

ENVIRONMENTAL MANAGEMENT

Paper 8291/11

Paper 11

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 note the number of marks available for each part question and compose their answers accordingly.
- It is important that instructions are followed carefully. An understanding of the differences between the command phrases outline, explain, describe, assess and give reasons would be valuable in improving answers, especially in **Section A**.
- Candidates should also check their work thoroughly, especially to ensure they have not turned two pages of the question paper at once or misinterpreted the question and as a consequence penalised themselves.

General Comments

There was a reasonably good response to all questions on this paper. 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.

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

Some candidates had difficulty with calculations involving negative numbers.

Comments on Specific Questions

Section A

Question 1

- (a) (i) Few difficulties were encountered with the majority of candidates obtaining credit. Some candidates had difficulty with the calculation involving minus numbers.
- (ii) Good answers were able to refer to the absorption of solar energy by the Earth's surface and subsequent radiation. In general this question was not well answered with many candidates simply referring to reflection. A common error was to refer to heat rather than energy.
- (iii) Candidates found this question difficult. Some realised that it was linked to temperature but were unable to elaborate. Few referred to the temperature inversion of the stratosphere.
- (iv) Good answers were characterised by developed examples. The most popular of which was the weather with supporting examples such as clouds, rain and wind. Candidates needed to be aware that this was not a question about the biosphere.

- (b) (i) Good answers were characterised by the use of the correct terminology throughout the response, with the role of the ozone layer correctly explained and a good depth of knowledge about the damage prevented. Although many candidates correctly referred to absorption, some used incorrect terms such as reflect/refract/bounce off. There were some examples confusion between global warming, the greenhouse effect and ozone depletion.
- (ii) There were many more examples of the usual confusion between global warming, the greenhouse effect and ozone depletion. Candidates referred to burning of fossil fuels as the source and tended to provide a generalised answer. Good answers correctly identified CFCs and their sources and were able to describe the chemical reactions which lead to ozone depletion.
- (iii) Candidates demonstrated good data interpretation skills and were able to describe and use the data from the figures. Good answers were typified by reference to the changes in size of the hole whilst noting the increased loss of ozone. Such answers also correctly identified the levelling out of the rate of loss and even acknowledged occasional spikes of renewal. Candidates should note the importance of addressing all parts of a question. Consequently, good answers were those which referred to the effectiveness of international agreements and in some cases gave examples.

Question 2

- (a) (i) Candidates demonstrated a good understanding of the structure of the Earth and generally placed the letters correctly. Credit was lost when too many options were provided by placing several (sometimes contradictory) answers.
- (ii) Candidates need to better understand the forces that combine to move tectonic plates, especially the source of the heat which triggers the convection currents in the mantle. Weaker answers used the four points from part (a)(i) to describe plate movement rather than describing the processes. Good answers were characterised by references to the mantle and convection currents.
- (b) (i) Candidates answered this question very well.
- (ii) Candidates provided a lot of successful answers which gained full credit. Some candidates gave the wrong type but were able to correctly describe it. Candidates were able to identify the explosive and acidic nature of the Montserrat volcano (most common response) and were less able to refer to the pyroclastic flow and high silica content. Weaker answers were characterised by descriptions of the formation of this particular volcano (taken from the figure) rather than the nature of the eruptions.
- (iii) Candidates displayed a good understanding of the strategies and were able to provide a good range of developed points in response. These included monitoring, training, evacuation planning and rescue and recovery.

Section B

For these questions, in general parts (a) and (b) were tackled equally well with only a minority not completing both parts. Candidates must understand that this section carries equal weighting to **Section A**, and should plan their time and work accordingly. Candidates this session have been much better at providing examples from case studies.

Question 3

- (a) Candidates were in general able to provide descriptions of the pattern of land use from the figure. Common omissions were the relationship to the rivers and the expressway. Answers often became economics-based and many discussed the relationship between slums and wealthy areas and respective access to commercial and industrial areas. Few referred to the starburst shape of the expansion and possible relationships with the topography.
- (b) Candidates generally provided a description of how a city develops and expands with references to economic issues and social engineering. In order to achieve higher credit candidates need to describe the effects of this expansion on the surrounding area and environment and provide an assessment of these effects. The most common answers provided referred to land use, soil damage and loss of agricultural land/habitats. In this sort of question candidates need to develop their examples with detailed descriptions.

Question 4

- (a) Candidates demonstrated good data interpretation skills and were able to provide accurate and detailed descriptions of the graph. Good answers were characterised by the provision of two likely sources of the air pollution as transport and industry and then supported these choices with references to population increase and additional use of such sources.
- (b) Comparisons between LEDCs and MEDCs were common and well made with named examples from studies provided. In order to gain higher credit candidates needed to accompany these by describing a range of air pollution examples and the strategies that could be used to control them such as traffic regulations, car-pooling, the use of clean burn technology and industrial scrubbers. Candidates should assess the effectiveness of such strategies. The least successful answers simply stated that pollution was a problem and needed to be controlled but did not provide any of the details to support this statement.

Question 5

- (a) The more successful answers made clear and accurate interpretations of the relationship between the points at Siberia and the North Atlantic. The majority of candidates, however, need to develop a better understanding of the differences between a maritime and a continental climate. It seems this essay was clearly chosen by some candidates so that they could answer their preferred part b question, about global warming.
- (b) This was generally well answered and a range of likely impacts were selected and described. Good answers were characterised by the selection of valid impacts which were then developed with appropriate examples. Global management issues were rarely referred to and candidates need to address all aspects of a question to access the highest marks. A lot of answers devoted too much time to the causes of global warming and some candidates also insisted on bringing ozone depletion into the essay as well. There were comparisons made between LEDCs and MEDCs, which whilst valid were more often superfluous to the essay.

ENVIRONMENTAL MANAGEMENT

Paper 8291/12

Paper 12

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 note the number of marks available for each part question and compose their answers accordingly.
- It is important that instructions are followed carefully. An understanding of the differences between the command phrases outline, explain, describe, assess and give reasons would be valuable in improving answers, especially in **Section A**.
- Candidates should also check their work thoroughly, especially to ensure they have not turned two pages of the question paper at once or misinterpreted the question and as a consequence penalised themselves.

General Comments

There was a reasonably good response to all questions on this paper. 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.

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

Some candidates had difficulty with calculations involving negative numbers.

Comments on Specific Questions

Section A

Question 1

- (a) (i) Some candidates proved unable to correctly name the mass movement and often gave the same answers for parts (i) and (ii). Common errors were landslides and slumping.
- (ii) Some candidates were similarly unable to correctly name this mass movement and often gave the same answers for parts (i) and (ii). Common errors were landslides and slumping.
- (iii) This question was generally well answered by candidates who demonstrated good understanding of the problems related to slope stability.
- (iv) Good answers were characterised by containing developed examples. The most popular of which was rainfall with supporting examples such as clay saturation. Some candidates appeared not to note the word 'weather' in the question.
- (b) (i) Good answers were typically structured answers referring to each of the three parts in turn. Often these went on to provide developed points. Afforestation was well understood and explained in

detail. A few candidates confused it with deforestation. Drainage was less well described and candidates were unsure as to the fate of the water. Slope angle reduction was generally well understood.

- (ii) In this question some candidates needed to make a better distinction between the three examples from the previous part and the factors that would need to be considered. As a result some candidates were unable to obtain full credit.

Question 2

- (a) (i) The majority of candidates obtained the full credit available. Some candidates had difficulty with negative numbers.
- (ii) Candidates were generally able to use the data to provide good answers.
- (iii) In general a good knowledge of the differences between maritime and inland climates was demonstrated by candidates.
- (b) (i) Candidates answered this question well showing they can interpret graphs. The best answers showed calculated differences between insolation and outgoing radiation in terms of net gain or net loss.
- (ii) The effects of cloud cover were not well understood. Candidates often offered a range of reflection synonyms without demonstrating further understanding. Few thought to describe the effects of having no cloud cover as a supporting point.
- (iii) Many candidates were able to suggest air and ocean currents but were unclear on the detail and as a consequence provided some weak answers. Some were also aware of cells but were similarly often unable to develop their responses. In order to achieve higher credit candidates need to develop answers with accurate descriptions and details of processes. Some candidates added Coriolis Effect and the rotation of the Earth to answers without any supporting information.

Section B

Questions 3 and 4 were almost equally popular, while **Question 5** was the least popular choice. Both parts (a) and (b) were equally well tackled with only a minority not completing both parts. Candidates must understand that this section carries equal weighting to **Section A**, and should plan their time and work accordingly. This session candidates have been much better at providing examples from case studies, and in providing assessments when required.

Question 3

- (a) A pleasing number of candidates were able to provide descriptions of the pattern of magnitude and the number of human deaths. The best answers made the connection between population size, developmental differences (LEDC/MEDC), relative location of epicentre and time of event. Weaker answers relied on long descriptions of the data with little interpretation.
- (b) Many candidates provided the economic argument for LEDCs compared with MEDCs, sometimes to the detriment of achieving the highest credit. More successful answers provided named examples and strategies and also assessed their relative merits. Some candidates had clearly studied two different natural disasters and were able to provide good, well-argued comparisons. The most successful answers provided named strategies, developed their descriptions and assessed their likely success.

Question 4

- (a) Candidates demonstrated good data interpretation skills and were able to provide accurate and detailed descriptions of the graph. Good answers were characterised by an explanation for the relationship between the rise in global carbon dioxide concentration and the other two factors. Candidates often provided detailed background on the sources and causes of these changes.
- (b) Candidates demonstrated a good understanding of the impact of global warming with good answers containing a range of effects with developed examples. Weaker responses were

restricted to melting ice and rising sea levels without providing detail of what impact the effect could cause. Candidates achieved higher marks by referring to habitat loss, change of migration patterns and also other effects such as increased salinity on plants and crops.

Question 5

- (a) The more successful answers made clear and accurate descriptions of the data and referred to the usefulness. Less credit could be awarded if there were only simple descriptions and no additional sources of information were suggested. To obtain more credit candidates needed to outline two sources, such as satellite information and radar technology.
- (b) Some candidates had difficulty with this question. Weak answers mainly consisted of the economic differences between LEDCs and MEDCs with undeveloped comments such as LEDCs can not afford to provide warnings with no subsequent development of the point. Better answers provided a range of strategies for dealing with tropical cyclones both in advance, during and after the event. The best developed these points with detailed descriptions as well as considerations of their relative effectiveness.

ENVIRONMENTAL MANAGEMENT

Paper 8291/13

Paper 13

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- (b) (i) Candidates answered this question well showing they can interpret graphs. The best answers showed calculated differences between insolation and outgoing radiation in terms of net gain or net loss.
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Section B

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restricted to melting ice and rising sea levels without providing detail of what impact the effect could cause. Candidates achieved higher marks by referring to habitat loss, change of migration patterns and also other effects such as increased salinity on plants and crops.

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ENVIRONMENTAL MANAGEMENT

Paper 8291/21

Paper 21

Key Messages

- Questions in **Section A** were generally done well. These answers should include specific details.
- Answers should use information from the resources provided. Data contained in diagrams should be analysed to reveal patterns and quoted in order to support and verify points.
- **Section B** answers need to contain detail. This includes definitions of key terms and well-chosen examples with a location and a description of characteristics. Answers should be developed and all aspects of the question considered.
- When the word assess is used in a question the answer should contain relevant evaluative statements.

General Comments

The majority of candidates engaged well with both questions in **Section A** and in general performed equally well on questions **1** and **2**. Candidate performance for each of the sections showed some imbalance with responses to **Section A** being better than **Section B**.

Comments on Specific Questions

Section A

Question 1

- (a) In both of parts (i) and (ii) full credit was often attained unless the terms abiotic and biotic were confused or human activity was suggested.
- (i) In this example the abiotic factors are those factors which determine the distribution of the coastal forest within the biome indicated on the map, characterised by the climate and soils, for example the temperature, humidity, salinity, minerals or pH.
- (ii) The biotic factors relate to the living things of the forest habitat and give some indication of how they might limit the golden rumped elephant shrew. Examples include the availability of food, competition for resources and predation but not just simply the presence of plants and animals.
- (iii) Good answers included some detail of how human activity had reduced the area of the forest and the purpose, most often deforestation and clearing of the trees by cutting or burning for agriculture. Weak answers tended to list human activities but not describe how the forest was reduced or just stated habitat destruction or pollution without further elaboration.
- (iv) Candidates were clear on the reasons for conservation with many candidates gaining credit for referring to the endangered elephant shrew only being found in the Arabuko-Sokoke Forest due to a specialised ecological niche, and thus at risk of extinction. This demonstrated good use of the information from Fig. 1.1. Other ecological factors relating to the forest habitat or economic or environmental reasons were also suggested, explained and developed.

- (b) Good answers, which accessed the higher marks, identified the strategies for conservation and the organisation into zones based upon a core, buffer and transition model. These answers described the conservation management plan with details of the biodiversity zone in the middle, surrounded by the ecotourism and the intervention zone as a barrier between villages and forest, with the villages on the outside or implied this organisation through describing the increasing human activity further from the centre. Although not always discerning the overall zoning pattern, good answers recognised the value of some of the zones and parts of the plan. For example, by explaining the value of the biodiversity zone in conservation or how the ecotourism zone regulated the number of people visiting the area and provided revenue. The information provided in the figure was not always used effectively, in some answers there was no reference to a pattern or specific zones, these answers are therefore lacking in specific detail and were over-generalised. Some candidates misread the question, offered criticism of the plan and suggested ways of improvement. Unfortunately this question was sometimes not attempted.

Question 2

- (a) Most candidates accessed at least some credit by reference to an aspect of the river flow. Interpretation the diagram was generally weak and very few candidates scored highly as a result of the limited use of the natural features in the diagram. Only a few observed the position within the gorge and the narrowing of the river at that point in Fig. 2.1. Some commented on the proximity of the location to cities and focused on human benefits rather than the natural features of the location as required by the question.
- (b) Very few candidates found difficulty with this question on the disadvantages of the Three Gorges scheme, with many candidates gaining a large portion of available credit. Candidates made good use of information in this part of the question to state the disadvantage relating to the displacement of people as a result of flooding of land for the dam. Good answers developed this point and considered the socioeconomic effects on the people and culture. The other common disadvantage considered related to the effect on the ecology of the river ecosystem and organisms living in the habitats as a consequence of the change in flow of the river and the effect on the migration of fish and their reproductive ability. Weak answers copied the information from Fig. 2.1 without elaboration and some candidates listed more than two disadvantages rather than explaining and developing two. These answers received limited credit.
- (c) In very good answers candidates clearly established three benefits, developed each benefit and used data from Fig. 2.1 as evidence. There was also reference to other examples such as the Hoover Dam and Lake Mead to illustrate the tourist facility and recreational benefit. Many answers focused solely on the benefit of the energy generated and used the data provided on amount of energy, also referring to the type of energy and the renewable and non-polluting nature of the energy reducing the need for fossil fuels.

Section B

In this section **Question 3** proved to be the most popular choice.

Question 3

- (a) Fig. 3.1 provided a wealth of information on a food web from the tundra biome which could have been used to give examples to illustrate the inter-relationships between the organisms. The inclusion of definition of a food web would have highlighted key points to include in the answer such as the interconnecting food chains, feeding relationships and energy flow. Good answers elaborated upon the trophic levels, the primary productivity of the producers, the food chains showing the energy losses at each level and the predator-prey relationships. Competition between species and changes in population size were also described. Most answers were characterised by the recognition of trophic levels, with organisms from Fig. 3.1 classified accordingly. Although there were numerous possible combinations of food chains, few examples were actually quoted. Weak answers were typified by simply listing all the organisms at each trophic level i.e. all the producers. These answers did not stress the relationships between organisms and less credit could be awarded for them.
- (b) Including a definition of a biome would also have helped when selecting a well-chosen example. Many candidates used an example of a local ecosystem; these should have been described as one of the ecosystems within a biome. Higher quality answers selected tropical rainforest as their

biome or used the tundra biome suggested in part (a) of the question. This essay required a consideration of the influence of human activity within the biome, the negative influences as well as the positive influence from conservation together with an account of the conservation measures. Very good answers incorporated all aspects of the essay and evaluated the effectiveness of the conservation measures. For example, in the tropical forest biome, the effectiveness of regulating the amount of deforestation, afforestation programmes, ecotourism and the use of protected areas could be included. Some answers were clear on the conservation measures but human activity was only implicit and not stated and there were some weaknesses in evaluating the effectiveness of the management. The weakest answers tended to be very brief and very general with no details on the biome, these simply listed conservation measures without development and tended to contain little if any evaluation. Some very weak essays dismissed the entire aspect of conservation by stating that conservation was completely ineffective in the chosen biome, in which case it was not a well-chosen example.

Question 4

- (a) This required a description and an explanation of the effect of the well on both the groundwater and water table. Good answers explained what is meant by groundwater and the water table, observed and described the cone of depression and incorporated many aspects of the diagram into an explanation. These emphasised the importance of recharge from precipitation and infiltration in maintaining the groundwater and water table with good linkage of the key points. Weak answers just described the diagram or did not explain the effect of the pumping well, these could be awarded partial credit at best.
- (b) Good answers to this question were characterised by sustainability being defined then illustrated with methods. Examples included water conservation schemes, desalination, and the sustainable use of aquifers. These answers used examples of various locations to assess where human needs and environmental protection are balanced. Negative impacts included groundwater pollution, disruption to the hydrological cycle, salt water intrusion in aquifers and the effects on biodiversity. Weak answers tended to concentrate on one example with few methods of how a sustainable supply could be provided. A few candidates based their answer solely on the content of part (a) of the question and considered only the environmental effects of a well.

Question 5

- (a) Good answers showed an understanding of the effect of deforestation on the mangrove ecosystem and the effect on the community of organisms and the habitats. These answers elaborated upon changes in the environment, in the water levels, water flow, and change in salinity of the brackish water. They described the changes in the distribution of the sparse and dense mangroves, salt pans and agricultural land, demonstrating good use of Fig. 5.1. Weaker answers did not emphasise the human activity of clearing the mangrove vegetation in order to create the shrimp farms and carry out aquaculture. There was weak description of the changes between 1989 and 1999 in the conversion of salt pans, and the decrease of the sparse and dense mangrove areas. These answers often tended to focus on changes to the beach areas.
- (b) There were some very good answers to this question, examples of ecosystems were well-chosen. Threats from deforestation, pollution, poaching and the introduction of invasive species were often described. Conservation measures tended to be general such as legislation, waste management, control of pollution and the use of national parks. Specific measures relating to the fauna and flora of the designated ecosystem, such as the protection of turtle nests or marram grass on coastal ecosystems were particularly pertinent as the question stated measures to conserve the flora and fauna. Examples of the fauna and flora from the chosen ecosystem should have been included in a description of the ecosystem. Very good answers had a balance between conservation measures and the threats to the ecosystem as well as some assessment. Weaker essays were poorly balanced and only mentioned conservation measures.

ENVIRONMENTAL MANAGEMENT

Paper 8291/22

Paper 22

Key Messages

- Questions in **Section A** were generally done well. These answers should include specific details.
- Answers should use information from the resources provided. Data contained in diagrams should be analysed to reveal patterns and quoted in order to support and verify points.
- **Section B** answers need to contain detail. This includes definitions of key terms and well-chosen examples with a location and a description of characteristics. Answers should be developed and all aspects of the question considered.
- When the word assess is used in a question the answer should contain relevant evaluative statements.

General Comments

Candidates either performed equally well on sections **A** and **B** or performed better on **Section B**. In **Section A**, a number of candidates performed better on **Question 1** than on **Question 2**. Candidates seemed to apportion their time very well between **Section A** and **Section B**.

Comments on Specific Questions

Section A

Question 1

- (a) Full credit was attained for definitions which clearly differentiated between each of the terms in the hydrological cycle by reference to stores and flows. Weaker definitions often lacked precision. For example, a definition of groundwater tended to lack a reference to the water store and a statement such as 'flows to the ocean' was more appropriate to groundwater flow.
- (b) Some high quality answers referred to the plant as a biological store of water, including different plant structures and their role in the water cycle. Good examples included roots in absorption of water from soil decreasing the groundwater store as well as leaves in interception as a temporary water store. Candidates incorporated knowledge of plant structure and function to enhance answers by reference to stomata, xylem vessels and osmosis. These answers demonstrated a good understanding of the role of vegetation in the hydrological cycle. The key to the question was in the understanding of the term role. Most answers referred to evapotranspiration increasing the water vapour in the atmosphere but a weakness in a small number of answers was to consider the hydrological cycle generally without reference to vegetation, with more emphasis needed on other aspects of Fig. 1.1.
- (c) This question required the changes in state of the water together with explanation of named processes. Processes were included in some answers but the actual changes in state omitted. Few candidates gained full credit. Most gained partial credit marks by using Fig. 1.1 to name different states and explain evaporation and transpiration.
- (d)(i) This was answered well with many candidates giving answers containing details as outlined in the mark scheme. There was however limited reference to the data in Fig. 1.1. Candidates could have

used this data to support statements and illustrate points e.g. an increase from the percentage of 16% for evaporation.

- (ii) Full credit was awarded for a different way in which human activity can affect the hydrological cycle. This was usually the negative effect of deforestation linked to a decrease in evapotranspiration, although the converse of afforestation increasing evapotranspiration was also mentioned. Other answers referred to groundwater extraction with a decrease in groundwater store or urbanisation/concrete surfaces with a decrease in infiltration. Answers that simply stated that the human activity will affect the water cycle, without outlining how it is affected, could receive only partial credit. This question required one other way that human activity could affect the water cycle further to that already outlined in (d)(i).

Question 2

In general candidates performed less well on **Question 2** than **Question 1**.

- (a) In general this was not answered well with a majority of candidates being awarded only partial credit. Often candidates just stated that high temperatures and rainfall accounted for the high level of primary productivity. Less frequently, better answers made the link between high productivity and a large biomass store and the subsequent availability of plant litter for decomposition. Other candidates focused on the energy flow through the food chains to primary and secondary consumers rather than the nutrient cycle.
- (b) Some answers demonstrated a sound understanding of the slash and burn cycle of land use, as an agricultural practice. Few answers achieved full credit. Often only 2 or 3 stages were correctly described, usually the initial clearing of the land, and the later stages of regrowth of the trees and climax. Second and third stages were often omitted and the majority missed the aspects of sowing of seeds and of crops being harvested.
- (c) Answers achieving the most credit linked the increased population demands with continued use of this type of slash and burn land use to a decrease in sustainability. This was explained as a result of larger areas of land being exploited with less time being available for fallow and trees no longer reaching climax, fewer nutrients being recycled, resulting in a decline in fertility which could eventually lead to land degradation. Other answers considered how a change in the method of agricultural practice could increase agricultural productivity to provide more food for the increasing population but recognised these practices may too be economically or environmentally unsustainable. When the purpose of this method of land use was not well noted in part (b) of the question this impacted upon answers in (c). Weak answers simply linked population increase to increased demand for forest resources.

Section B

In **Section B**, **Question 5** proved to be the most popular and **Question 4** was the least popular. The use of exemplar material in assessing water resources and conservation measures demonstrates a very good awareness and understanding of the value of sustainable environmental management, conservation strategies and effective control of pollution.

Question 3

- (a) Very good answers acknowledged fluctuations in the data and identified, described and explained four main trends. Weaker answers described the data but without recognising the main trends. These answers tended to be lacking in explanation and obtained only partial credit. There was some misinterpretation of the graph scale for the number of oil spills. This demonstrates the need to pay close attention to the axis labels, scales, and keys when interpreting data.
- (b) A good range of marine pollution hazards and measures to combat these characterised were seen. Good essays incorporated all aspects of the question, including the effects of the hazards, and evaluated the effectiveness of the measures. In these answers the nature of the marine environment was considered so that the issue of why it is so difficult to control marine pollution was addressed. Weaker answers lacked balance. Some answers tended to be very general or contain a narrow range of hazards, often limited to oil and how to deal with oil spills. Some examples of oil spill disasters were quoted with the most usual being the Exxon Valdez and the Gulf of Mexico. Evaluation of the effectiveness of measures tended to be the weakest aspect of this essay.

Question 4

- (a) Although this was not a popular choice, many answers were strong. Almost all answers achieved a balance between advantages and disadvantages and there was good use of information from Fig. 4.1.
- (b) The majority of candidates displayed a good understanding of sustainability and the factors affecting the availability of water. Strong answers included a good range of methods for achieving a sustainable supply of water with good use of exemplar material to compare provision of water in terms of quantity and quality and the ease and difficulty of supply for agricultural, industrial and domestic use. Although all answers compared countries at different levels of economic development appropriately, the assessment of extent was less well conducted with many simply stating that some found it easier than others. Discerning candidates showed how the problem of supply was not limited to one type of country. In weak answers the methods used to provide a water supply were often omitted and some answers only developed the example of the provision of pipelines as in part (a) of the question.

Question 5

- (a) Interpretation of the figure was good, the changes shown in the graph were described and data was quoted to support the points made. In some excellent answers data was manipulated to reveal further information, for example the percentage increase in the catch. Each of the main trends was explained. Weaker answers described the trends but offered no explanations of the changes limiting to half of the available credit. In less effective descriptions of the graph, each fluctuation in the data was described in detail, without revealing the overall patterns, such as the increasing trend between 1850 and 1950.
- (b) This essay focused on the negative impact of human activity on the marine environment and conservation measures. These tended to include general measures such as waste management, control of pollution, use of marine parks, use of protected areas, fishing controls and other legislation. The role conservation groups in raising awareness and education was also discussed. Measures specifically relating to the designated ecosystem are always more pertinent. Very good essays had a good balance between conservation measures and the impact of human activity as well as some assessment. These used well-chosen examples with a specific location, for example The Great Barrier Reef. Weaker answers lacked balance where either the human impact or the conservation was considered and evaluation tended to be omitted. Some answers lacked an example of a specific marine ecosystem and, unfortunately, some candidates used examples of river ecosystems rather than marine ecosystems.

ENVIRONMENTAL MANAGEMENT

Paper 8291/23

Paper 23

Key Messages

- Questions in **Section A** were generally done well. These answers should include specific details.
- Answers should use information from the resources provided. Data contained in diagrams should be analysed to reveal patterns and quoted in order to support and verify points.
- **Section B** answers need to contain detail. This includes definitions of key terms and well-chosen examples with a location and a description of characteristics. Answers should be developed and all aspects of the question considered.
- When the word assess is used in a question the answer should contain relevant evaluative statements.

General Comments

Candidates either performed equally well on sections **A** and **B** or performed better on **Section B**. In **Section A**, a number of candidates performed better on **Question 1** than on **Question 2**. Candidates seemed to apportion their time very well between **Section A** and **Section B**.

Comments on Specific Questions

Section A

Question 1

- (a) Full credit was attained for definitions which clearly differentiated between each of the terms in the hydrological cycle by reference to stores and flows. Weaker definitions often lacked precision. For example, a definition of groundwater tended to lack a reference to the water store and a statement such as 'flows to the ocean' was more appropriate to groundwater flow.
- (b) Some high quality answers referred to the plant as a biological store of water, including different plant structures and their role in the water cycle. Good examples included roots in absorption of water from soil decreasing the groundwater store as well as leaves in interception as a temporary water store. Candidates incorporated knowledge of plant structure and function to enhance answers by reference to stomata, xylem vessels and osmosis. These answers demonstrated a good understanding of the role of vegetation in the hydrological cycle. The key to the question was in the understanding of the term role. Most answers referred to evapotranspiration increasing the water vapour in the atmosphere but a weakness in a small number of answers was to consider the hydrological cycle generally without reference to vegetation, with more emphasis needed on other aspects of Fig. 1.1.
- (c) This question required the changes in state of the water together with explanation of named processes. Processes were included in some answers but the actual changes in state omitted. Few candidates gained full credit. Most gained partial credit marks by using Fig. 1.1 to name different states and explain evaporation and transpiration.
- (d)(i) This was answered well with many candidates giving answers containing details as outlined in the mark scheme. There was however limited reference to the data in Fig. 1.1. Candidates could have

used this data to support statements and illustrate points e.g. an increase from the percentage of 16% for evaporation.

- (ii) Full credit was awarded for a different way in which human activity can affect the hydrological cycle. This was usually the negative effect of deforestation linked to a decrease in evapotranspiration, although the converse of afforestation increasing evapotranspiration was also mentioned. Other answers referred to groundwater extraction with a decrease in groundwater store or urbanisation/concrete surfaces with a decrease in infiltration. Answers that simply stated that the human activity will affect the water cycle, without outlining how it is affected, could receive only partial credit. This question required one other way that human activity could affect the water cycle further to that already outlined in (d)(i).

Question 2

In general candidates performed less well on **Question 2** than **Question 1**.

- (a) In general this was not answered well with a majority of candidates being awarded only partial credit. Often candidates just stated that high temperatures and rainfall accounted for the high level of primary productivity. Less frequently, better answers made the link between high productivity and a large biomass store and the subsequent availability of plant litter for decomposition. Other candidates focused on the energy flow through the food chains to primary and secondary consumers rather than the nutrient cycle.
- (b) Some answers demonstrated a sound understanding of the slash and burn cycle of land use, as an agricultural practice. Few answers achieved full credit. Often only 2 or 3 stages were correctly described, usually the initial clearing of the land, and the later stages of regrowth of the trees and climax. Second and third stages were often omitted and the majority missed the aspects of sowing of seeds and of crops being harvested.
- (c) Answers achieving the most credit linked the increased population demands with continued use of this type of slash and burn land use to a decrease in sustainability. This was explained as a result of larger areas of land being exploited with less time being available for fallow and trees no longer reaching climax, fewer nutrients being recycled, resulting in a decline in fertility which could eventually lead to land degradation. Other answers considered how a change in the method of agricultural practice could increase agricultural productivity to provide more food for the increasing population but recognised these practices may too be economically or environmentally unsustainable. When the purpose of this method of land use was not well noted in part (b) of the question this impacted upon answers in (c). Weak answers simply linked population increase to increased demand for forest resources.

Section B

In **Section B**, **Question 5** proved to be the most popular and **Question 4** was the least popular. The use of exemplar material in assessing water resources and conservation measures demonstrates a very good awareness and understanding of the value of sustainable environmental management, conservation strategies and effective control of pollution.

Question 3

- (a) Very good answers acknowledged fluctuations in the data and identified, described and explained four main trends. Weaker answers described the data but without recognising the main trends. These answers tended to be lacking in explanation and obtained only partial credit. There was some misinterpretation of the graph scale for the number of oil spills. This demonstrates the need to pay close attention to the axis labels, scales, and keys when interpreting data.
- (b) A good range of marine pollution hazards and measures to combat these characterised were seen. Good essays incorporated all aspects of the question, including the effects of the hazards, and evaluated the effectiveness of the measures. In these answers the nature of the marine environment was considered so that the issue of why it is so difficult to control marine pollution was addressed. Weaker answers lacked balance. Some answers tended to be very general or contain a narrow range of hazards, often limited to oil and how to deal with oil spills. Some examples of oil spill disasters were quoted with the most usual being the Exxon Valdez and the Gulf of Mexico. Evaluation of the effectiveness of measures tended to be the weakest aspect of this essay.

Question 4

- (a) Although this was not a popular choice, many answers were strong. Almost all answers achieved a balance between advantages and disadvantages and there was good use of information from Fig. 4.1.
- (b) The majority of candidates displayed a good understanding of sustainability and the factors affecting the availability of water. Strong answers included a good range of methods for achieving a sustainable supply of water with good use of exemplar material to compare provision of water in terms of quantity and quality and the ease and difficulty of supply for agricultural, industrial and domestic use. Although all answers compared countries at different levels of economic development appropriately, the assessment of extent was less well conducted with many simply stating that some found it easier than others. Discerning candidates showed how the problem of supply was not limited to one type of country. In weak answers the methods used to provide a water supply were often omitted and some answers only developed the example of the provision of pipelines as in part (a) of the question.

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ENVIRONMENTAL MANAGEMENT

Paper 8291/03
School Based Assessment

General comments

Summer 2014 has seen a further increase in the entry, notably with a significant number of larger Centres, some with over 50 candidates

This year's reports were generally of a good standard with very few achieving less than 16 out of 40 and the majority falling within the 25 to 30 range. As in previous years a significant number of reports did not contain a clear evaluation nor a statistical tool, and in their concluding sections there was often a lack of reference to the data previously mentioned. 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. A significant number of candidates rely on secondary data, invariably obtained from the Internet. The issue of plagiarism and Internet copying/pasting was seemingly much less than in previous sessions.

Although the quality of work completed by the majority of candidates continues to be impressive this year has seen a wider variation in the quality of assessment and administration.

Assessment issues have included:

- excessive generosity especially by some smaller Centres. In these cases credit was frequently given for criteria not present in the report, particularly for use of a statistical tool and in skill area C3 a lack of reference to data and the absence of an evaluation.
- occasional weaknesses in developing a hypothesis or question and outlining and justifying a methodology was generally ignored. Significantly, most of the larger Centres provided accurate assessments of these elements.
- occasional inconsistencies within Centres where two or more candidates are awarded the same mark for criteria that vary from 0 to 2 marks; invariably the highest mark is given.

Administrative issues have included:

- half marks awarded then doubled to an odd number
- the recurrent issue of no MS1's
- completely unassessed reports where the record cards, summary mark sheets, MS1's and submitted marks are missing
- candidates incorrectly ordered in both the summary mark sheet and within the submitted package
- it would be helpful if all Centres could annotate the candidate record cards rather than leaving them blank, as it does help with moderation and provides justification for the mark given
- reports contained in plastic containers or stapled
- two packages only containing an MS1 and no reports
- very late submissions

It is relevant to reiterate a point made in previous reports. It is very important that candidates are made fully aware of the requirements of this School based assessment. Written reports should be of approximately 2000 words in length and ideally structured into the four 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 scientific method model can be used to provide 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 my 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.

Generally hypotheses or questions were stated by most candidates; mostly supported with a full introductory statement. It was pleasing to see reduced content to this section of around 250 words; a brief but thorough introductory statement is all that is needed. Although most candidates included a methodology it was often a brief list without any explanation or justification. Additionally only a small number of candidates assessed whether or not their developed plan would be effective in testing their hypothesis or answering their question.

Most good quality research requires the formulation of a plan detailing research sites, equipment, expected data and how it will be collated and presented. 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 significant number of high quality research reports that did very well in this section not many achieved the 9 marks available. Mostly excellent use was made of relevant collected data which was presented in a variety of ways including graphs, table's diagrams and photographs; invariably integrated into an analysis through the use of figure references. However, very few candidates utilised a statistical tool to assess the significance of their data. This might involve the use of correlation, chi squared, t test etc. It is important that the statistical tool is seen to be used. Unfortunately some Centres award this mark when there is no evidence.

Weaker projects generally exhibited 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 small number of candidates offered very limited evidence of data collection. A disappointing 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 was present, they became decorative and were not referred to in the analysis or description.

The majority of candidates deserve credit for the logical organisation of their work and the high quality of written communication.

Skill C3

This final skill area is an important feature of almost any scientific investigation. Unfortunately it is where a lot of candidates lose marks.

Whilst the better reports contained a detailed summative conclusion that utilised data to assess the original hypothesis and achieved 2 marks, many candidates failed to refer to their data and therefore only scored 1 mark. Likewise, although most reports contained references to environmental and management principals they were not used to explain trends and patterns derived from results contained in the body of the report.

Very few candidates attempted an evaluative assessment of their work. This needs to include a brief survey of those things that went well and those that went not so well i.e. success and limitations. Many still confuse an evaluation with a conclusion.

Concluding comments

It is pleasing that Centres and their candidates engage enthusiastically with this element of the Environmental Management examination through researching a topic of their choice. As frequently stated; better reports are derived from locally based research; ideally utilising primary data.

Fortunately in this session fewer candidates relied solely upon secondary sources and whether Internet or text based there was an attempt to collate and present such derived data.

The majority of Centres worked closely with the requirement contained in the syllabus. Although most administrative errors can be rectified, these can be time consuming and attention to the syllabus requirements would reduce these.

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.