ENVIRONMENTAL MANAGEMENT

Paper 5014/12
Theory

Key messages

- Candidates should ensure that questions are read carefully, particularly the requirements of the active verbs.

- Questions that require a description of a trend should refer to the longer-term changes rather than a focus on specific years.

- Ensure that where more than one example is required, the answers are clearly distinct and not a repeat of a similar example.

- When referring to locations on maps, candidates should use terms such as 'North and South' rather than 'above or below'.

General comments

There were relatively few examples of candidates leaving answer lines blank. In some cases, omissions were where responses are required to be included within the image rather than on a separate response line under the question. This highlights the need for candidates to read all questions carefully.

There was greater evidence of candidates providing answers that more closely address the command words such as explain, describe, or state. This helps prevent time being wasted providing more detail than is needed, or providing insufficient detail, which may impact on the total mark attained.

Candidates demonstrated a broad range of knowledge. There were opportunities to gain additional credit where responses were vague and needed qualification, particularly in discussion of the methods of managing population size and the damage caused by the tropical cyclone.

The six-mark, level of response question at the end of the paper was attempted by most candidates, although there was a significant difference in the approach between the stronger candidates and weaker ones. Stronger candidates provided a clear structure, justification of their views and came to a clear conclusion. This matched the level descriptors published in the mark scheme which is used to establish the mark for this question.

Comments on specific questions

Section A

Question 1

(a) (i) This introductory question required candidates to analyse a simple data set. This was successfully achieved by most of the cohort.

   (ii) While most candidates completed the percentage calculation correctly to achieve the answer, some did not completely follow the instructions of the question to provide their answer to the nearest whole number.

(b) A wide range of answers were credited; many identified the environmental issues or the impact of profitability on decision making. Whilst many candidates understood the key ideas, some were poorly articulated within the response given.

(c) Strategies for the restoring of landscapes were well understood. The command verb for this question was 'state' meaning that a detailed explanation was not expected.

Question 2

(a) Most candidates were able to interpret the data in the line graph correctly to complete the calculation.

(b) Generally answered well, however, a small proportion of the weakest candidates gave more diverse answers suggesting that they did not understand the meaning of the word 'range' and there were a few examples of candidates not attempting the question.

(c) Candidates were typically able to state that an increase in population and an increase in farming to feed the growing population caused the increase in atmospheric methane. Full credit proved harder to attain although this was achieved by the more able candidates.

Question 3

(a) This question was generally answered well; candidates were able to interpret the photograph and the human activity that caused the damage.

(b) Generally, responses showed a good understanding of the link between deforestation and soil erosion and provided an explanation as directed by the question.

(c) This question required candidates to state two reasons, which was completed by most respondents. The need to maintain biodiversity and use as carbon sinks were both commonly stated. Some weaker candidates wrote vaguely of the impact on photosynthesis but these answers were not sufficiently specific.

Question 4

(a) The majority of candidates were able to correctly identify the year when the predicted world population would reach 10 billion.

(b) This question proved to be slightly more challenging; whilst many identified the role of better health care, some incorrectly focussed on changes to birth rate, suggesting they had misinterpreted the data as relating to proportions of the population rather than a specific number.

(c) Many candidates stated two distinct strategies. Common errors were providing an example in the second response line of the strategy named in the first one, or lack of specificity, i.e. providing the word 'contraception' without any qualification.

Section B

Question 5

(a) (i) A two-mark question testing the candidates' skill at using a scale. Credit was awarded if there was clear evidence of the application of the scale, even if the final answer was incorrect. This was only possible if candidates showed their working as to how they derived the answer.

(ii) While most candidates were able to describe potential impacts of the cyclone, the question focussed on the impacts during the period prescribed. This meant that longer term issues were not credited.

(b) Most candidates were well prepared and were able to describe strategies to manage the impact of cyclones. A wide range of potential strategies were credited, although these strategies should be distinct from each other rather than a repetition to maximise the credit awarded.

Question 6

(a) (i)   A well-answered question; candidates were generally accurate in their interpretation of the graphical information.

(ii)   A description of the trends in the graph proved to be more challenging for some candidates. The expectation within responses is that answers refer to the change over a significant period of time rather than a detailed analysis of specific years. There was some confusion when describing the trends in the two categories of spills.

(b) (i)   Attempted by most candidates, there was a general understanding of the impact of oil pollution on coastal ecosystems although some responses were muddled or lacked sufficient detail to gain full credit.

(ii)   Candidates generally understood that booms stop oil from spreading, although there was a lesser understanding of the limitations to the use of this technology, such as the size of spill and the impact of weather conditions. A few more able candidates correctly identified that booms are only suited to oil floating on the water surface.

(c) (i)   Stronger candidates scored well on this question; weaker candidates benefitted from the inclusion of the diagram, although there was some misinterpretation of the role of the fissures created in the rock.

(ii)   Linked to the previous question, there was a correlation between success on both. Those who had less knowledge of fracking made only general comments about pollution and environmental damage.

Question 7

(a)   There was good knowledge amongst the cohort about the structure of the Earth's atmosphere. Most respondents were able to complete the missing label, although there were a few examples of candidates not attempting the question, illustrating the importance of reading the question carefully.

(b)   This question required knowledge of the composition of the atmosphere and a mathematical calculation, there were some examples where candidates were successful in one of these skills, and a good proportion of respondents were able to gain full credit.

(c)   Using the stimulus image, candidates were required to link the numbers with the description statements. Most respondents achieved credit and a good proportion gained the full credit available (all five statements in the correct spaces).

(d)   A more challenging five-mark question, with many responses lacking clarity. Candidates were able to provide examples of where greenhouse gases came from and often how the emissions of these gases could be reduced, although many needed to address the fact that the policy stated is not enough to reduce the greenhouse effect on its own.

Question 8

(a)   This question required the candidates to relate their answer to the information presented within the map. Credit was not given for responses which described areas as 'above' or 'below'. It is expected that candidates use terms such as North and South. Similarly, credit was not awarded for describing areas that are not predicted to have water shortages.

(b) (i)   There were some good responses to this question, and stronger candidates often provided significant detail. Weaker candidates sometimes confused distillation and desalination.

(ii)   A wide range of sources of fresh water were given credit although some were restatements of the term 'aquifer'.

(c) (i)   This was generally well answered; a few candidates gave the percentage rather than the name of the country, highlighting the need to read questions carefully.

(ii) Whilst the reasons for the population of Uruguay being low risk from cholera were generally understood, some responses were too vague to receive credit. Many needed to state that cholera is a waterborne disease.

(d) The quality of responses for this question were more variable. Some were able to articulate the impact of the leaching of nutrients with a clear understanding of eutrophication; others were less focussed in their answers and used vague comments such as the water becoming poisoned.

(e) This last question provided the candidate with the opportunity to write about a topic in more detail, ideally bringing together several related ideas supported by relevant examples. Stronger responses showed good planning, evidenced through a clear structure and logical argument. Weaker responses often included a range of ideas, but these were not ordered and sometimes contradictory.

This question is a level of response style question, meaning that marks are awarded according to the level descriptors provided within the mark scheme. A good understanding of these levels will help candidates provide more structured responses rather than the lists sometimes provided by candidates which are not given sufficient context or indeed reach a conclusion.

ENVIRONMENTAL MANAGEMENT

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│      Paper 5014/22          │
│   Management in Context     │
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Key messages

- There was a common misconception that carbon dioxide in the atmosphere destroys the ozone layer and that acid rain leads to global warming.

- To make best use of examination time, candidates are not required to repeat the question in their answer. For example, 'The impact of an oil spill on marine mammals is…'.

- Stronger performing candidates are guided by the mark allocation for a question which indicates the number of separate marking points required in a response. The use of bullet points in responses can help to ensure concise answers that address a sufficient number of points.

- Candidates should be encouraged to check their question paper to ensure they have attempted every question.

- Diagrams, charts and graphs should be drawn with a sharp pencil and ruler. Errors are more difficult to correct if pen is used.

- Stronger performing candidates read each question carefully and follow the rubric of a question to ensure they are answering the question that has been set. For example, if three reasons are asked for, they should not give a fourth as an incorrect answer can contradict a previous correct one.

- Candidates should always show their working out to calculation questions as credit may be available for correct workings even if the final answer is incorrect.

General comments

Candidates should avoid vague statements such as 'causes harm', 'causes pollution', 'affects the environment', 'causes death'; these unspecific statements are unlikely to gain credit.

Candidates found plotting the graph in **Question 1(b)(ii)** very challenging. More practice in graph plotting would be of benefit to many.

Candidates should ensure they are familiar with the mathematical requirements listed in the syllabus.

Comments on specific questions

Question 1

(a)   Most candidates were able to calculate the area to achieve the answer of 1.6. Fewer could correctly give the answer to one decimal place.

(b)(i) Stronger responses that showed working out were able to gain some credit for identifying the maximum and minimum values, even if they struggled with the subtraction of two negative numbers.

(ii) The *y*-axis label was often missing from graphs and units were rarely seen. Candidates found the data challenging to plot and most started their *y*-axis at zero and vertically increased to –25 °C. Many non-linear scales were seen and often linear scales did not cover half the grid space. Frequently, the points were joined with double or multiple thickness lines.

(iii) This was a well-answered question. Most candidates gave good explanations as to why it is not possible to grow crops at Halley. Most responses were logical and detailed.

(c) (i) Weaker responses repeated information in the stem without suggesting why metal skis and adjustable legs are used at Halley. A few of the higher performing candidates were guided by the mark allocation and attempted to give four clear reasons.

(ii) Most responses included an idea about keeping the scientists warm. Fewer went on to give a second different reason.

(d) (i) Candidates generally understood why the quantity of waste at Halley should be minimised. Ideas of creating a risk of water pollution or animals ingesting waste were common. Weaker responses stated, 'to reduce pollution' – this answer was not credited as candidates must always clarify the type of pollution or how an area is polluted.

(ii) Many candidates suggested that the problems of transporting sewage are due to the risk of disease and the large quantities involved.

(e) (i) Oxygen gas was widely known; carbon dioxide was a common incorrect response.

(ii) Many candidates suggested it was the inserted gas that increased the pressure. Some were able to name carbon dioxide.

(iii) The majority of candidates could name three abiotic factors. There were a number of responses where biotic factors were listed or a mixture of abiotic and biotic. Many candidates gave more than three answers; this reduced the credit achieved for those where a previously correct answer was contradicted by an incorrect fourth or fifth one.

(iv) The release of carbon dioxode was commonly given. Weaker responses stated, 'gases released', which was insufficient for credit at this level.

(v) The addition of organic matter to increase fertility was suggested by many candidates.

(vi) Most candidates knew two renewable resources. Occasionally, 'nuclear' was incorrectly given or 'biofuels', which was given in the question stem.

Question 2

(a) (i) Stronger responses suggested an increased risk of competition for food and the absence of natural predators of the rats as reasons for removal. Some candidates knew the term 'invasive species', which was also credited. Weaker answers copied out the text from the fact sheet without adding any additional knowledge.

(ii) Most candidates recognised that non-target species could consume the rat poison.

(b) (i) It was common to see the text from the question repeated in the answer without additional knowledge or interpretation.

(ii) Candidates performed well on this question, and most were able to suggest correct limitations for both methods.

(c) The larger area of New Zealand and the larger population were common answers. It was less common for candidates to give a third correct answer.

(d) The syllabus lists chlorination and boiling as strategies to treat water that contains bacteria. These were not universally known.

Question 3

(a)   Good explanations of unsustainable fishing were seen. Weaker responses referred to 'illegal fishing' that did not answer the question asked.

(b)(i)   The correct calculation and the answer were often seen. There were also a number of answers that were incorrect with no obvious reason for the value stated, as no working out was given.

(ii)   Candidates found this question challenging. Most answers were limited to the idea of the high cost of the toothfish. Some responses referred to an 'absence of laws' but as the question had already established that the fishing was illegal, this was not credited.

(iii)   The managed harvesting of marine species was a well-known area of the syllabus for most candidates. Weaker answers referred to 'change net and mesh size' without saying how each of these should be changed.

(c)(i)   Weaker responses needed to refer to the toothfish in their answer.

(ii)   Good answers were seen for why climate change could reduce the krill population. Typically, these referred to a reduction in food for the krill and an increase in water temperature. Weaker answers stated, 'the conditions are not ideal' without saying why the conditions are not ideal.

Question 4

(a)(i)   Candidates struggled to suggest why thin slices of ice core are used. Many stated 'to improve accuracy' which was insufficient for credit.

(ii)   Most could suggest that some form of emission, e.g. ash or 'chemical evidence' could be seen or analysed in the slices of ice core.

(b)(i)   This was well answered. The strongest responses stated the overall trend of increasing and then described the slower rate, which increased to a faster rate in more recent years.

(ii)   Many candidates could suggest reasons for the trend. Those who answered in bullet points and were guided by the mark allocation often gave more detailed answers that related well to the question.

(iii)   Many candidates were able to name the greenhouse gases from the syllabus; others attempted to name other chemicals, which were frequently incorrect. Some responses included more than two names, which often contradicted previously correct gases.

(iv)   Candidates found this a challenging question. Most referred to the melting of glaciers and a very few went on to discuss warming of water in seas and the idea of ocean expansion. There was a general confusion between climate change and ozone depletion.

(c)(i)   CFCs were well known. Occasionally, carbon dioxide was seen.

(ii)   Candidates who performed less well stated 'troposphere', 'thermopause' or 'ozone layer'.

(iii)   The majority of answers confused ozone depletion and global warming.

Question 5

(a)(i)   Most could calculate the percentage increase and gave the correct answer. Stronger responses included full working out so credit could be awarded for the method even if the final answer was incorrect.

(ii)   Reducing the risk of littering and educating tourists were the most common answers.

(b)(i)   Weaker answers repeated the question with 'they have a double hull', without explaining what this means or how it reduces the risk of an oil spill.

(ii)   A strategy for dealing with an oil spill was known by most candidates.

(c) Many candidates could have improved their answers by reading the question more carefully and answering in terms of marine mammals as required.