ENVIRONMENTAL MANAGEMENT

| Paper 8291/11 |
| Paper 11 |

Key messages

1. Adequate preparation for the examination is essential. This includes learning the facts, possessing the necessary skills of analysis and interpretation, and practising on questions from past papers.
2. Ensure you understand the various question instructions, e.g. state, describe and explain, and answer only what is asked. Irrelevant answers, even though correct in themselves, will not gain credit and will waste your valuable time.
3. Use the published mark schemes to identify the type of answer, both in content and length, required by different questions. Use the allocated number of marks in the question paper to assist you in constructing your answer.
4. Apportion your time sensibly between questions, and between Sections A and B.
5. Quote data in tables and graphs in order to support points.

General comments

Now that different papers are taken according to global time zones, the entry to this paper was mainly confined to the Americas. The entry covered the whole ability range and it was pleasing to view the very positive approach taken by the majority of candidates. Most candidates utilised their time well with a fairly equal input into **Sections A** and **B**. Only a small number answered more than one question in **Section B**.

This examination proved to effectively discriminate according to ability, and test candidates' understanding of environmental management. It is impressive that as the entry increases so does the level of performance. It is also impressive that candidates continue to make use of exemplar material familiar to the candidate (local or studied).

Overall the quality of English ranged from good to very good, with some excellent use of technical vocabulary, effective essay structure and use of exemplar material. Most candidates paid careful attention to the wording of questions and according to variations in ability produced relevant and clear answers. As with previous sessions the main weaknesses occur in the data response questions where there is still confusion about the instructions e.g. 'describe and explain' and defining specific terms.

Comments on individual questions

Section A

Perhaps greater familiarity with the subject matter of natural hazards contributed to **Question 1** answers being generally stronger than **Question 2**.

Question 1

(a)   Although there were some weak and vague answers, the majority of candidates were able to define a natural hazard either by type or more generically.

(b)

    (i)   The graph required a fairly simple reference to earthquakes fluctuating at a low level whilst floods and tropical cyclones increase in frequency. Full credit could only be achieved by mentioning both elements. Many candidates referred to floods and cyclones but ignored the pattern for earthquakes.

(ii) Most candidates understood that the tectonic processes producing earthquakes were less frequent than changes to the weather and climate**.**

(iii) Surprisingly a significant number of candidates did not link tropical cyclones with rainfall and therefore flooding.

(iv) There very few incorrect answers with most outlining how rivers, dams and levees bursting etc. could produce flooding.

(c)

(i) Most candidates identified the anti- or counter-clockwise direction but it was not explained through reference to the Coriolis force.

(ii) Candidates are expected to be familiar with the passage of hurricanes, but answers showed a remarkable variation in quality. For location A, most were awarded credit for mentioning strong winds and heavy rain but only a minority outlined the early stages of a hurricane arriving in bands from the north. For location B, whilst most mentioned 'calm' not all referred to low pressure and clear skies surrounded by a wall of cloud.

(iii) Here answers were a little disappointing. The question needed description and explanation and the majority of candidates were only successful with the first. Explanations were mostly confined to strong winds and only a small minority outlined the impact of storm surges.

Question 2

Responses to this question were, in the main, very disappointing. Although all terms and data response elements were derived from the syllabus, candidates expressed little understanding and often resorted to repeating items stated in the question.

(a)

(i) The most common answer was the movement of material from one place to another. The vast majority of candidates ignored the need for gravity and slopes. The term erosion was often confused with mass movement.

(ii) Figure 2.1 was understood and most candidates were awarded full credit.

(iii) Explaining the characteristics of landslides and solifluction proved to be very difficult. Nearly all candidates wrote very brief descriptions that repeated, very simply, the elements of fast, slow, wet and dry from Fig. 2.1. Explanations were either missing or very weak and the two forms of mass movement not understood.

(b)

(i) Approximately 50 % of answers stated soil creep and many thought the picture showed a landslide.

(ii) Although it was possible to achieve full credit having answered **(i)** incorrectly, only partial credit was most commonly achieved. Trees and poles being slowly or gradually dragged down by soil movement were the most common credit-worthy points. It was surprising that a significant number of candidates described landslides and earthquakes. There was even reference to the crack in the road being a tectonic plate boundary.

(iii) The description of management strategies to stabilise the slope was much better answered. Many answers outlined how planting trees and constructing walls or barriers could help to arrest soil creep.

Section B

Question 3 was the most popular with **4** and **5** having similar but lower take-ups. In each of the three questions in **Section B**, candidates acquitted themselves quite well in both parts of the question. In most cases essays were well structured with a reasonably high level of written English.

The main issues that arose were within part **(a)** of each question:

- some are still confused about instructions 'describe' and 'explain',
- a significant number of answers would have benefitted from using and quoting relevant data from the diagram, table or graph.

Question 3

The answers to **(b)** were of better quality than **(a)**.

(a) Most candidates described the pollution that would be produced in an urban area and how it would linger in the upper diagram and in the lower diagram drift because of wind. Very few mentioned the characteristics of the atmospheric pollution in the rural areas:

- in the upper diagram it lowers to both the east and west,
- in the lower diagram it is reduced to the west and rises to dissipate in the east.

(b) Although there was quite a wide range in quality, the majority of candidates selected an appropriate urban region they had some familiarity with. Good answers were clear about the sources and types of pollution. In most answers these candidates expressed a good understanding of the measures that are being used to reduce atmospheric pollution; the discriminator between good and very good being the quality of assessment. Weak answers were characterised by the lack of an appropriate urban region and a superficial coverage of both elements of the question.

Question 4

This was a moderately popular question and one in which, with the exception of a small number of very good answers, most candidates found difficulties in fully developing the question topic. Thus, although relevant, many answers lacked important items of detail or assessment.

(a) Although most candidates described the general effects of volcanic eruptions on the reduced receipt of solar radiation, only a small number used the data in Figure 4.1 to describe deviations from the norm. Many candidates gave adequate reasons linked to their descriptions but often ignored the scale of the eruption.

(b) Most candidates described how human activity had contributed greenhouse gases and therefore encouraged various forms of changes to weather and climate. To varying degrees these answers briefly assessed the difficulties of introducing effective solutions; contrasts were invariably drawn between the economic and resource priorities of MEDCs and LEDCs. The best answers went a little further by assessing the extent to which human activity contributed to global warming in comparison to natural processes. These answers also assessed the success of international meetings and protocols. There is still some confusion between global warming and stratospheric ozone depletion and some candidates referred to the Montreal Protocol concerning CFCs rather than the Kyoto agreement on greenhouse gases (carbon dioxide).

Question 5

This proved to be the least popular of the **Section B** questions. Either candidates found the topic difficult or as it was the final question, ignored it. Part **(a)** proved to be more difficult than **(b)**.

(a) This question involved a description of the ways in which urban populations for MEDCs and LEDCs changed between 1950 and 2007. Candidates were required to describe two similarities and one difference between the groups of countries. Unfortunately most candidates interpreted the graph as being about changes to the total population and outlined stages in the Demographic Transition Model. Urban population change for LEDCs and MEDCs involves inward and outward migration coupled with natural population change within urban areas. Whilst there were some effective references to differences, similarities were less well covered as most candidates ignored the most recent trend of a decline in both sets of nations.

(b) For this question, answers polarised into the very good or poor. High quality answers satisfied the requirements laid out in the mark scheme and poor answers were either poorly balanced or very confused. In most cases it was easier to relate the effects of rapid urban growth on areas beyond the city region with the most common effects being loss of land to building or intensified agriculture and pollution. Only the best answers were clear about effects within the city and included detail about the loss of open land, new traffic routes and municipal neglect.

The main issue with this question was the lack of reference to land as a resource, recognising losses to the potential ways in which land can be used by people, industry and urban authorities.

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Key messages

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General comments

This paper proved to be more challenging than those of previous sessions. As with past papers, **Section A** proved to be more difficult than **Section B**. Although the majority of candidates used their time well, a small number seemed to rush through **Section A** in order to write at length in **Section B**. There were no rubric errors.

There is a need for all Centres to make certain their candidates clearly understand question instructions such as: describe and explain, either/or, using examples and briefly outline. Additionally **Section A** questions invariably require references to, and the use of data. The quality of **Section B** essays was generally quite good and hopefully candidates will continue to make good use of examples with which they are familiar.

Although the overall level of written communication in **Section B** essays was good, there is still a need for greater precision in defining terms and responding to data response in **Section A**.

Comments on specific questions

Section A

Question 1

This proved to be quite a difficult question. Whilst candidates were aware of the types and sources of pollution contained in Table 1.1, most did not understand the term 'secondary pollutant' and had little idea about the formation and transference of ground level ozone; even though Fig. 1.1 was there to be interpreted. The shape of the pollution plume was correctly drawn by 50 % of the candidates but a significant number only drew a straight line over the city.

Having laid the foundations of urban pollution, the final part was concerned with an example of pollution in Prague. Some able candidates correctly identified the road pollution and drew out the variations across the city. Unfortunately a significant number of candidates wrote about atmospheric pollution across the whole of the map rather than along the roads.

Question 2

Candidates fared much better with this question. It is apparent that there is much greater familiarity with questions involving plate tectonics. Few difficulties were encountered in describing the movement of the Earth's plates from the Permian period to the present day and many candidates achieved full credit. Of the two pieces of evidence, Palaeontology was the more popular and mostly accurately described.

The questions involving the San Andreas Fault received moderately good responses. The photograph of the Carrizo Plain section received a mixed response with most pointing the lack of evidence for subduction and the fresh topography surrounding the fault. The map received adequate interpretation with a minority understanding that in a creeping section there is less likelihood of a severe earthquake; unlike the locked sections that are subject to sudden and severe movements.

Most candidates achieved at least partial credit in (c) for the graph showing the frequency of seismic activity. Whilst there were clear references to areas where earthquakes have been frequent, only a small number mentioned the likelihood of severe earthquakes in the gaps; seismic gap prediction is stated in the syllabus.

Section B

The choice of questions was reasonably even and for most candidates the quality of answers was much better than **Section A**. The essays in (b) were of a better quality than the shorter questions (a).

Question 3

(a) Although this question contained a graphical technique with which candidates should be familiar, many answers were spoilt by a lack of reference to the data or over-generalisation. Most achieved a description (with or without data) of the obvious correlation between carbon dioxide and temperature but were less clear about sunspot activity. Only a small number of candidates provided an assessment of the extent to which carbon dioxide and sunspots contributed to global warming.

(b) This question follows a well-trodden path and was answered moderately well by a small number of candidates. The majority of candidates were well versed in the need for achieving agreement and went on to describe the socio-economic issue associated with reducing carbon dioxide levels; mainly through alternative energy. Only a small number assessed the success/failure of international meetings such as Kyoto and Bali.

Question 4

(a) This question on global rates of soil degradation was quite poorly answered. The fundamental issue being the poor use made of the map and there being no mention of places and the degree to which their soils are degraded. Instead some generic credit was achieved through outlining 3 ways in which soils can become degraded. Thus specific locations in which there is population pressure, drought, over farming, flooding etc. were often missed.

(b) This part was much better answered as many candidates were familiar with the topic. Most candidates achieved a balance of positive and negative assessments. Such methods as irrigation, rotational cropping, intercropping, organic fertilization and low density grazing all featured within answers. The main difference between high and low quality answers lay in the breadth of detail, the degree of assessment and the quality of written English.

Question 5

This proved to be the most popular question in **Section B** and candidates tended to receive more credit.

(a) This was largely well answered. High quality answers contained a good balance of renewable, non-renewable and recyclable resources, combining definitions with appropriate examples. Weaker answers either lacked details on definitions or did not show an understanding of how recycled products could become resources. Sometimes recyclable and renewable resources were confused.

(b) The statement that preceded the actual question provided the majority of candidates with the emphasis they needed. Thus most essays had a focus on how the demands of an increasing global population for either renewable or non-renewable energy might impact on the environment. Most candidates were able to develop arguments for replacing fossil fuels with various forms of alternative energy and recyclable products, and supported their points with suitable examples. The assessment of whether or not such methods are practical, impractical, successful or unsuccessful formed the main omission from many answers,

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> **Paper 8291/13**
> **Paper 13**

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General comments

This paper proved to be more challenging than those of previous sessions. As with past papers, **Section A** proved to be more difficult than **Section B**. Although the majority of candidates used their time well, a small number seemed to rush through **Section A** in order to write at length in **Section B**. There were no rubric errors.

There is a need for all Centres to make certain their candidates clearly understand question instructions such as: describe and explain, either/or, using examples and briefly outline. Additionally **Section A** questions invariably require references to, and the use of data. The quality of **Section B** essays was generally quite good and hopefully candidates will continue to make good use of examples with which they are familiar.

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Paper 21

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5. Quote data in tables and graphs in order to support points.

General comments

This paper was taken by an increased entry from the USA and Guyana. The performance within the paper varied with some candidates doing better in **Section A** and others better in **Section B**. A significant number of candidates are to be congratulated on their overall achievement in both sections of the paper. Noticeably other candidates would have improved their performance by:

- reading instructions such as: describe and explain, either/or, with reference to Fig. ?,
- where approximately 45 minutes is given over to a **Section B** answer, the whole time should be usefully spent; some essays amounted to a short paragraph,
- where the word 'assess' is used in a question the answer should obtain relevant evaluative statements,
- the data contained in tables or graphs should be quoted in order to support and verify a point.

The Hydrosphere and Biosphere paper has come across as being a successful test of both knowledge and interest in environmental management. The longer essay topics elicited some interesting and sensitive responses and in **Questions 4** and **5** good use was made of exemplar material. One of the features of this syllabus is that wherever possible schools/colleges and their candidates will be encouraged to both understand and practise environmental management at a local scale. This element was successfully achieved in this paper.

It is still disappointing that many candidates find the data response questions in **Section A** difficult. These short answer questions combine knowledge of the environment and its management with the analysis of reasonably current data presented as models, photographs, tables or graphs. It is here that the correct understanding of instructions such as 'describe and explain', 'using examples' and 'what is meant by' is so important.

Comments on Specific Questions

Section A

Question 1

(a) Whilst few difficulties were encountered in explaining biotic and abiotic processes only a small number capably suggested changes to the ecology of the lake and its surrounding area; the main issue being a lack of direct reference to Fig. 1.1. As the illustration actually referred to infilling it is difficult to understand why a large number sought to justify water loss through evaporation, animals drinking the water and flooding due to heavy rainfall. Obviously some candidates did achieve full

credit by describing how the lake would receive sediment (abiotic) and become populated with vegetation (biotic).

The final part on the woodland climax was also successfully answered by those candidates who provided a brief description of vegetation succession.

(b) Part **(i)** was slightly better answered than **(ii)**. The first part was concerned with the effects of deforestation in the Amazon Rain Forest region of Rondonia. Although most candidates picked up ecological impacts such as habitat loss, losses to biodiversity and river pollution, such linkages were more tenuous when referring to soil erosion. The main issue with the assessment of this question was actually identifying three effects; many answers were disorganised. The weakest answers completely ignored effects on the environment and elaborated upon urbanisation. A very small number did not attempt this question.

The requirements of **(ii)** were to assess how tropical rain forest might recover from felling and fire fairly quickly whilst it takes longer to recover (if at all) from mining. Good answers elaborated upon the physical and chemical damage caused by mining in contrast to the temporary surface damage caused by fires. Oddly many candidates ignored recovery after felling.

Question 2

This question was found to be more difficult than **Question 1**; possibly due to candidates not following instructions and not understanding the term *hydrological cycle.*

(a)

(i) Some candidates did not understand the difference between a flow and a store. The key to the answers lay in the word 'role' thus simply giving a definition might not secure full credit e.g. whilst precipitation is rain, sleet or snow, its role is to start the cycle or replenish surface water / groundwater.

(ii) It was pleasing that a significant number outlined how increases or decreases in precipitation might affect infiltration, the water table and river levels. Unfortunately there were some very brief answers and some that gave brief consideration to both increases and decreases in precipitation when the question clearly states either/or.

(b) This part of **Question 2** had a rather mixed response. The majority of the answers describing non-point pollution outlined sources such as trash (or domestic waste), petrol and diesel on roads and agricultural waste. Many of these answers did not mention the important element of transport by rivers and acid deposition by winds. Contrasts with point pollution were not outlined.

(c) Answers to this final part were rather disappointing, particularly as the example has been well publicised within the USA. It must be pointed out that the 'Dead Zone' and the red tides of Louisiana and Texas considerably precede the recent tragic oil spill. Whilst there were a small number of answers detailing pollution from the Mississippi and the consequent effects of eutrophication in this region of the Gulf of Mexico, they were in a minority. Most candidates ignored the effects of river pollution and resorted to describing the effects of the hot climate, hurricanes, the BP oil spill or passing shipping.

Section B

Question 3 proved to be the most popular with **Question 5** being answered by about 30% and **Question 4** about 15%.

Question 3

(a) Candidates produced good answers if they separated parts **A, B** and **C** of the graph and used the interaction of birth and death rates to explain the differences. However a significant number either just quoted data from each section or jumbled the three sections together. These answers displayed an inability to generalise the trends in global population growth indicating a lack of understanding.

(b) There were some very good answers to this question. Most candidates expressed a good understanding of the issues associated with rapid population growth and overpopulation in LEDCs and the more stable population growth rates in MEDCs. The important discriminator between strong and weak answers lay in understanding what constitutes a sustainable global environment. This not only includes land, biomes and the climate but also renewable and non-renewable resources.

There were some very good answers to this question. Most candidates expressed a good understanding of the issues associated with rapid population growth and overpopulation in LEDCs and the more stable population growth rates in MEDCs. The important discriminator between strong and weak answers lay in understanding what constitutes a sustainable global environment. This not only includes land, biomes and the climate but also renewable and non-renewable resources.

Whilst the majority unfortunately viewed reducing population growth as enabling a decline in global population, a discerning minority concentrated on the growth rate and how a sustainable environment would be a balance between future population size and management of the environment coupled with increasing the resources to meet future needs.

Question 4

(a) Most candidates managed interpretations of the IUCN Red List, that were for the most part valid and credit-worthy; the most popular route being the highlighting of amphibians and mammals as most under threat and in need of preservation. A smaller number of candidates concerned themselves with the different degrees of vulnerability, normally in relation to amphibians. The best answers combined the two approaches. The main weakness in most answers was in linking the extent of the threat to a preferred method of conservation or preservation (e.g. zoos, wildlife parks etc.)

(b) The question was well answered and enabled candidates to utilise local and studied National Parks, wildlife parks and conservation area. There were some excellent and interesting answers on the Florida Everglades, Yellowstone National Park, the Serengeti and rain forest in Guyana. Most candidates were clear about the value of their chosen area with some very detailed and sometimes passionate accounts of both species preservation and conservation of the natural landscape i.e. habitats.

Some candidates did however struggle with the ways in which the chosen areas were managed. Important aspects of management such as car/vehicle parks, designated routes, camping restrictions, controls on hunting and poaching, and zoological and botanical research were often poorly covered and absent in the weakest essays.

Question 5

(a) The majority of candidates made an adequate to good interpretation of Fig. 5.1. Most gave a clear analysis of the data with better answers offering valid reasons. There were frequent references to Malaysia being an LEDC and more dependent on agriculture whilst Australia's water requirements were linked to its arid climate and vast expanses of agricultural land.

There were some inaccurate references to the UK's dependence on industry as there is little or no agricultural land. The figures are given as percentages rather than the actual volume of water consumed. Most candidates viewed the USA as having a fairly even balance between domestic, agriculture and industry but again ignored the percentages in the data; the USA consumes a greater volume of water than the other countries.

(b) Fortunately nearly all candidates recognised the need to select either agriculture or industry for their essay. It was impressive that many candidates chose a local area with which they had some familiarity. This meant that the issues of excessive water use and pollution had a local context that could be linked to one method of achieving a sustainable current and future supply. The vast majority of answers were concerned with agricultural land and were mostly of good quality. Industry seemed to be a more difficult choice and candidates fared less well with this.

ENVIRONMENTAL MANAGEMENT

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| **Paper 8291/22** |
| **Paper 22** |
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Key messages

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5. Quote data in tables and graphs in order to support points.

General comments

The hydrosphere and biosphere paper has come across as being a successful test of both knowledge and interest in environmental management. The longer essays produced some interesting responses and in **Questions 3** and **4** made good use of exemplar material. One of the features of this syllabus is that wherever possible schools/colleges and their candidates will be encouraged to both understand and practice environmental management at a local scale. This element was successfully achieved in this paper.

A significant number of candidates are to be congratulated on their overall achievement in both sections of the paper. Other candidates did not perform as well in **Section A** as in **Section B**. There appeared to be good use of the time available with most candidates responding to all questions. **Section B** answers showed wide variation in both quality and length although there were few very short essays.

Comments on specific questions

Section A

Although able candidates scored equally well on both questions in **Section A**, weaker candidates tended to perform better in **Question 2** on the hydrosphere than in **Question 1** on the biosphere.

Question 1

This question illustrates the need for candidates to pay particular attention to the detail of questions and, when requested to, specifically refer to the information provided in flow charts and diagrams to support points in their answers.

(a)   This was well answered with many candidates gaining full credit and almost all gaining at least partial credit. This was the result of a clear definition which included reference to the interactions between the community of organisms and their environment. This was expressed accurately in a variety of different ways although there was occasionally some confusion between the terms biotic and abiotic when used in an answer.

(b)   Parts **(i)** and **(ii)** were slightly better answered than **(iii)**.

   (i)   The food chain was often correctly identified for full credit although some candidates ignored the food web in Fig. 1.1 and labelled the boxes with a type of feeding at each stage e.g. herbivore or primary consumer while some cited part of a longer food chain or one which did not end with the top predator as required.

(ii) Credit could be gained by describing the energy flow through the trophic levels obtained from the food web in Fig. 1.1. The decrease in energy through the trophic levels was explained well using data although some candidates thought there was an increase of energy through the trophic levels.

(iii) This part generated wide ranging answers through the many ways that stability of the ecosystem could be implied e.g. through the complexity of the food chains and the variety of feeding alternatives available, offering resistance to change and limiting disruption of the food web or through the idea of a climax in a succession.

(c) Part **(i)** was answered better than **(ii)**. The key to answering the question was by reference to Fig. 1.2., which provided essential information. In **(ii)** reference to diagram Fig. 1.2 allowed candidates to logically sequence their answers and to make the correct linkages emphasising the effect of the removal of the biomass store in their explanations. Some answers missed out the removal of the biomass store by deforestation and simply described rather than explained Fig. 1.2. This demonstrates the need to pay close attention to the command word in questions. A very small number did not attempt this question.

Question 2

(a) Precipitation and ground water store were often correctly identified although some candidates referred to a ground water flow even though the question stated a store at **B**. They clearly did not understand the difference between a flow and a store. Part **(ii)** was less well answered as a significant number of candidates were unable to give precise definitions of the terms interception and water table. In **(iii)** it was pleasing that there were answers which demonstrated a good understanding of the response of the hydrological cycle to prolonged rainfall. Links were made between an increase in precipitation and the effect on infiltration, the level of water table and river levels although some answers were less effective in demonstrating an understanding of the response of the cycle to a prolonged dry summer.

(b) In this question candidates made good use of both the data and the diagram to compare and to explain the differences in infiltration and runoff in the urban and non-urban areas although information on evapotranspiration was often not considered; this seems to be the least well understood aspect of the hydrological process. In **(ii)** there were some very good responses, being answered in terms of both the contribution of the water losses from the urban area to flooding and the contribution to pollution. Many linked water from an urban area with the likelihood that this will become polluted. There was also description of the effect of the pollutants on water quality and consequences for the biology of the river while some described the process of eutrophication. The quantity of water reaching the river from runoff increasing the discharge resulting in flooding was also well documented. Some candidates misinterpreted this question and thought the reference was to water loss for the urban area as a result of reduced water levels in the river leading to a shortage of water supply to the urban area.

Section B

Question 3 was the most popular, answered by about 40 % of candidates while **Questions 4** and **5** were each chosen by about 30 %. Candidates mostly allocated sufficient time to write full and lengthy answers with the correct proportion of time and length to the two parts of the question. Unfortunately some candidates only answered **(a)**. Candidates should be encouraged to write in continuous prose rather than to use bullet points.

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(a) The graph showing the boundaries of the temperature and rainfall for specific biomes was described well. Candidates divided their answers equally into three sections, one for each of three biomes and gave general details of the climate and vegetation. More able candidates specifically linked the type of vegetation, often describing their physiological and structural adaptations to the climate. In general, specific details of the vegetation of the biome were the weakest aspect of some answers.

(b) As expected, tropical rainforest was the most popular biome chosen. There were some excellent and interesting answers which described the environment, outlined the pressures and presented wide ranging measures specific to a locality. These essays were a pleasure to read. There was a large variation in the credit awarded for this question as some weaker answers simply listed both pressures and measures while others omitted to give any measures. This demonstrates the need to consider all aspects of a question.

Question 4

(a) This part of the question was found to be more difficult than **(b)**. The expectation was that candidates would consider the variation in mortality rate. Some good answers recognised that the data showed areas of high mortality linking reduced precipitation, drought conditions, crop failure and famine. These also recognised the variation in mortality and identified where mortality was low although reasons here were less secure. Some weaker candidates completely ignored the data in Fig. 4.1 and gave reasons for mortality as resulting from reduced precipitation with no links to regions and no consideration of the variation in the rate of mortality. These answers focused generally on issues relating to supply and storage of water. Few answers emphasised the issue of climate change and in general many candidates did not make the connection between climate change, precipitation and variation in water supply.

(b) By contrast to **(a)**, the vast majority of answers were of very good quality and a variety of approaches were employed to achieve well balanced essays which scored highly as a result. Well-chosen examples were used to illustrate localities where the economic and social factors in dam and reservoir construction had taken priority contrasted with specific examples where the human and natural environment had priority. In others a more general discussion of the advantages of economic priorities and social priorities contrasted with the disadvantages for the human and natural environment was also successful.

Question 5

(a) More able candidates accounted for the projections of population growth in terms of the interaction between birth and death rates and explained factors which could lead to the particular projection. Weaker candidates simply described the increases and decreases in the data for each of three projections and did not recognise the relationship between birth rate and death rate. Sometimes this was explained in terms of migration to urban areas, which would have no effect upon the global population.

(b) Most candidates recognised the pressures placed upon the environment as a result of population growth together with some assessment of extent; this first part of the essay was well done. Only a few answers recognised how a sustainable environment would be achieved by a balance between management of the environment together with utilising ways of increasing the food resources to meet future needs. The strategies required in the second part of the essay were very often missing in weaker answers. Some answers focused on population control as a strategy in order to achieve a sustainable balance between population size and food supply. These answers ignored the aspect of environmental sustainability in producing the food supply.

ENVIRONMENTAL MANAGEMENT

Key messages

1. Adequate preparation for the examination is essential. This includes learning the facts, possessing the necessary skills of analysis and interpretation, and practising on questions from past papers.
2. Ensure you understand the various question instructions, and answer only what is asked. Irrelevant answers, even though correct in themselves, will not gain credit and will waste your valuable time.
3. Use the published mark schemes to identify the type of answer, both in content and length, required by different questions. Use the allocated number of marks in the question paper to assist you in constructing your answer.
4. Apportion your time sensibly between questions, and between Sections A and B.
5. Quote data in tables and graphs in order to support points.

General comments

The hydrosphere and biosphere paper has come across as being a successful test of both knowledge and interest in environmental management. The longer essays produced some interesting responses and in **Questions 3** and **4** made good use of exemplar material. One of the features of this syllabus is that wherever possible schools/colleges and their candidates will be encouraged to both understand and practice environmental management at a local scale. This element was successfully achieved in this paper.

A significant number of candidates are to be congratulated on their overall achievement in both sections of the paper. Other candidates did not perform as well in **Section A** as in **Section B**. There appeared to be good use of the time available with most candidates responding to all questions. **Section B** answers showed wide variation in both quality and length although there were few very short essays.

Comments on specific questions

Section A

Although able candidates scored equally well on both questions in **Section A**, weaker candidates tended to perform better in **Question 2** on the hydrosphere than in **Question 1** on the biosphere.

Question 1

This question illustrates the need for candidates to pay particular attention to the detail of questions and, when requested to, specifically refer to the information provided in flow charts and diagrams to support points in their answers.

(a)   This was well answered with many candidates gaining full credit and almost all gaining at least partial credit. This was the result of a clear definition which included reference to the interactions between the community of organisms and their environment. This was expressed accurately in a variety of different ways although there was occasionally some confusion between the terms biotic and abiotic when used in an answer.

(b)   Parts **(i)** and **(ii)** were slightly better answered than **(iii)**.

   (i)   The food chain was often correctly identified for full credit although some candidates ignored the food web in Fig. 1.1 and labelled the boxes with a type of feeding at each stage e.g. herbivore or primary consumer while some cited part of a longer food chain or one which did not end with the top predator as required.

(ii) Credit could be gained by describing the energy flow through the trophic levels obtained from the food web in Fig. 1.1. The decrease in energy through the trophic levels was explained well using data although some candidates thought there was an increase of energy through the trophic levels.

(iii) This part generated wide ranging answers through the many ways that stability of the ecosystem could be implied e.g. through the complexity of the food chains and the variety of feeding alternatives available, offering resistance to change and limiting disruption of the food web or through the idea of a climax in a succession.

(c) Part **(i)** was answered better than **(ii)**. The key to answering the question was by reference to Fig. 1.2., which provided essential information. In **(ii)** reference to diagram Fig. 1.2 allowed candidates to logically sequence their answers and to make the correct linkages emphasising the effect of the removal of the biomass store in their explanations. Some answers missed out the removal of the biomass store by deforestation and simply described rather than explained Fig. 1.2. This demonstrates the need to pay close attention to the command word in questions. A very small number did not attempt this question.

Question 2

(a) Precipitation and ground water store were often correctly identified although some candidates referred to a ground water flow even though the question stated a store at **B**. They clearly did not understand the difference between a flow and a store. Part **(ii)** was less well answered as a significant number of candidates were unable to give precise definitions of the terms interception and water table. In **(iii)** it was pleasing that there were answers which demonstrated a good understanding of the response of the hydrological cycle to prolonged rainfall. Links were made between an increase in precipitation and the effect on infiltration, the level of water table and river levels although some answers were less effective in demonstrating an understanding of the response of the cycle to a prolonged dry summer.

(b) In this question candidates made good use of both the data and the diagram to compare and to explain the differences in infiltration and runoff in the urban and non-urban areas although information on evapotranspiration was often not considered; this seems to be the least well understood aspect of the hydrological process. In **(ii)** there were some very good responses, being answered in terms of both the contribution of the water losses from the urban area to flooding and the contribution to pollution. Many linked water from an urban area with the likelihood that this will become polluted. There was also description of the effect of the pollutants on water quality and consequences for the biology of the river while some described the process of eutrophication. The quantity of water reaching the river from runoff increasing the discharge resulting in flooding was also well documented. Some candidates misinterpreted this question and thought the reference was to water loss for the urban area as a result of reduced water levels in the river leading to a shortage of water supply to the urban area.

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ENVIRONMENTAL MANAGEMENT

| Paper 8291/03 |
| School Based Assessment |

Key messages

For the Centres:
1. Be fully aware of the assessment and recording procedures. This includes ensuring that all coursework marks are properly recorded and samples sent to the external moderator by the deadline.
2. Ensure that criteria for which marks are awarded are present in the final report.

For the Candidates:
1. Written reports should be of the correct length and ideally the four stages of scientific method: introduction; methods (justified); results and analysis; conclusion and evaluation; should enable well structured reports with chapter or section headings This model of scientific method can be also used as a check on how well the project is progressing.
2. Good quality research requires the formulation of a plan detailing research sites, equipment, expected data and how it will be collated and presented.
3. The best reports derive from the collection and collation of primary data obtained from either field investigations or laboratory work. The work is ordered well and the data clearly presented.

General comments

May 2011 has seen the entry increase to 47 Centres totalling over 500 candidates; the largest increase being from the USA. Although some Centres continue to enter small numbers of candidates the trend towards larger entries from individual Centres, sometimes in excess of 50 candidates, has continued. This has a number of effects:

- where the Centre entry is small, candidates find little difficulty in finding original topics,
- with a larger entry there are often several candidates with the same project topic and title; whilst this can lead to copying it also enables candidates to undertake group field work; this is acceptable as long as the final reports are written independently of other candidates,
- large entries also raise internal assessment issues such as an increased burden of monitoring candidates work, meeting deadlines and achieving an accurate rank order of candidates work.

This year's reports were of a high standard with very few achieving less than 16 out of 40 and more than usual achieving the 30 to 36 range. It has been a frequent issue that Centre assessors are awarding credit for criteria not present in the final report; notably for use of a statistical tool and developing an evaluation that contains both negative and positive assessments of the candidates own work. In this situation it becomes impossible to achieve marks in the 36 to 40 range.

However this session has seen the submission of some really impressive pieces of work and 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. Reliance on secondary data, invariably obtained from the internet can lead to plagiarism as well as blatant copying and pasting; fortunately the latter only applies to a very small number.

It is important that candidates are made fully aware of the requirements of this School based assessment. Written reports should be of around 2000 words in length. The four stages of scientific method: introduction; methods (justified); results and analysis; conclusion and evaluation should provide well-structured reports with chapter or section headings. This model of scientific method can also be used as a check on how well the project is progressing. 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 in 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

Most candidates performed well in this skill area.

The introductory section should firstly develop skills C1a and C1b. It is better to lay the foundation of the project by stating the hypothesis or question at the start. This should be followed by a clear explanation of its underpinning principles. Although this should only accommodate about 250/300 words, a small number of candidates spent too much time on this part, sometimes to the extent that it dominated their report.

This introduction leads into the methods section of the report. Good quality research requires the formulation of a plan detailing research sites, equipment, expected data and how it will be collated and presented. These methods should be justified by briefly indicating whether or not these techniques and equipment will be effective in testing their hypothesis or answering their question. Like the introduction this section needs no more than 250/300 words.

Needless to say, 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

Although a large number fulfilled this skill area with great expertise, some reports were lacking in the presentation of collected data (*a* and *b*). Most candidates communicated their analysis well and ordered their work correctly, thereby achieving good marks for criteria *c* and *d*.

A disappointing feature of a small number of reports was a mismatch between the specified methods and the presentation of related results. For many, greater clarity could have been obtained through figure referenced graphs, tables and photographs. In some cases the data was either absent or submerged within a mass of descriptive text. In some other instances, although a graph or photograph was present, it did not receive any description or analysis. High quality reports made use of figure references, thus diagrammatic material was integrated with written analysis.

It was somewhat surprising that many Centres credited the use of a statistical tool that was not present in the report.

Skill C3

This final skill area forms an important feature of almost any scientific investigation. For the Environmental Management syllabus it comprises three sections. In this session candidates coped reasonably well with C3*a* and *b* but frequently ignored *c*.

The better reports contained a detailed summative conclusion that utilised results to assess the original hypothesis; these correctly received 2 marks. However a significant number of candidates did not refer to their data and therefore only scored 1 mark. As skill area *b* also crops up in the analysis of results, as long as there was reference to environmental management principles and trends derived from the data, many candidates were able to achieve 2 marks for this criterion.

Very few candidates attempted an evaluative assessment of their work. This needs to include a brief survey of those things that went well and not so well i.e. success and limitations. Unfortunately this criterion was often credited when in fact it was not present in the report.

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International Examinations

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Conclusion

It is pleasing that Centres and their candidates are engaging so enthusiastically with this element of the Environmental Management examination. The rationale behind its inclusion in the syllabus is to give candidates the opportunity to research a topic of their own choice that falls within the broad content area of the syllabus. The wide global dispersal of Centres almost dictates the wide selection of topics. As in previous sessions the better topics and final reports are derived from locally based research; ideally these should utilise primary data.

Those candidates who rely on secondary data, particularly the internet, need to take care. Reports based on such derived data can be rambling and without structure. Prior to using the web or texts, candidates should carefully research the background to their topic, decide upon a central theme and the nature of the data they will require. It seems that many simply surf the World Wide Web, then copy and paste as much information as they can obtain; the resultant report can become a disjointed pruning of this information. Ideally secondary information should lend support to field or laboratory research. It is worth noting that plagiarism and copying and pasting from internet sources is not permitted.

This session was marred by some administrative issues and all Centres should make themselves fully aware of the assessment and recording procedures. Although most errors can be rectified, this can be time consuming and in a worst case scenario contribute to an inaccurate moderation of a research report. The main issues that arose this year were:

- more than one Centre did not return the MS1 form,
- half and even quarter marks were recorded on the candidate record card and transferred to the summary mark sheet and MS1; whole numbers are required,
- credit was sometimes given for elements not present in the research report, particularly for criteria C2e and C3c,
- some projects did not receive board approval.

Deserving some attention is that a significant number of moderation samples arrive well beyond the deadline. Moderation samples need to be posted well before the end of April in order to arrive at the board's offices by the 1st May. It is unfair on those Centres who submit their samples on time to have other Centres delaying the posting of samples. If candidates are late in completing their work, either the board should be notified or that which has been completed should be assessed and submitted. It is of course possible to mark the candidate as absent from this part of the examination. If there is a genuine reason for a late submission e.g. illness, then permission can be sought from CIE.

Although these comments refer to a small number of Centres it is important that the board's moderation procedures are efficiently undertaken for the benefit of Centres and their candidates. I would personally like to thank all teachers and assessors concerned with this examination for the hard work that so obviously takes place in order to satisfy the needs of this section of the Environmental Management examination.