

# ENVIRONMENTAL MANAGEMENT

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Paper 0680/11  
Theory

## Key messages

- The examination differentiated well between candidates across the full range of ability. The strongest responses showed competence across the paper and good answers were seen to all questions set.
- Command words such as 'describe' or 'explain' provide key information about the style of response required and the level of detail required to access marks.
- The focus in all questions and the context should be considered carefully – this could include causes or effects, problems or benefits, people or the environment, and local or global.
- Definitions of subject-specific terms should be learnt in order to define and accurately use them. When defining terms, candidates should try to avoid repeating a part of the word being defined as part of their definition but use completely different wording.
- When describing a trend on a graph, candidates should be aware that they are looking for a pattern or relationship – words such as increase, decrease, constant, plateau, fluctuate, for example, should be considered in such responses.
- Candidates should show their workings in all calculations even if this is not specifically asked for in the question.

## General comments

The quality of many answers to this paper is of great credit to the candidates and their teachers. There were very few rubric errors, and the overall performance was positive, with some excellent responses to individual questions. In order to write answers that contain the appropriate detail and number of points, the mark allocations and answer spaces provided in the question paper should be seen as a guide for candidates.

Candidates should continue to practise using graphs of different types; bar charts, pie charts, tables of data, photographs, diagrams and maps. Graph completion tasks should be done with care, using a ruler and sharp pencil to produce the required precision. When completing a bar chart, bars should be of the same width, the axes should be labelled precisely using the data source and the graph should cover the space provided. Unless asked for in the question, shading should be avoided as it can waste valuable time. Candidates should avoid the tendency to list without offering full explanations, and general responses such as 'pollution' need further development, for example, 'noise pollution'.

## Comments on specific questions

### *Section A*

#### **Question 1**

- (a) There was a good response to this question with most candidates stating at least two processes correctly. Weaker candidates did not state a process but instead described how carbon could be emitted into the atmosphere by, for example, deforestation and vehicle emissions.
- (b) The vast majority of candidates were able to gain credit for stating evaporation and transpiration; some struggled to identify a third process. Many stated condensation, but this does not add water to the atmosphere as it is merely the process that changes water vapour into liquid water. Precipitation was a common incorrect answer.

## Question 2

- (a) This was generally well answered with most candidates showing at least some understanding of a compound responsible for smog. Chemical symbols were accepted, and all mark scheme ideas were seen. A common error was stating carbon dioxide or fog as a potential compound and a few candidates did not understand the term compound.
- (b) Many candidates were awarded full credit for this question. A few could have developed their answer further with more detail, for example, lung cancer rather than just cancer. Other candidates did not take note of the prompt in the question ‘that can cause an early death’ and suggested issues such as eye, nose or throat irritation which are unlikely to lead to a premature death.
- (c) A sizeable minority had difficulty accessing the credit available for this question and re-wrote the labels from diagram A. Many just put the words in the opposite order: warm, cool, cold, going downwards, so did not attain any credit, while others wrote warm air at the highest altitude.

## Question 3

- (a) Candidates were very strong at being able to define the term habitat and demonstrated their understanding very well. Some responses were unclear about the definition of niche.
- (b)(i) Candidates made effective use of the information supplied together with their own knowledge. Many responses correctly drew a pyramid or a stepped pyramid and were able to label the different energy levels. Some suggested named examples for the different energy levels and credit was awarded for this approach when correct. A few candidates gave the trophic levels the wrong way round and put the tertiary consumer at the bottom of the pyramid and the producer at the top. A small number drew a food chain or a food web which did not attain any credit as this did not answer the question.
- (ii) The majority of candidates correctly stated sunlight as the source of energy for a producer.

## Question 4

- (a) Successful answers linked the sign to the need to alert or warn people of a potential tsunami. Most candidates considered the availability of an evacuation shelter and the need to reach higher ground to avoid loss of life or injury. Stronger candidates considered the unpredictable nature of tsunamis and the resulting coastal flooding hazard. A few went on to suggest that the picture would help people unable to read the language.
- (b) Candidates needed to explain why the contamination of water following a tsunami is a danger to people. Weaker responses discussed the impact of tsunamis in general, but many candidates quickly achieved full credit by writing about waterborne diseases and developing their answer by citing named diseases such as typhoid and cholera. Some candidates stated malaria as a waterborne disease. This did not gain credit as the focus was on contaminated water. Although some candidates suggested the water would cause health problems or diseases, they did not always specify if the water was drunk or consumed so did not attain any credit. A small minority did not understand the question and described people being washed away or buildings damaged by a tsunami.

## Section B

### Question 5

- (a) Whilst many candidates correctly calculated the percentage of farmland in Africa that was at risk from locusts swarms, some missed out on full credit as they needed to give their answer to one decimal place. 2.96 was often incorrectly rounded down to 2.9. Others correctly rounded their answer to 3 but did not give their answer to one decimal place and stated 3 as the answer rather than 3.0. 0.3 was a common incorrect answer.
- (b)(i) Most candidates suggested two appropriate limitations. The most common correct responses were that it was hard to see in the dark and it was time consuming. The idea of the locusts being too small to see was not given credit as it had previously been stated that the locusts were 6–8 cm in length.

- (ii) The vast majority of candidates suggested that the reduction of costs was the benefit to farmers. Using the crushed and dried locusts as fertiliser was not accepted as an answer as the candidates had been told in the question that the crushed locusts were used as animal feed.
- (c) Most candidates were able to effectively describe two impacts of the overuse of insecticides. A common misconception was that insecticides alter the soil structure. Contamination of soil was the required response for this marking point. A common error was discussing eutrophication in nearby water sources with some candidates confusing with overapplication of fertilisers.
- (d) Generally, candidates answered this question well, with many referring to a wide variety of methods used to control locusts and suggesting how the Emergency Locust Response Program (ELRP) fund could support countries affected by locust swarms. The most common correct marking point was that the fund could be used to supply farmers with a named method to control locusts. However, some candidates used all the available answer lines to list every possible control strategy the fund could supply for very little credit. More successful answers referred to provision of food aid, replacement seeds or insect resistant crops, and education.
- (e) This question was answered exceptionally well by many candidates who described how global warming could lead to higher rainfall totals and increase in temperatures. However, those who suggested the greenhouse effect often omitted to use the term enhanced in their answers and thus lost out on credit. Some confused global warming and ozone depletion, suggesting that greenhouse gas emissions led to ozone depletion. Other successful candidates discussed the idea that more food would be available for locusts and possibly less predators.

#### Question 6

- (a) Candidates were shown a photograph of wind turbines used to generate electricity and were asked to suggest reasons why people did not want wind turbines to be built. Most candidates were confident in suggesting two valid reasons. Popular answers included noise and visual pollution, that large areas were needed and birds could be killed in the rotating blades. Vague suggestions that wind turbines are expensive to install did not attain credit unless a direct comparison to the costs of another energy source was made.
- (b)(i) Wind turbine 3 in 2022 generated 0 annual electricity/megawatt-hours. Candidates were asked to suggest a reason for this value. Most candidates suggested that the turbine was broken or had been switched off. Those who suggested that there was no wind did not gain credit as this was unlikely to be true. The values given were for annual electricity generation and it would be very unlikely for there to be low wind speeds or no wind for a whole year.
  - (ii) Nearly all candidates correctly calculated the average annual electricity generated for turbine two. However, a small number of candidates forgot to divide by 4 when calculating the average.
  - (iii) Virtually all candidates identified that output decreased over the four-year period. A minority did not attain credit as they suggested that wind speeds rather than electricity output decreased over the four-year period.
- (c)(i) There were a variety of responses to this question. Candidates were asked to calculate the range for average wind speed at location A. A common error was where candidates used the highest value for location B and the lowest value for location A for the calculation.
  - (ii) Most candidates understood that the average wind speed at location A was higher than at location B. Weak answers that did not gain credit merely stated that the wind speed was higher or faster.

#### Question 7

- (a)(i) Most candidates displayed a clear understanding of why the total mass of plastic waste produced in the United States increased between 1980 and 2018. Increasing population and demand were the two most common correct answers given. Some did not gain credit as they suggested plastic was cheap or was used to make many items but did not account for the increase or suggest these items had previously been made from other materials.

- (ii) Many candidates made good use of the table showing the trends for the different strategies of plastic waste disposal. Trends were described in detail. Weaker responses simply described the general increase for all three strategies but did not go into detail on the three different strategies. Some suggested landfill was the most effective method rather than the most used method. A few other candidates did not understand the question and discussed the relative advantages and disadvantages of each disposal method, often in terms of their impact on the environment. Some also included the plastic waste produced in their discussion of the trends, not realising that this is not a waste disposal method.
- (iii) The vast majority of candidates correctly identified one reason for the difference stated in the question.
- (b) Most candidates were able to state three ways plastic waste pollution has impacted on the oceans. It was common to see plastic blocking sunlight and causing a reduction in photosynthesis at the bottom of food chains and the impact on marine creatures by consuming or becoming entangled in plastic. Bioaccumulation and decreased biodiversity were also cited as possible impacts. Plastic islands and toxicity were seen less often.

### Question 8

- (a) Many candidates successfully selected three reasons for the removal of trees. A few answers listed environmental impacts of deforestation which would have been best used in responses to **Question 8(b)** and did not gain credit.
- (b) Candidates demonstrated their understanding of the impacts of deforestation very well in this question. There were many well-developed answers provided, examples were often referred to, and many candidates gained all of the credit available. Positive and negative impacts were discussed at length. Some candidates mistakenly wrote about the importance of forests generally rather than on the impact of removing the forests. Some answers listed simple bullet points instead of developing or linking ideas in the mark scheme.

### Question 9

- (a) Many candidates understood the question and used the diagram of the dolphin exclusion device (DED) to good effect. Many responses discussed the grid and the escape hole, and some candidates developed their answers further by noting that floats kept the escape hole open and that it was large enough for dolphins to escape through it. A common misconception was the idea that dolphins push the floats up to open the escape hole, rather than the floats holding the escape hole open.
- (b) (i) This question was answered correctly by virtually all candidates. Candidates analysed the data shown on the graph to correctly suggest boat 2 caught the most dolphins, although a small number suggested boat 3 or non-DED fitted.
- (ii) Most candidates gained full credit for this question, concluding that DEDs do reduce the number of dolphins caught. Some candidates also recognised that DEDs are not a completely successful strategy as some dolphins are still caught.
- (c) Candidates were very strong at being able to suggest three strategies to reduce overfishing. Common responses included quotas, fish farming, closed seasons and protected areas. Some answers could have been developed, for example conservation laws rather than just laws.

### Question 10

- (a) (i) Most candidates successfully calculated the percentage and completed the table.
- (ii) This question was completed well and most candidates understood how to plot a bar chart. The vast majority of candidates labelled the axes, plotted the bar chart accurately, the width of bars being drawn correctly in most cases, and sensible linear scales were used. Where an error occurred, it was usually due to the inaccurate plotting of 10.5 percent with some candidates plotting 15 percent instead. Candidates should remember to include 0 on scales where appropriate; this was missing in a significant number of responses. Some candidates could have improved the accuracy of their answers by using a sharp HB pencil and a ruler for plotting the bars.

- (b)(i)** Most candidates were able to give a confident account of the disadvantages of the process of converting limestone to lime. The key idea was that large volumes of carbon dioxide are produced and hence the process can contribute to the enhanced greenhouse effect. Some of those who discussed greenhouse gas emissions needed to use the term enhanced when referring to the greenhouse effect. A common misconception was that carbon dioxide emissions lead to ozone depletion. Strong responses suggested that a lot of energy is required and referred to the use of fossil fuels for heating the limestone or the possibility of acid rain.
- (ii)** This question was less well accessed with very few candidates selecting the correct two boxes. Weak answers selected more than two boxes or only one which gained no credit. 'Permeable' and 'erodes in acid rain' were required to attain the credit.
- (c)** The six-mark, level of response question requires the candidate to write a more extended answer. Arguments for and against the statement in the question are expected and should be balanced. A very clear conclusion and evaluation are required. The development of a point of view, supported by clear evidence, is important.

This question, about whether the need to use mineral resources for the present is more important than keeping them for the future, proved to be a good discriminator. Many candidates rose to the challenge presented and there were some excellent responses. To reach Level 3, candidates took ideas and developed them as fully as possible, including relevant examples to evidence points made. The strongest responses included subject-specific vocabulary and showed evidence of some initial planning.

Weaker responses did not focus on the full question and gave answers limited to just the present global population or the future population. Evaluation was often absent, as was the inclusion of examples. A common misunderstanding was the idea of switching to the use of renewable mineral resources rather than renewable energy resources, as all mineral resources are non-renewable. Few appreciated that the transition to renewable energy resources still requires the use of non-renewable mineral resources, including scarce metals that are in short supply.

# ENVIRONMENTAL MANAGEMENT

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Paper 0680/12  
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 0680/13  
Theory

## Key messages

- Candidates should read questions with care and respond to the command verb and instructions to maximise their potential credit.
- Candidates should be aware of the requirements to state mathematical answers to the correct level of accuracy, such as the request to complete a calculation to one decimal place.
- The six-mark, level of response question requires candidates to look at the given topic broadly. The use of appropriate examples to support their views will increase the validity of their argument. This type of question also benefits from a level of planning which was evident within some of the scripts seen.
- Candidates are encouraged to ensure there is sufficient detail within their answers rather than simply providing generic phrases.

## General comments

The paper proved accessible to most of the cohort and the majority of candidates attempted most questions. Where there were omissions, these were often where answer prompt lines were not prominent. This highlights the need for careful reading of every part of the question.

Candidates applied their knowledge of the syllabus to unfamiliar situations with varying degrees of success. This type of skill is often required within questions which use the active verb 'suggest'.

The six-mark, level of response question was attempted by most candidates, again with varying degrees of success. Some of the strongest answers showed evidence of initial planning before completing the answer. This enabled these candidates to provide arguments for and against the statement and support with specific examples where necessary. Within this question, and throughout other parts of the paper, weaker candidates sometimes used generic statements or simply key words. In some situations, it is important that more detail is provided for the candidate to demonstrate that they have responded fully to the context posed in the question.

There were several opportunities for candidates to demonstrate their mathematical skills. These questions were generally completed competently, although candidates may benefit by showing their working as well as the final answer, as credit may still be awarded for the correct choice of process even if there is a subsequent mathematical error. Additional instructions, such as presenting the answer to one decimal place, were sometimes missed.

Overall, candidates demonstrated a good range of knowledge. The most notable area of potential weakness was in understanding of wave power. Some candidates needed to use directional terms such as 'North' and 'South' instead of 'above' and 'below' to describe locations.

## Comments on specific questions

### **Section A**

#### **Question 1**

- (a) (i) This introductory question required candidates to state the trend in Arctic Sea ice. Most candidates successfully identified that there was an overall reduction. It was not expected that candidates would describe the various peaks and troughs.

(ii) Using the information in the graph, most were able to correctly retrieve the correct value.

(b) A more challenging question, many identified the impact on the loss of habitat and stronger candidates also listed the rise to sea levels, the resultant flooding and in some cases the need for forced migration.

### Question 2

(a) A question focussing on the water cycle. Candidates were required to link the processes to the places in the diagram. This was completed successfully by the majority of candidates. The most common error was a confusion between transpiration and condensation.

(b) Candidates were well prepared for this question relating to soil erosion. Weaker answers gained limited credit for vague descriptions or statements that did not directly relate to trees.

### Question 3

(a) Using the picture as a stimulus, most candidates attempted this question. Credit was given to any valid response that could be clearly seen within the image. Some candidates incorrectly linked the cause of the drought to a lack of trees.

(b) This question required candidates to give three different examples. In a few cases, there was an overlap between the responses which limited the final credit achieved. Generic statements such as 'spread of disease' or 'death' should be appropriately qualified so that they relate to the scenario.

### Question 4

(a) Diagrams provided the stimulus information to enable this question to be answered. This proved useful for all candidates to varying degrees of success. While many correctly identified the movement of water, a number did not sufficiently describe the role of the turbine or the generator in the production of electricity.

(b) Describing the benefits and limitations of using wave power proved to be more challenging for many candidates. Many responses successfully identified a benefit, often relating to sustainability; the limitations were more challenging. Some responses confused wave power with tidal power.

## Section B

### Question 5

(a) (i) Credit was available in this calculation question for the method, for an accurate calculation, and finally for providing the answer to one decimal place. A few candidates missed the final instruction and so lost out on full credit.

(ii) Most candidates had some awareness of reasons why the actual number of migrants would vary from the predicted number. Many correctly identified that there may be a different number of wars that cannot be predicted, similarly the impact of epidemics is unknown.

(b) This question proved to be challenging to many candidates. Many incorrectly described issues such as a low birth rate or increased healthcare which were not relevant to this question. Stronger candidates focussed on the details within the population pyramid, occasionally acknowledging that this data relates to migrants and is not representative of a whole country population.

### Question 6

(a) Candidates were generally able to name two igneous rocks. While it is expected that candidates should know those listed in the syllabus, other correct answers were given credit.

(b) (i) This was well understood by most candidates. The focus of the question was the impact on the surrounding environment, a detail missed by a small proportion of the cohort.

(ii) Some good responses were seen and the strongest candidates identified three distinct strategies. Many responses included references to recycling and the efficiency of extraction.

### Question 7

- (a) (i) A question requiring candidates to describe the distribution of areas on a map. As with other similar questions of this type, phrasing such as 'above' or 'below' was not given credit; candidates should use the points of the compass to describe locations. It was not expected that candidates should be able to name any specific country, the inclusion of the Tropics and the Equator allowed for areas to be described clearly.
- (ii) A more challenging question for some candidates, credit was given for a range of potential scenarios. The command verb for this question was 'explain', which meant that it was important for responses to provide sufficient detail to support their suggestions.
- (b) (i) Most candidates were able to interpret the pie chart accurately and completed the calculation of the percentage of the soil which was completely decayed organic matter.
- (ii) This question proved to be challenging and required an understanding of intensive production for candidates to be able to form a conclusion. The strongest responses identified that the agricultural system removes plant material (due to harvesting) and the fact that some of the nutrients may be added using chemical fertilisers. Weaker answers sometimes confused fertilisers with pesticides or simply referred to the use of chemicals, which was imprecise.
- (c) This question required the candidate to mark on the diagram where the greatest quantity of organic matter may be found. A proportion of candidates missed the instructions given and did not attempt this question.
- (d) (i) Candidates needed to complete the boxes with the names of types of soil particle. As with **Question 7(c)**, a proportion of scripts did not include an answer. It is important that candidates read the directions of each question as some do not include the prompts provided by the addition of conventional lines for the answer. A good number of responses received full credit for this question.
- (ii) There was a high correlation between those candidates who were able to name the soil particles in **Question 7(d)(i)** and the non-solid components of the soil. Examples of gaseous components in the air were accepted as an alternative to specifically naming air.

### Question 8

- (a) (i) Many candidates were able to interpret the data in the graph and identified the low population number in 1978 to help shape their answers. Common themes included the risk of predation either from humans or animals, and that there may be difficulty in finding a mate. A few strong candidates also highlighted the potential issue of lack of genetic diversity and the problems inbreeding may cause.
- (ii) This question required the candidate to form their own conclusions from the data to either support the statement or reject it. Credit was given for the justification of their decision rather than a simple 'yes' or 'no' as both conclusions could be supported by the data presented. This question encouraged the candidate to look at the trend rather than a one-year figure. Those who supported the student's viewpoint identified that there has been a sizeable decrease in population since 2000 and that the population is still small. The converse argument identifies the overall increase and the increase at the end of the period. Responses that suggested the data is inconclusive were also given credit if there was suitable supporting evidence.
- (b) This five-mark question discriminated well between the abilities of different candidates. The best-performing candidates were able to take a structured, planned approach and refer to each type of interaction shown in the diagram, often prefacing their responses with the fact that success is dependent upon all three interactions. Weaker candidates were able to identify one or two examples of interactions but showed a general lack of order in their answers. As a result, they did not always address each of the potential interaction types.

## Question 9

- (a) (i) The impact of El Niño Southern Oscillation (ENSO) was not universally understood within this cohort. Some candidates were able to follow the impacts in a logical order, resulting in less food availability for fish, and migration as a result. Weaker candidates identified selected isolated points so were able to obtain limited credit.
- (ii) A range of potential impacts of reduced fish catch were given credit. The command verb 'suggest' indicates that candidates are expected to be able to apply their knowledge and draw upon skills they have gained through the learning of the syllabus.
- (b) (i) This question required candidates to demonstrate their skills in the presentation of data. Most candidates interpreted the information in the correct way and were able to create a table. The most common error was to include percentage signs within the body of the table in addition to within the table heading. This limited the credit achieved on this question. A few candidates omitted to include the negative sign to show a decrease in consumption.
- (ii) The majority of candidates correctly identified fish farming as a method to provide fish sustainably.
- (iii) Another question with the command verb 'suggest'. Here, candidates needed to provide potential reasons why fish consumption in Africa is predicted to decrease. Using their existing knowledge, expected answers included the growth in human population outpacing supply, the potential impact of overfishing and the potential for prices to increase if supply is limited. Candidates who identified climate change as an issue were given credit provided they were able to justify how this would affect supply.
- (c) This final six-mark, level of response question allows candidates to write about a topic at length and to bring together knowledge from a variety of subjects to support their answer. The strongest responses will consider both sides of the debate, use specific examples to support points they are making and finally reach a conclusion.

As with previous questions of this type, marks are not given for the conclusion made but for the supporting argument that helps inform this decision.

The strongest responses show attention to planning and a logical order. Marks are not awarded directly for the number of true points made but for the overall quality of the response, aligning the quality of the answer to the level descriptors included in the mark scheme.

In this example, the focus was on maintenance of fish stocks and the banning of fishing during the breeding season. Some of the best responses gave examples of how this might help and how it would be possible to identify those breaking the rules if linked to a calendar period. On the converse side they often identified that fishing is an international trade so would be difficult to police without international enforcement; similarly they identified that not all fish breed in the same season. Many other relevant arguments were seen.

Weaker candidates often missed out on the credit available by less rigorous planning or simply providing a list of statements, thus not providing a comprehensive answer. This question was attempted by most candidates.

# ENVIRONMENTAL MANAGEMENT

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Paper 0680/21  
Management in Context

## Key messages

- Candidates should show their working out when completing calculations, especially when more than one mark is available for the answer, as partial credit may be given even if the final answer is incorrect.
- A ruler and a sharp pencil should be used to plot pie charts. Errors are more difficult to correct if a pen is used.
- Candidates should read questions carefully, taking particular notice of command words and any supporting information. It is important that candidates understand the difference in meaning of the command words, such as 'state', 'suggest', 'describe', and 'explain'.
- The mark allocation and number of answer lines should be used as a guide to the number of ideas needed in the answer.
- Responses should give detail to support statements such as 'pollution', e.g. air, land, light, litter, noise, plastic, visual and water.

## General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one country. Many candidates understood and made good use of the source material and their written responses were sufficiently clearly expressed for credit to be awarded. The mathematical and graphical questions posed some difficulties for a minority of candidates.

## Comments on specific questions

### Question 1

- (a) (i) Most candidates were able to correctly calculate the total area of land in the UK used for pasture and arable. A minority of candidates did not put a decimal point in their answer, writing 1 729 631 instead of 172 963.1. These candidates, and others who showed their working, were often able to gain partial credit.
- (ii) Most candidates gained partial credit for drawing a pie chart of the data in the table. Many completed the pie chart by presenting the sectors in the order given in the table. Pie chart sectors should be presented in rank order, largest first, beginning at the top and proceeding clockwise; this includes other data, so the row 'other' should have been plotted before 'forest'. There were few plotting errors and most candidates completed the key to match their sector shading.
- (b) (i) Many candidates were able to state at least three intensive agricultural practices. A common mistake was listing three types of farming.
- (ii) This question required candidates to state benefits and negative impacts of intensive agricultural practices. Many candidates stated increased yields and/or profits and the need for fewer workers as benefits. Negative impacts was often the stronger section; frequent responses were: habitat loss, eutrophication, loss of biodiversity, loss of soil fertility and soil erosion.
- (c) Most candidates were able to state that random sampling was the type of sampling method shown in the diagram. Some incorrectly gave quadrat as the answer.
- (d) (i) This question required candidates to suggest one reason why the soil samples are passed through a 2 mm sieve. Many candidates' responses were vague suggestions about removing impurities,



bits or things that were not needed. The more successful responses mentioned rocks, plant roots and organisms such as worms.

- (ii) Many candidates did not show understanding of why the soil samples are dried to remove the water.
  - (iii) Few candidates understood that all seven soil samples are put into the same large container before being analysed to obtain a representative sample.
- (e) (i) Candidates who described how eutrophication impacts on the environment if a soil has a reading of 53 mg/kg for nitrate ions often gained full credit. These candidates understood the question and wrote about run-off from fields leaching nitrate ions into rivers and lakes, increasing the growth of algae. The most common errors were responses about increased crop growth, nitrogen release into the atmosphere and acid rain.
- (ii) Most candidates correctly stated that there would be low or no agricultural yields if a soil has a reading of 5 mg/kg for nitrate ions.
- (f) Most candidates understood the question and gained full credit. Air, water and organic matter were the most common correct answers. Some responses named mineral particles or mineral ions, although the question required the addition of other components of soil to the list.

## Question 2

- (a) (i) The most common suggested benefit of high-speed trains to people living in the UK was faster transport. Many candidates went on to write that trains would arrive on time. The second most common benefit was reduced vehicles on roads. Very few candidates mentioned improved connectivity, cities and regions being better connected to each other, or improvements to the economy.
- (ii) This question required candidates to suggest two impacts, other than loss of natural habitat, of building a large number of houses near the HS2 stations and to give a reason for each impact. Many candidates struggled to suggest appropriate impacts with reasons to achieve full credit on this question. The most common impacts were deforestation, loss of biodiversity and noise from trains. Some candidates misunderstood the question and wrote about the impact of the train, the station, and the railway line instead of the impact of building the houses. Others wrote about pollution (without specifying what type), crime or overpopulation.
- (b) Few candidates were able to explain clearly why emitting less carbon is important. Many wrote that carbon was a greenhouse gas. Many made the link to climate change or global warming, and a very few mentioned the idea that it would enable a country to meet its carbon neutral targets. Many wrote about ozone depletion, health problems and smog.
- (c) Responses to this question were more successful. Many candidates gained full credit for detailed explanations of how trees help to reduce carbon emissions, showing a good understanding of photosynthesis. These answers often stated that the trees absorb carbon dioxide for photosynthesis and included reference to chlorophyll, carbon sinks and carbon stores. A number of candidates supported their answer with the word or chemical equation for photosynthesis.
- (d) Few candidates understood green corridors and so found it difficult to suggest why the green corridor must be made before construction of the track.
- (e) (i) Many candidates suggested that Japanese knotweed is removed from the green corridor because it is invasive. This repeated supporting information in the question. Some candidates gained full credit for understanding that plants compete for resources such as light, minerals, root space in the soil, and water. Others thought that the climate in the UK would not be suitable for a Japanese plant, so it would die.
- (ii) Some candidates correctly suggested that vehicles in an area with Japanese knotweed must be washed before leaving the area because there could be seeds or plants on the vehicle. If this was not done vehicles would take the plants to other areas where they would grow and spread. Other candidates suggested that the vehicles needed to be washed to prevent the spread of disease.

### Question 3

- (a) Many candidates suggested that some people are concerned that the construction of houses in the UK may cause some Bechstein bats to die from starvation because there would be no food for them. Some candidates wrote about insects losing their habitat and needed to go on to make the link that the insects were eaten by the bats.
- (b) (i) Many candidates made good use of the fact sheet to suggest that, as bats were nocturnal or active at night, the survey should be carried out between sunset and sunrise. Some wrote answers that confused sunset and sunrise. Others wrote about local people being awake at night.
- (ii) Many reasons were suggested as to why this type of survey can result in an overestimate of the bat population. These included different ways the same bat could be counted more than once using information from the form. Some candidates suggested that some people might count birds as bats.
- (iii) This question required candidates to suggest four benefits of asking local people to complete bat population surveys. A few candidates gained full credit with excellent answers that included ideas about large numbers of people being invited to take part, local people being volunteers who would not need to be paid, and that lots of forms could be filled in so lots of data would be collected. There was a lot of repetition in candidate responses which limited the credit achieved, e.g. local people know where the bats can be found, they know what the bats look like, and they might have useful information because they live close to the bats.
- (c) (i) Some candidates gave 20–1 instead of 20 as the temperature range. Other candidates calculated the difference between the maximum and minimum temperatures for each month and added them to provide an answer.
- (ii) The calculations of the average maximum (max) temperature during the hibernation period were more successful with many candidates giving the correct answer of 9 °C.
- (iii) Most candidates suggested climate change could shorten the length of time that Bechstein bats hibernate because temperatures would increase.
- (d) (i) Many candidates correctly named the white ermine moth as the primary consumer in the food chain. The most common wrong answer was evening primrose plant.
- (ii) Many candidates suggested that the short-term impact of a reduction in Bechstein bat numbers on the tawny owl bird was that the numbers of the bird would decrease. They gave less food to eat or starvation as the reason. There were some references to extinction, rather than numbers decreasing; this was not credited as it would be the long-term impact.
- (e) Many candidates successfully named two other ways pollination can occur. The most common correct answers were insects and wind.
- (f) Most candidates had difficulty in explaining what is meant by bioaccumulation without using the words accumulation or accumulates.

### Question 4

- (a) (i) Many candidates stated correctly that the UK became a net importer of energy in 2004. The most common incorrect answer was 2013.
- (ii) Most candidates were able to suggest at least one reason why a country is a net importer of energy. The main reasons given were increasing demand, population growth, lack of resources such as coal or oil, and importing energy was cheaper than producing. Some candidates confused imports and exports.
- (iii) Many candidates were able to suggest one limitation for a country being a net importer of energy. The most common limitations suggested were the cost and the need to rely on another country for energy supplies. As with the previous question, some candidates confused imports and exports.

- (b) (i)** Most candidates gained credit for describing the first trend shown by the data in the graph, the increase between 1880 and 1916. The descriptions of other trends were often vague. The more successful answers identified three stages in the graph.
- (ii)** This question required candidates to suggest reasons for the trends shown by the data in the graph. The stronger responses suggested two reasons for the decreases in the number of people employed. These included the exhaustion of coal deposits, mechanisation in the coal mines, the discovery of oil deposits and the growth of renewable energy. Reasons for the increase were weaker and usually about the Industrial Revolution and the demand for coal. The most common incorrect suggestions were about the decrease in employment being caused by miners' health problems and more highly paid jobs in other industries.
- (c)** There was varied success in completing the diagram by putting the processes involved in the formation of sedimentary rock in the correct order. Few candidates gained full credit.
- (d) (i)** Few candidates were able to state why a pilot questionnaire is carried out before the main questionnaire. The successful responses stated that it was to check that people understood the questions.
- (ii)** The responses to this question were more successful. Suggestions why fracking might go ahead even if local people are against the idea included the need for a new source of energy as supplies from oil rigs were running out, increase in demand to supply homes and industries, and government or landowners making decisions about fracking and not local people.
- (e) (i)** Many candidates were able to correctly state that seven earthquake events required fracking to stop during the two-week period. Incorrect answers were often a total of the number of magnitudes above zero.
- (ii)** Most candidates were able to correctly state that two earthquake events were felt on the Earth's surface during the two-week period.
- (iii)** Most candidates were able to suggest one reason why the UK government decided to stop fracking in November 2019, the most common reason being that there were many more earthquakes.
- (f) (i)** Many candidates looked at the plate boundaries on the map and explained that earthquakes have only caused three deaths in the UK in the last 100 years because the country is not located on or near a plate boundary. Some candidates wrote about earthquakes only happening at sea. Others did not use the map and wrote about the UK having strategies to reduce the impacts of earthquakes, or the earthquakes not happening near cities or densely populated areas.
- (ii)** Most candidates were able to state at least one way to prepare for a natural hazard to help prevent deaths. The most common ways were warnings, drills, evacuation, emergency supplies (water, food), rescue teams and shelters.
- (g) (i)** Most candidates were able to state at least one cause of flooding. The most common causes were deforestation, heavy rainfall and increase in sea level. Some candidates stated three causes related to heavy rainfall, e.g. prolonged rainfall, hurricane, typhoon, cyclone and storms.
- (ii)** The strongest responses explained that flooding can benefit farmers because silt or alluvium is deposited by the flood and this improves the fertility of the soil.

# ENVIRONMENTAL MANAGEMENT

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Paper 0680/22  
Management in Context

## 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  $-25^{\circ}\text{C}$ . 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 dioxide 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.

# ENVIRONMENTAL MANAGEMENT

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Paper 0680/23  
Management in Context

## Key messages

- Candidates should be encouraged to check their question paper to ensure they have attempted every question.
- 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.
- To make best use of examination time, candidates are not required to repeat the question in their answer.
- 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 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 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 should ensure they are familiar with the mathematical requirements listed in the syllabus.

Candidates should be encouraged to carefully read the whole question to ensure they answer the question asked.

Systematic sampling, acid rain and water treatment were areas of the syllabus where many candidates showed a gap in their knowledge.

## Comments on specific questions

### Question 1

- (a) (i) Most candidates were able to calculate the number of people living in urban areas of Zimbabwe and gave the correct answer. Weaker answers gave the figure in millions when the unit provided was already in millions.
- (ii) Most candidates performed well. Employment was the most common answer, followed by education and health care. Weak answers were often vague, e.g. 'more opportunities'.
- (b) (i) The majority of candidates were able to state Mashonaland West.
- (ii) Four was usually correctly given.

- (c) Many candidates misinterpreted the question and gave descriptions of the living conditions regarding lack of water availability. Others described reasons for the lack of clean water as an indicator of poverty or disadvantages of not having nearby access to clean water. Those who interpreted the question correctly performed well.
- (d)(i) Most candidates appreciated that consuming contaminated food or water was a factor.
- (ii) This was not a well-known area of the syllabus and many answers were vague, such as ‘treat or clean water’ or ‘seek medical help’. There was also confusion with treatment of diseases, e.g. vaccinations.
- (iii) Strategies for improving water quality was an area of the syllabus where candidates needed greater confidence. Vague, generic answers were common and few responses gave specific examples.
- (e)(i) The majority circled 50%. Some incorrectly suggested 25%.
- (ii) Many candidates needed to read the question more carefully and gave recommendations on the best place to visit or descriptions of high and low malaria risk areas across Zimbabwe, instead of limitations of using the map as required by the question.
- (iii) Most understood the different cost of the two methods and that nets control the vector while drugs give protection against infection. Some gave reverse arguments. A few candidates gave sufficient points to gain the full credit available.

## Question 2

- (a) There was considerable confusion between the terms accurate, reliable and precise, and candidates would benefit from avoiding the use of these terms. Stronger answers referred to the data being more representative and that anomalies could be identified.
- (b)(i) Most were able to calculate the correct range.
- (ii) The majority were able to identify the anomalous result.
- (iii) Most candidates made a sensible suggestion and gave a valid reason. There was occasional confusion that mercury levels were insufficient.
- (c)(i) The majority interpreted the data correctly. Some candidates misread the question and gave the mass of fish instead of the site letter.
- (ii) The strongest answers suggested that the number of people surveyed was low compared to the other sites. Some answers were too vague or commented on seeing if variables had changed over time.
- (d) Sources of fresh water were well known. Weaker answers needed to use specific terminology such as melted ice rather than glaciers. Some used synonyms such as rivers and streams. The ocean was a common incorrect response as sea water must be processed before it becomes fresh water.
- (e) The strongest responses showed full working out and used the scale correctly. Common errors were in converting the scale to km. The weakest answers simply stated that the factory could not be built, without any evidence to how this conclusion was obtained.

## Question 3

- (a) This was generally well answered. Cost and the requirement for a water source were the most commonly seen responses. Some weaker answers included repetition of points or were too vague, such as ‘requires specific locations’.

- (b) The question asked for causes of pollution other than air pollution. Some candidates who performed less well needed to read the question more carefully as they gave a list of different air pollution issues.
- (c) (i) Acid rain was an area of the syllabus that was not well known by candidates and this question was poorly answered with vague responses that did not give full descriptions. Many indicated the source was from fossil fuels and needed to go on to refer to their combustion. Others stated 'the gas reacts with clouds' without referring to sulfur dioxide or oxides of nitrogen or the reaction with water in the clouds.
- (ii) The impacts of acid rain were not well known and vague answers were given, such as 'harms health' and 'harms plants', without stating what this harm involved.
- (d) Higher performing candidates were guided by the mark allocation and attempted to give three separate ideas. The use of bullet points may have helped candidates with this question. Weaker answers repeated the same marking point in a variety of different ways and were often rambling and confused.
- (e) (i) The strongest answers described how biofuel can be used to generate electricity. A few responses matched the mark allocation; many only described one renewable resource. Few included batteries to store solar power.
- (ii) This was generally well answered.

#### Question 4

- (a)(i) 'Arable' was well known. The most common incorrect answers were 'commercial' or 'cash crops'.
- (ii) Techniques to increase agricultural yield were well known. Weaker answers stated only 'irrigation' rather than improving it. Others were too vague with 'give access to soil/sun/water'. Some gave fertiliser as an answer despite this being in the stem of the question.
- (iii) Some candidates may have benefitted from the use of bullet points to ensure they gave three separate answers. Many responses were one word or short statements and these candidates could have gained further credit from development of their initial ideas of 'cost', 'resources' or 'not enough water'.
- (b)(i) The stages in eutrophication were well known.
- (ii) A very few responses referred to respiration.
- (c) (i) The bar chart was usually plotted correctly. Weaker responses did not use a linear scale for the y-axis or had uneven width bars. A significant number did not use half the grid space. It was common for the y-axis to be unlabelled or the units to be missing.
- (ii) The term 'cash crop' was well understood.
- (d)(i) The producer was usually correctly identified.
- (ii) The number of trophic levels was determined correctly by most.
- (iii) The majority drew a fully labelled correct pyramid of biomass. Some candidates added additional detail, such as energy percentage losses or labelled ecosystem categories, e.g. producer, consumer, which were not required. Occasional weaker answers gave the incorrect pyramid orientation.
- (iv) Most responses gave a full explanation of the impact on the banana plant of the removal of all the ants. Occasionally, the terms 'increase' or 'decrease' needed to be written more clearly for credit to be awarded. Weaker responses did not make the decrease specific, such as 'the population will suffer'.
- (e) (i) The systematic sampling method was poorly answered. Many described random or stratified sampling or answered about the type of farm.

- (ii) Suggested reasons for why the number of questionnaires returned were fewer than those sent out were generally appropriate. Weaker answers included repetition of ideas.