures: a retail park (business and shopping), a road, a city, agricultural land and a quarry. Important in this is recognition of a conflict of interest with the AONB. Candidates who simple described pressures on non-urban land without reference to the information in Fig. 3.1 received few marks. The significant number who directly referred to Fig. 3.1 did well.

(b)   This question gave candidates the opportunity to elaborate upon the various responsibilities of National Parks towards protecting area of ecological importance. It was pleasing to read essays in which local National Parks received thorough analysis from candidates who expressed genuine concerns for conservation and preservation. Weaker answers in the 13 to 18 range tended to give a limited analysis of a wide range of parks rather than an in-depth assessment.

Question 4

(a)   This question had a similar theme to 3(a) with, in this case, an assessment of the adverse effects an expanding city may have on water supplies. The question needed three effects and there was little point in writing rambling essays covering the effects of human activity on water supplies. Again good answers were obtained by adhering to the requirements of the question. There were

some effective references to pollution from the power station, urban expansion across rural land and possible salination of agricultural land

Weak answers gave Fig. 4.1 very little attention with some even mentioning effects that were not present e.g. deforestation for agricultural land up-valley from the dam or marine pollution. Examiners commented that some candidates desired to write all they knew about a particular topic without reference to the context of the question.

(b)   This question on achieving a sustainable supply of water was quite well answered. The best answers combined water quantity with quality, evaluating a good range of strategies. The question was not simply about dams and reservoirs and answers also referred to desalination, tube wells, water conservation and water treatment. At the very top there was some excellent positive and negative evaluation of strategies.

      Weaker answers tended to focus in particular on reservoirs and information on water supply became subsumed within information on HEP and power supplies. There was very little evaluation in these essays.

Question 5

This question was possibly a little more popular than 3 and 4, and like these it was generally well answered. Part *a* posed more difficulties than *b*.

(a)   Candidates were expected to give three reasons for the differences in population growth. Stronger answers focused on 3 distinct reasons and referred concisely to a selection from: education, family planning, standards of living, exponential growth and government legislation.

(b)   Although a seeming gift for those who had revised China's One Child Policy, the question fell into two parts and many missed the required preamble on why the management of population change was needed.

      The first part of the question really needed an assessment of overpopulation, under population and an ageing population. This leads onto why it is desirable to achieve an optimum population in which resources and population growth had a balance where resources were fully utilised; Many only mentioned overpopulation.

      The second part required an assessment of how one country is managing its population growth in terms of the future rather than the past. China was an overwhelmingly popular choice and many candidates were obviously well versed in the detail and ramifications of the One Child Policy. The main discriminator between strong and weak answers was the quality of positive and negative assessment. A small number of candidates selected Singapore and there was very little about MEDCs. The weakest answers more or less ignored the first element of the question and provided a weak assessment of one or more countries.

Conclusion

Overall it was quite a pleasure to assess this question paper. Candidates were able to develop material with which they were familiar and most of the longer essays were well constructed and interesting to read. It is important that more teaching time is given to answering data response questions.

ENVIRONMENTAL MANAGEMENT

> **Paper 8291/23**
> **Paper 23**

General comments

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Comments on specific questions

Section A

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ENVIRONMENTAL MANAGEMENT

Paper 8291/03
School Based Assessment

General comments

The increase in this year's entry has considerably diversified the range of project reports and with this a number of negatives and positives. The majority of candidates can be congratulated on the quality and presentation of their work. Although some candidates, mainly from newer Centres, need to structure their reports better, a generally high standard of written style and detail was achieved by most. It was also pleasing that, seemingly, there was less reliance on the Internet.

The major issues were mainly administrative and are summarised below:

- A significant number of Centres did not meet the deadline of having their candidate research reports with the board by the end of April.
- Occasionally marks were not transferred to MS1 and in four instances MS1s were not submitted.
- Only a minority of Centres completed the comment section of the candidate record card. This is important as it informs the Moderator of where and why marks are allocated.
- Two Centres entered percentages onto the MS1 form instead of a mark out of 40.
- In a small number of cases the assessment of the projects was inconsistent.
- A small number of research reports were extremely long and contained a great deal of extraneous material, very often with literary reviews comprising copied and pasted articles and sections of books of up to 20 pages in length; such a review needs to be short i.e. 150 words maximum. The candidate's own work should be the focus and assessors and Moderators need only be concerned with such input.

As a general comment, it is important that candidates are made fully aware of the requirements of this School based assessment. Written reports should be of approximately 2000 words in length and ideally structured into the four sections: introduction/hypothesis; methodology; results and analysis; conclusion and evaluation

Comments on assessment criteria

Although it is possible to find fault with any set of assessment criteria, Centres should recognise that for Environmental Management, the division of the 12 criteria into the three skill areas C1, C2 and C3 does broadly follow the stages of scientific method. The structure suggested by the criteria should also enable candidates to omit over-lengthy preambles and literary reviews that detract from the candidate's own work and avoid Internet copying and plagiarism.

This session's research reports revealed strengths in C1 (*a* and *b*); C2 (*c* and *d*); C3 *b*, whilst there were particular weaknesses in clearly explaining methods (C1 *c*), using statistical tools (C2*e*), developing valid conclusions and evaluation (C3 *a* and *c*).

Criterion C1

Most candidates included a hypothesis or question, supported by a clear explanation of the principles underpinning the topic. Unfortunately some reports contained a supportive preamble of excessive length; for one Centre totalling 15 to 20 pages of copied Internet material under the heading of a literary review. As the report needs only to be of 2000 words in length this inclusion should be limited to 200/300 words. Many candidates satisfied the criteria in C1 (*a* and *b*) by providing a clear introduction accompanied by their hypothesis or question, prior to moving onto their methodology.

I suggest all candidates begin their report with a clear hypothesis or question as this forms a statement of intent. This should be following by a brief introductory paragraph outlining the background to the topic.

Whilst many candidates detailed and explained methodologies, a significant number only wrote brief lists without any amplification; e.g. a listing of chemical tests or setting of questionnaires should be accompanied by an explanation that gives credence to the proposed methods.

Criterion C2

Three of the criteria in C2 were less well developed than in previous sessions. As most reports were organised in a logical order and well written full marks were usually achieved for these criteria (*c* and *d*).

Only a minority clearly satisfied the requirements for the collection, collation and presentation of data. Clearly when the methodology outlines the need for quantitative data, this should be presented in an appropriate form. In many instances frequency data was not collated and presented as tables or graphs e.g. instead of simplifying questionnaire responses some candidates simply put all sheets into the body of their report, thereby rendering this information almost meaningless. Another common issue was to loosely quote statistics in the text instead of putting information in a table or graph.

A feature this session was the inclusion of photographs, sometimes without any context or text reference. This is a pity, as such illustrative material often forms very interesting and supportive evidence. Whilst photographs may satisfy parts of C2 (*a* and *b*)*,* they are clearly not data collected and recorded accurately with an appropriate degree of precision.

Criterion C3

Whilst high quality reports displayed good quality conclusions and evaluations many candidates failed to achieve any more than 2 marks in this section. A conclusion needs to be a summing up with reference to data that supports or rejects the chosen hypotheses. An evaluation points out the strengths and weaknesses in the candidate's own work i.e. the feedback loop in scientific method; it should also point out where improvements can be made. I am always surprised that most candidates are not prepared to point out, with a justification, the successful features of their work.

Criterion *b* was more successful as the explanation of trends in the research data can derive from the results analysis in C2 as well as the conclusion.

Concluding comments

It is obviously easy as a Moderator to be critical. It must be pointed out that according to ability and time constraints the majority of research reports were of a good to high quality. The vast majority of candidates clearly enjoyed their research and produced reports of a very creditable standard; the samples I received certainly made for very interesting reading and I sometimes wonder if I would have achieved the same standards at their age. However, there is still a need for all candidates to be reminded of the requirements of this coursework element and for teachers to be vigilant about presentation, structure and length.