ENVIRONMENTAL MANAGEMENT

Paper 8291/11
Paper 11

General comments

The session has seen an encouraging increase in the total entry to just under 1000 candidates. Significantly, this has been due to both an increase in the number of centres and the size of the entry from a small number of centres. As a consequence, the entry now contains a much broader range of ability and performance.

Better scripts clearly displayed a good use of time with a balance between sections A and B. However, a significant number of candidates spent most of their time on section A and made a very limited attempt at section B.

Section A

Question 1

Candidates responded well to the data in part **(b)** but less well to parts **(a)** and **(c)**. A significant number of candidates obtained no credit at all for each of the parts in **(a)**; most of these candidates simply repeated the letters X, Y and Z.

(a) (i) Responses were quite varied, with most recognising that seismic waves were shock waves or vibrations generated by an earthquake.

(ii) Very few candidates understood that these were P and S waves.

(iii) A small number of candidates correctly named the wave that causes most damage as an L wave.

(iv) Whilst partial credit could be given for describing the wave pattern for Z in Fig. 1.1, only a small number of candidates stated that they were surface waves with a rolling motion, thereby causing structural damage.

(b) For most candidates this formed the best part of **Question 1**. There were some excellent interpretations of Fig. 1.2, which lead to good analysis in **(iii)**. It was pleasing that in part **(iii)** most candidates pointed out how little time there was to make any realistic preparation for the shock waves.

(c) (i) Most candidates achieved partial credit for stating that Iwate is closer to the epicentre. However, not all candidates stated that with distance from the epicentre the strength of the shock waves diminished.

(ii) Very few responses displayed an understanding of the broad mechanics of a tsunami, however did achieve partial credit for describing its impact upon a coastline. Some candidates incorrectly referred to a tsunami as being a tidal wave, rather than a standing wave generated by a seismic shock.

Question 2

(a) (i) There were no issues with the correct placement of group A and group B factors.

(ii) Earth-Sun geometry and solar output were the popular choices. For the former, although there were some incorrect references to the distance between the Earth and the Sun, the Earth's axial tilt and seasons were generally accurately described. Solar output achieved some good responses,

with reference to the receipt of solar energy and heating. A few candidates even mentioned solar flares.

(iii) There was quite an even balance of choice, with most responses partially developed. Most were clear about the factor, but less clear about its influence on climate.

(b) There was a large variation for this part, with a significant number of candidates achieving full credit in contrast to those who either had little understanding of greenhouse gases or did not read the question thoroughly.

(i) A surprisingly large number had little idea about the sources of greenhouse gases and as a consequence few obtained full credit.

(ii) About 50% of candidates clearly understood that 'relative risk' referred to the variations in the contributions made by each of greenhouse gases. Full credit was awarded to candidates who quoted the data, with 3 marks available for generalised descriptions. However, a significant number of candidates wrote general descriptions of the greenhouse effect without any reference to the contributions made by each of the gases in Table 2.2.

(iii) This was quite well answered with most responses mentioning the cyclic nature of long term climatic variations, with the ice age being the most popular example.

Section B

Question 3 was overwhelmingly the most popular, with about 15% of candidates answering **Question 5** and very few attempting **Question 4**. It seems that atmosphere questions remain difficult for many candidates.

Question 3

(a) The majority of candidates made a good attempt at this question and marks were mainly in the range 5 – 8. Good responses were typified by descriptions of deforestation and urban development, enabling loosened, lubricated or dry sediment to move down the slope; such movements often triggered by seismic activity or sudden rainfall. Weaker responses either contained a poor balance of natural processes and human activity, or lacked any reference to Fig. 3.1.

(b) The quality of responses was largely dependent on the attention given to the details in the question. A significant number of candidates lost credit by not using examples to illustrate their answers; those that selected examples mainly opted for Sarno and Rio de Janeiro. In both instances candidates were able to select an acceptable range of strategies including: afforestation, barriers, drainage and avoidance. Although a strategy used to cope with the aftermath of a sudden mass movement evacuation from an affected area does little to manage the slope by preventing further mass movements.

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 underachieved in this 10 mark question. Although a significant number of responses contained relevant detail, they were frequently rambling descriptions of deaths from natural hazards, rather than three distinct reasons. Other weaker responses concentrated on deaths from geophysical events without any contrast with the high percentages.

(b) The requirement was to assess either a LEDC or a MEDC for its vulnerability to natural hazards. The two most common errors were:

- to describe in great detail one (mostly tectonic) event; mostly the Kobe Earthquake or the Haiti earthquake rather than the range natural hazards that affect a country
- to write a comparison between LEDCs and MEDCs in very general terms

Good responses did provide 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.

Question 5

(a) Good responses were those 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 cliffs become more prone to wave attack, thereby steepening the cliff profile. Too many answers dwelt on marine processes rather than sea level rise. Few candidates made reference to Fig. 5.1.

(b) Mass wasting is a topic with which most candidates have studied and have seen in previous examinations. The requirement was to firstly describe the cause and effects of mass wasting in urban areas and then link them with measures that aim to reduce the problem. Some good responses achieved this objective and achieved full credit. However, weaker responses either dwelt on rural areas or, in simple terms, described some measures that help to reduce mass wasting.

With the exception of a small number of candidates using Hong Kong or Rio de Janeiro, there was little use of studied examples.

Conclusion

This paper 1 proved to be an effective test of both knowledge and the ability to analyse a wide variety of data. Candidates need to be encouraged to read questions carefully and, particularly in section A, achieve consistency through a set of linked questions. The quality of written English was generally of a high standard, with many of the essays a pleasure to read.

ENVIRONMENTAL MANAGEMENT

Paper 8291/12

Paper 12

Key Messages

Candidates should be encouraged to read the questions, particularly in ***Section B***, more analytically, so that their responses may be focused more effectively on what is required, including giving named examples where necessary. Often an answer may be answered well by reference to one or more case studies rather than an over-lengthy account which is generalised and predominantly descriptive. This especially applies where the requirement is to "assess" or "evaluate".

General Comments

Candidates tended to focus more on the essay section and many essays were very well-written, with good coverage of the material and clear exemplification and use of case studies. There were, however, instances of candidates misinterpreting the questions and/or attempting to write an essay on related issues rather than those required by the question. Candidates who had planned and structured their responses tended to produce more coherent and informative essays than those who wrote everything they could think of about the topic, which tended to yield an unfocused, almost list-like approach lacking evaluative comment. The popularity of **Question 4** in ***Section B*** suggests that on the whole candidates are reluctant to attempt questions on atmosphere and physical processes. This was also evident in ***Section A,*** where a relatively high number of candidates either did not attempt some sections or gave very limited responses, followed by lengthy **Question 4** answers.

A small number of candidates made rubric errors by attempting all three questions in ***Section B***; on the whole, this was not beneficial to the candidates. The majority of candidates timed themselves well, and the quality of language and communication was good in general and occasionally excellent.

Comments on Specific Questions

Section A

Question 1

Responses to this question varied immensely; although it was evident that most candidates had studied plate tectonics and volcanic activity, understanding was not strong. The majority of candidates recognised a convergent plate boundary, but few candidates correctly named all three features and it was evident that for many the processes were not fully understood.

(a) (i) Feature **A** (trench) was incorrectly named or left blank by a high proportion of candidates; feature **B** was more successfully recognised as a fold mountain or a volcano ("hill" or "mountain" were commonly seen) and although the process of subduction was often correctly named for **C**, other common answers included "melting" (acceptable) and "Benioff Zone" (not a process).

(ii) The majority of candidates positioned the two arrows correctly.

(iii) On the whole, candidates were able to explain the formation of features **A** and **B**, even if they had not been correctly named in part **(a)(i)**. Good answers demonstrated a clear knowledge of the processes linked to convergence and resultant vulcanicity and fold mountain building. A minority of candidates confused the terminology of convergence and divergence, whilst some answers incorrectly described the formation of mid-ocean ridges and rift valleys, or less commonly, conservative margins.

(b) The best answers focused on the photograph and the accompanying captions, and it was evident from the detailed and entirely appropriate responses that this eruption had been studied. Many candidates used the photograph and map successfully to discuss the impacts of ash clouds, lahars and flooding on settlements, farming, communications, health and trade in a more general sense, whilst weaker answers ignored the resource and referred in more generalised terms to lava flows and pyroclastics. A few candidates did not attempt this part of the question.

Question 2

On the whole, this question was less well answered than **Question 1**, although there were exceptions.

(a) Many candidates managed to produce an acceptable line, although frequently the troposphere inversion was either absent or placed too high, whilst the positioning of the stratosphere and troposphere varied considerably. Weaker candidates did not notice the scales and drew the temperature-height diagram to include all the layers of atmosphere. Almost all candidates answered part **(iii)** correctly. Few candidates showed a knowledge of weather balloons and their functions, although most gained some credit for reference to temperature, winds or moisture and linkage to weather forecasts. A common misconception was that they were used to monitor ozone and greenhouse gas levels.

(b) (i) Candidates generally struggled in their attempts to explain the conditions at **X**, and either described the circulation as seen in the diagram, or commented that it would be hotter at 30° because it is nearer the Equator. There were occasional incorrect references to Hadley cells. Some credit was usually obtained for reference to drier air and lack of clouds. A small number of candidates referred correctly to adiabatic warming in the descending air mass.

(ii) This was generally answered more successfully, although very few candidates showed any knowledge of the polar front or westerly air stream. Many referred incorrectly to trade winds or to Hadley circulation, or repeated part of the answer given in part **(i)**. Credit was awarded for references to rising air and cloud formation, resulting in precipitation, although candidates commonly tended to refer to cumulonimbus formation. As in part **(i)**, there was a tendency to describe the whole pattern of circulation rather than focusing specifically on the processes operating at points **X** and **Y**.

Section B

Question 3

This was not a popular question, but those who attempted it tended to produce either very good or very poor responses.

(a) Although the term was not specifically required in the answer, no candidates identified the soil catena and answers were generally descriptive, based on the diagram. Few candidates were able to convincingly explain the relationship between slope and drainage.

(b) Good answers assessed human and natural causes of soil degradation and outlined a valid method. As in other ***Section B*** questions, some otherwise good answers were weakened by the absence of an example. The best candidates referred to very well-described case studies, usually linked to re-afforestation and irrigation, although sustainability and restoration were treated as inter-changeable terms.

Question 4

This was by far the most popular choice of question in ***Section B*** and the quality of responses ranged widely.

(a) On the whole, candidates coped well with the data table. The best answers compared LEDC and MEDC countries, using the percentages in the table effectively, although occasionally mixing up the two terms. The majority focused on the higher percentages in the table, referring particularly to high atmospheric pollution levels and the difficulties of providing clean water and efficient sewerage systems in LEDCs. There were some misconceptions, for example some candidates believed that population densities in MEDC cities were higher than in LEDCs, thus producing more atmospheric pollution and there was some confusion between the terms “rural” and “urban”. Weaker answers

did not make explicit reference to the data table, focusing instead on more general issues in LEDCs.

(b) The best answers tended to be concise and focused, with the emphasis on urban atmospheric pollution in named areas. Particularly noteworthy examples dealt in detail with the measures implemented in specific cities in the candidates' home countries/cities; these answers were of a much higher quality than the much more common type of response, where the candidate listed all the types of urban atmospheric pollution (and sometimes all other types), often in great detail and occasionally in bullet-point form. The latter type of answer tended to be over-lengthy, descriptive, usually lacking any reference to named examples and without any attempt to assess the effectiveness of measures taken to reduce atmospheric pollution in urban areas. It was not necessary to go into in-depth explanations of the chemical reactions involved in atmospheric pollution processes, especially when this influenced the fluency and structure of the response. Candidates need to read and interpret the question more closely and plan their answers in order to give the most effective responses.

Question 5

There were very few answers to this question, but these were mostly of good quality.

(a) Weather forecasting techniques were dealt with reasonably well, with references to satellite and map data. Better candidates described how the data is brought together to inform long and short term weather forecasts; weaker candidates wrote lengthy descriptions of the different methods for recording the elements of weather – precipitation, temperature, pressure, cloud cover, etc. - but failed to show how it is collated and used for forecasting.

(b) Responses varied in scale from global warming issues to localised effects such as urban heat islands, with candidates focusing on urban activities which result in atmospheric pollution as a cause of localised weather change. On a regional scale, however, very good responses included reference to causes as diverse as deforestation, over-grazing, over-cultivation, urbanisation and the El Niño effect, following up with descriptions of measures used to combat the problems in named areas as varied as the Sahel and the Punjab.

ENVIRONMENTAL MANAGEMENT

Paper 8291/13
Paper 13

Key Messages

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General Comments

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Section B

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ENVIRONMENTAL MANAGEMENT

Paper 8291/21

Paper 21

Key Messages

- Candidates need to be aware of the equal balance between ***Section A*** and ***Section B*** of the paper and plan their time and answers accordingly.
- In ***Section A***, candidates should be aware of the credit allocation for each part question and compose their answers accordingly.
- It is important that instructions are followed carefully. An understanding of the differences between the phrases *explain/describe/assess/give reasons* would be valuable in scoring full credit especially in ***Section A***.
- Candidates should also check their work thoroughly especially to ensure that they have not turned two pages of the question paper at once, or misinterpreted the rubric and as a consequence penalised themselves.

General Comments

There was a reasonably good response to all questions on this paper although in some cases there was a lack of equivalence of performance between ***Section A*** and ***Section B*** of the paper.

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

Some answers were enhanced by effective use of appropriate examples to illustrate key points and the incorporation of precise definitions of terms.

Comments on Specific Questions

Section A

Question 1

(a) (i) Few difficulties were encountered, and the majority of candidates obtained the full credit available.

(ii) Good answers referred to the losses of water to the atmosphere and ocean currents, and particularly to the locking of water into glaciers, ice and underground aquifers. In general, this question was not well answered, with many candidates simply repeating the stem of the question and using the words from part **(i)**.

(iii) Candidates with good graph interpretation skills were able to earn full credit for this question by correctly describing the relationships between *infiltration* and *surface runoff* shown in the two graphs. This question was generally less well answered, with candidates tending to refer to the two axes of the graph rather than to the relationship between the two lines drawn on the graph. Some were unable to correctly explain the differences between *porosity*, *infiltration* and *surface runoff.*

(b) Good answers were characterised by the use of examples throughout the response within each of the three areas of flood risk management. These answers gave the examples and developed each point with an explanation or description. Some weaker answers simply used the terminology provided in the diagram and repeated them as an answer, stating that it was important to have them and were, as a result, less creditworthy. Where candidates mentioned levees, dams and specific emergency services and then described how they were effective, full credit was awarded.

Question 2

(a) Where candidates attempted to merely translate the terms *biodiversity* and *biomass*, only partial credit could be awarded, whereas knowledge of the definitions gained full credit. Candidates would benefit from learning a precise definition of *biomass* in particular as this was less well understood.

(b) Candidates confused the terms *nutrients* and *energy* and used them interchangeably to the detriment of accuracy and consequently the credit awarded in both **(i)** and **(ii)**. Simply describing the diagram without reference to the processes involved such as photosynthesis, eating/digestion and decomposition was insufficient to gain full credit. Few candidates went beyond the release of heat at each stage and were able to refer to processes such as respiration, growth and movement. Many candidates quoted the 10% rule but were unable to sufficiently demonstrate that they understood it.

(c) Weaker answers stuck rigidly to descriptions of the diagram without going deeper into the detailed background of the rainforest structure, and relied heavily on comparisons of the relative sizes of arrows and circles. In **(i)** there was a lack of knowledge regarding the cycling of nutrients in the rainforest, and in particular the hot and humid conditions which contribute to this. Some candidates misinterpreted the word 'litter' to mean trash/garbage/rubbish and did not understand that this is in fact a soil horizon. More successful answers were able to describe the rapid decomposition by micro-organisms and decomposers with reference also to the effects of runoff. Candidates found it difficult in many cases to provide sufficient range and detail in their answers for part **(iii)**, especially when referring to the effects of leaching, erosion and runoff. Many did not suggest that the removal of the trees in fact removed the bulk of the biomass store. More creditworthy answers described the events in detail, and added examples and developed points to support their statements.

Section B

Questions 4 and **5** were almost equally popular while **Question 3** was the least popular. Both parts **(a)** and **(b)** were equally well tackled with only a minority not completing **(b)**, the essay question. Candidates must understand that this section carries equal weighting to ***Section A***, and should plan their work accordingly.

Question 3

(a) Many of the candidates with weak graph interpretation skills found the structure of the graph hard to understand. Candidates who understood the graph found the description of the relationships between the different areas relatively straightforward, but there was a widespread lack of understanding about the differences between the different regions mentioned. Where candidates were successful they showed understanding of LEDCs, MEDCs and the situation in the newly emerging nations such as China and Brazil.

(b) Candidates were able to provide named examples and produce a range of well described and detailed disadvantages. Some answers lacked balance because they did not name many advantages, or did so only in passing without giving any detail. Some candidates produced a list of disadvantages but provided no detail or assessment for any of them. Better answers considered a balance of both disadvantages and advantages related to named examples, and discussed the relative effects of some of these. Popular choices were the Three Gorges Dam in China and the Hoover Dam in the USA, although some candidates were able to draw on local examples and add some personal experience to their discussion.

Question 4

(a) Success came from translating the pie chart into percentage numbers and then discussing the relative contributions of the different sources. The largest contributor, but the least well understood, was *seepage from oil-bearing rocks*, with candidates demonstrating a wide range of misapprehensions as to what these are and where they are found. Weaker candidates focused on the *spillage* parts and in particular the *spillage due to extraction* which, despite being the least of the sources, presented an opportunity to discuss BP and its recent troubles which was beyond the scope of the question.

(b) Many candidates were unable to distinguish between cause and effect or to assess strategies. More successful candidates were able to suggest the problem caused by the sheer size of the

oceans and to suggest two strategies, but tended not to attempt to assess any of the strategies. Cause and effect were reduced to short sentences such as 'boats spill engine oil and this gets on the feathers of seabirds' rather than 'Boats illegally dump used engine oil at sea when cleaning out their engines. This has the effect of oiling the feathers of seabirds causing them to be unable to fly and to poison them as they attempt to clean themselves. This is in contravention of internationally agreed protocols and can necessitate volunteer organisations attempting to rescue and clean the birds.'

Question 5

(a) The more successful answers made clear and accurate interpretations of the relationship between the two plotted lines at key points along the time axis, and then described events such as the Industrial Revolution and how they related to the increase in extinction rates. Weaker answers focused on a single description of the relationship between the two lines, and then mentioned habitat destruction and hunting. This type of question requires more detail than many candidates are used to providing and in order to obtain full credit, this issue has to be addressed.

(b) This was generally well answered with an interesting range of areas chosen by the candidates for discussion. The most successful named a specific area, described in detail the influences which affect the area and then gave a range of assessed strategies to help conserve the area. National parks in particular were used very successfully. Some candidates lost credit because they did not assess the strategies described. Where credit was lost it was often because the area chosen was too generalised to successfully describe strategies, for example giving 'rainforest' rather than choosing and describing a particular rainforest area, e.g. the Brazilian rainforest or the Sumatran rainforest. One very popular choice which also tended to provide weak answers was pandas in China. Having picked this, many candidates were unsure what to describe in terms of strategies and were reduced to brief undeveloped points about planting bamboo and having breeding programmes.

ENVIRONMENTAL MANAGEMENT

Paper 8291/22

Paper 22

Key Messages

- Performance in ***Section A*** questions could be improved by directly linking answers to interpretation of the relevant diagram or photograph.
- Data in graphs and tables should be analysed to identify patterns and trends, and data from these quoted in the answer.
- In ***Section B***, candidates should be aware of the definition of key terms and note that where the word 'assess' is used in questions, evaluative statements are required in the answer.
- The use of appropriate exemplar material in the essay question is most important and close attention to the type of examples required in a question should be considered at the planning stage.

General Comments

In general candidates performed better in ***Section B***, although a significant number of candidates are to be congratulated on their overall achievement in both sections of the paper. Candidates apportioned their time well between ***Section A*** and ***Section B***.

The use of appropriate exemplar material in the essay question is most important and close attention to the type of examples required in a question should be considered at the planning stage.

The essays were a pleasure to read and the quality of the presentation of many most impressive, with some excellent and interesting content. This was particularly so when good use was made of case studies or where appropriate examples of environmental management from the local area were incorporated, thus allowing a pertinent assessment of issues, strategies and policies.

Comments on Specific Questions

Section A

Question 1

Responses to this question were varied with more problems encountered in some parts than others, which illustrates the need for candidates to pay close attention to the detail of questions.

(a) (i) Very few candidates were awarded full credit as the hydrological terms were positioned incorrectly in relation to one another in the flow chart. This highlights a requirement to differentiate particularly between the related terms *percolation* and *infiltration* in the hydrological cycle.

(ii) This was quite well answered in detail, with many candidates achieving at least partial credit even though some of the terms had been confused in **(i)**. These answers demonstrated a good understanding of the relationship between the flows and stores and the sequence of events resulting in flooding. Very good answers referred directly to Fig. 1.1, with answers remaining within the confines of the flowchart. These correctly identified how an increase in the input, (precipitation), would directly impact upon and change all the other components. Weaker answers tried to explain the flooding by involving other inputs into the river system to increase the volume of water reaching the river, usually snow melt or through human activity such as deforestation, reducing interception and increasing surface run-off.

(iii) This was generally well done with many different ways suggested for increasing the store of water, reducing the flow to the river or using alternative flood alleviation schemes including channel

dredging and diversion channels. Some candidates, possibly as a consequence of having missed the word 'subside', discussed ways in which human activity has increased the likelihood of flooding, for example through deforestation or urbanisation.

(b) (i) Good answers clearly made good use of Fig. 1.2 and focused on the area being uninhabited together with the natural features of the area to explain the suitability of the location of the dam. The majority of candidates achieved some credit for reference to the lack of settlement. In some answers only benefits gained after the dam had been constructed were considered rather than why it was built at this location.

(ii) There were many good answers considering a wide range of environmental issues. Developed explanations of two clear issues were required for full credit to be awarded. In general candidates were well versed in this topic. Weaker answers often repeated the same developed points for each of two issues, for example the effect upon biodiversity. Candidates should make a considered choice of issues to demonstrate a breadth of knowledge in their answers.

Question 2

Part **(b)** was answered better than part **(a)**.

(a) (i) Good answers provided a succinct definition of succession and made reference to Fig. 2.2, highlighting the pioneer community of the succession, while some also observed the climax vegetation in the background. The vast majority of candidates presented a vague definition of succession, and there was some confusion of the term 'succession' with changes as part of a life cycle of a plant or the evolution of an organism.

(ii) Knowledge of marram grass as a xerophyte adapted to living in a dry environment was incorporated into some very good answers. Equally successful were those candidates who used Fig. 2.1 and Fig. 2.2 appropriately, observed marram grass as a dominant species and noted a lack of competition from other plants, suggesting that the plant must somehow be adapted to the specific set of conditions and able to withstand both salinity and exposure in a hostile environment.

(iii) In his part of the question very good answers were characterised by appropriate analysis and interpretation of the data and explanations linking the evidence from the data to the changes in the environment. Discerning candidates not only recognised the overall trend in increasing diversity between 0 and 125 metres, but also recognised the anomalies at particular locations along the transect. These answers described an emerging pattern with the highest percentages of marram grass, not only in the early stages of the succession, but also on the exposed ridges, together with the pattern of the higher diversity with increasing distance along the transect and in the dune hollows. The hostile environment was described with reference to the data for wind speed being highest close to the shore and on the exposed ridges. The trend was explained in terms of the effect of the wind speed on the humidity of the air and the rate of transpiration. The more favourable environment further along the transect was explained with reference to decreasing salinity, increased humus and organic matter from decomposition, increased availability of nutrients and water within the developing soil, all facilitating conditions which allow the colonisation by an increased number of species. A description of the basic trend of increasing diversity was achieved by many candidates and adequate answers also quoted data from Fig. 2.1. Use of the data posed some problems in explaining the trend. Weaker answers simply described the data, with no trend identified, and unsupported by data from the table.

(b) All candidates recognised some benefits from the conservation measures and provided at least some exemplification of each bullet point. Strong candidates gave each element of the question detailed descriptions with some illustration of the potential benefits from each strategy.

Section B

Question 3 proved to be the most popular, followed by **Question 5**. **Question 4** was the least popular. Responses were varied with weaker candidates doing better in part **(a)** of the questions, with the exception of **Question 4**, while stronger candidates achieved higher credit for the part **(b)** essay.

Question 3

(a) Good answers defined groundwater pollution and considered how pollutants from various sources could lead to groundwater pollution, together with the processes by which the pollutant would reach the groundwater for three of the sources illustrated. A detailed description of the sources and pollutants shown in Fig. 3.1, rather than focusing on the way in which the pollutants reach the groundwater through run-off, leaks, seepage, leaching and salt water intrusion, characterised weaker answers. Sometimes more than three sources were explained unnecessarily and material which could have been used in part **(b)** was detailed in **(a)**. This often impacted upon the length and quality of the response in part **(b)** of the question.

(b) Very good answers considered issues which necessitated the environmental management measures and identified an agricultural or urban area. These answers clearly demonstrate an understanding of the need for that particular measure, developing a good range of measures covering aspects of preventing pollution, treating water, delivering pure water and preventing water shortages through water conservation. In these answers measures were related specifically to the area, rather than being generalised. This allowed for pertinent assessment of the effectiveness of the measures. Weaker answers were differentiated by either no mention of an area or, if an area was named, no indication through a lack of detail whether it was an urban or agricultural region. Often these answers were restricted to preventing pollution of the water supply from the sources shown in part **(a)** of the question, with no distinction between urban and agricultural areas. Measures were better addressed than issues and therefore these essays lacked balance.

Question 4

(a) In good answers the differences in the size and shape of the delta was described and this provided evidence of appropriate use of Fig. 4.1. The reasons for the reduction in area observed included a wide range of suggestions relating to land use, water extraction and inundation, in addition to rising sea levels resulting from global warming. In general for this part of the question observation of the change in the land area was omitted and suggestions limited to one explanation relating to a rise in sea level resulting from global warming.

(b) This was completed more successfully than part **(a)**. The best essays were characterised by reference to a wide range of human actions responsible for the adverse effects on the quality of river water. These were explored through a number of specific examples of rivers and detailed both the causes and the adverse effects on water quality. These answers also considered how human activity had affected the quantity of water available. More discerning candidates recognised the contribution from natural causes and were able to offer an assessment of the extent. In weaker answers, examples were often omitted, with the main focus on water quality, and only a brief reference to quantity with no assessment of extent.

Question 5

(a) Very good answers described the interrelationship between the population and resources, and explained the significance of the point of crisis and subsequent trends. These answers offered a critique of the model, often contrasting the Thomas Malthus model with that of Boserup, explaining a more optimistic outcome of increased resources in response to an increase in population. Weaker answers were typified by a simple description of each graph line, but criticism of the graph often related simply to a mention of the lack of data and a time scale.

(b) This question elicited some high quality answers. In these essays the relevant terms were accurately defined and a good understanding of issues relating to population growth, overpopulation and underpopulation was demonstrated. Detailed knowledge and evaluation of a range of policies from named examples, including both MEDCs and LEDCs, were incorporated in the essay content. An adequate approach was to consider one example of overpopulation from an LEDC and contrast with one example of underpopulation from a MEDC. Weaker essays tended to be lacking in examples, or refer to only an example of overpopulation in an LEDC, often being generalised, lacking in issues relating to population growth and limited in the range of policies used in the management of the population.

ENVIRONMENTAL MANAGEMENT

Paper 8291/23

Paper 23

Key Messages

- Performance in ***Section A*** questions could be improved by directly linking answers to interpretation of the relevant diagram or photograph.
- Data in graphs and tables should be analysed to identify patterns and trends, and data from these quoted in the answer.
- In ***Section B***, candidates should be aware of the definition of key terms and note that where the word 'assess' is used in questions, evaluative statements are required in the answer.
- The use of appropriate exemplar material in the essay question is most important and close attention to the type of examples required in a question should be considered at the planning stage.

General Comments

In general candidates performed better in ***Section B***, although a significant number of candidates are to be congratulated on their overall achievement in both sections of the paper. Candidates apportioned their time well between ***Section A*** and ***Section B***.

The use of appropriate exemplar material in the essay question is most important and close attention to the type of examples required in a question should be considered at the planning stage.

The essays were a pleasure to read and the quality of the presentation of many most impressive, with some excellent and interesting content. This was particularly so when good use was made of case studies or where appropriate examples of environmental management from the local area were incorporated, thus allowing a pertinent assessment of issues, strategies and policies.

Comments on Specific Questions

Section A

Question 1

Responses to this question were varied with more problems encountered in some parts than others, which illustrates the need for candidates to pay close attention to the detail of questions.

(a) (i) Very few candidates were awarded full credit as the hydrological terms were positioned incorrectly in relation to one another in the flow chart. This highlights a requirement to differentiate particularly between the related terms *percolation* and *infiltration* in the hydrological cycle.

(ii) This was quite well answered in detail, with many candidates achieving at least partial credit even though some of the terms had been confused in **(i)**. These answers demonstrated a good understanding of the relationship between the flows and stores and the sequence of events resulting in flooding. Very good answers referred directly to Fig. 1.1, with answers remaining within the confines of the flowchart. These correctly identified how an increase in the input, (precipitation), would directly impact upon and change all the other components. Weaker answers tried to explain the flooding by involving other inputs into the river system to increase the volume of water reaching the river, usually snow melt or through human activity such as deforestation, reducing interception and increasing surface run-off.

(iii) This was generally well done with many different ways suggested for increasing the store of water, reducing the flow to the river or using alternative flood alleviation schemes including channel dredging and diversion channels. Some candidates, possibly as a consequence of having missed

the word 'subside', discussed ways in which human activity has increased the likelihood of flooding, for example through deforestation or urbanisation.

(b) (i) Good answers clearly made good use of Fig. 1.2 and focused on the area being uninhabited together with the natural features of the area to explain the suitability of the location of the dam. The majority of candidates achieved some credit for reference to the lack of settlement. In some answers only benefits gained after the dam had been constructed were considered rather than why it was built at this location.

(ii) There were many good answers considering a wide range of environmental issues. Developed explanations of two clear issues were required for full credit to be awarded. In general candidates were well versed in this topic. Weaker answers often repeated the same developed points for each of two issues, for example the effect upon biodiversity. Candidates should make a considered choice of issues to demonstrate a breadth of knowledge in their answers.

Question 2

Part **(b)** was answered better than part **(a)**.

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ENVIRONMENTAL MANAGEMENT

Paper 8291/03
School Based Assessment

General comments

Summer 2013 has seen the total entry reach 1000 candidates across 70 Centres. Although most Centres enter a small number of candidates, the trend towards large entries from individual Centres continues; this year exceeding 60 candidates. As there is a mixture of Centres with lengthy experience of this syllabus and a significant number having just started, a number of issues arise that can broadly be divided into administrative and assessment.

- Where the Centre entry is small, candidates find little difficulty in finding original topics. However, with a large entry there are often several candidates with the same project topic. A positive effect of this is that as long as candidates develop different aspects of the topic, group work can be undertaken. A negative effect is the potential for copying and plagiarism. This is an administrative matter that involves Centre staff carefully monitoring the work of their candidates.
- Large Centre entries means that Centres must be careful about meeting their internal deadlines in accordance with those of CIE. As marks have to be submitted by the end of April there should be no problem with dispatching projects at the same time.
- A significant number of Centres do not include their MS1 (attendance and final mark register) with their project sample.
- A small number of Centres continue to award half marks for an assessment criteria. The marks should be whole numbers which are then doubled into an even number. This final even number score should be entered onto the MS1.
- Although not entirely a reflection of the increased entry, this session has seen a trend towards assessment leniency. Particularly in assessment criteria: C1 b and d; C2 a, b and e; C3 a, b and c, either 2 marks are being awarded when 1 is better and very frequently credit is being given for criteria not actually present in the project report. Credit cannot be given for use of a statistical tool when one has not been used, nor can 2 marks be given for conclusions that do not relate back to the data.

Overall this session's project reports were generally of equivalence to 2012, with nearly all achieving marks in the 16 to 36 range. As most reports did not contain a clear evaluation or a statistical tool, very few candidates achieved marks in the range 36 to 40. It is still the case that the best reports derive from the collection and collation of primary data obtained from either field investigations or laboratory work. Increasingly, a significant number of candidates rely on secondary data, invariably obtained from the internet. It was pleasing that fewer candidates resorted to copying and pasting from the internet.

Finally as stated in the Moderator's report of last summer, 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, 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 of scientific method can be used to provide a check on how well the project is 99progressing. 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 majority of candidates continue to perform reasonably well in this skill area.

Either as the project title or as part of an introduction, hypotheses or questions were stated by most candidates. These were generally accompanied by a clear explanation of its underpinning principles. The outlining of the methodology to be undertaken was slightly weaker. Good quality research requires the formulation of a plan, detailing research sites, equipment, expected data and how it will be collated and presented. Although most candidates included a methodology it was too frequently a brief list without any explanation or justification. As a consequence it was often difficult to judge whether or not their developed plan would be effective in testing their hypothesis or answering their question.

The better projects achieved these goals, whilst weaker reports did not specify the details of their topic and were unclear about how it should be investigated.

Skill C2

Achievement in C2 was very similar to previous sessions thus it is only necessary to reiterate that which has been stated before. There were a significant number of high quality research reports that did very well in this section. They made excellent use of relevant collected data which were presented in a variety of ways including graphs, tables, diagrams and photographs; invariably integrated into an analysis through the use of figure references.

For remaining candidates there was quite a wide variation across the five criteria in this section, with the main weaknesses being within data collection/presentation and the use of a statistical tool. A significant number of candidates offered very limited evidence of data collection. A feature of some reports was the mismatch between the stated methodology and the presentation of related results. In these instances the methods stated in C1 did not yield related graphs, tables and photographs. On other occasions, collected data was submerged within a mass of descriptive text. Sometimes although diagrammatic or pictorial, material such as photographs were present but became decorative and were not referred to in the analysis or description.

The use of a statistical tool continues to be a weakness. There is a difference between statistical methods that are used to describe data and statistical tools that are used to analyse data. The former might include bar charts or line graphs whilst the latter would include correlation, chi squared, t test etc. Some Centres award this mark when there is no evidence of statistics.

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

Skill C3

This important skill frequently forms the weakest part of a candidate's work. Weaknesses occurred in each of the assessment criteria. In writing a conclusion and outlining relevant environmental management issues, most candidates failed to make use of their data as a source of justification. Although frequently given the full 2 marks for each, most candidates deserved only 1 mark.

Many candidates confused an evaluation with a conclusion and a significant number did not write an evaluation. For their evaluation, candidates should provide a brief survey of those things that went well and not so well i.e. success and limitations.

Concluding comments

Centres and their candidates continue to engage enthusiastically with this element of the Environmental Management examination. The majority of candidates seem to welcome the opportunity to research a topic of their own choice. As in previous sessions, the better topics and final reports are derived from locally based research; ideally these should utilise primary data. It is pleasing that this summer more candidates relied upon primary data rather than secondary information obtained from the internet.