ENVIRONMENTAL MANAGEMENT

Paper 0680/11
Theory

Key messages

Candidates are strongly encouraged to read each question carefully and ensure that their responses directly address the question posed. Answers should be detailed and relevant, demonstrating a clear understanding of the topic. To maximise their chances of gaining full marks, candidates should pay close attention to the number of marks allocated to each section and provide a sufficient number of well-developed points accordingly.

When drawing graphs, candidates must use appropriate and consistent scales. Axes should be clearly labelled, and data points must be plotted with precision. Accuracy in graph construction is essential, as it contributes directly to the marks awarded.

For the six-mark, level of response questions, candidates are expected to engage with the statement provided in a broad and balanced manner. Responses should demonstrate a clear understanding of the topic and include relevant, well-chosen examples to support their views. It is important that candidates explore both sides of the argument—presenting points for and against the statement—and then reach a reasoned conclusion, stating whether they agree or disagree with the statement overall.

General comments

Most candidates made a commendable effort to attempt all questions, with very few instances of no response being recorded.

Candidates should pay close attention to the command words used in each question, such as *'explain'*, *'describe'*, or *'state',* and ensure their answers are structured appropriately to meet the requirements of these terms and gain credit.

The overall standard of mathematical work was good. Candidates are reminded to show their working wherever possible, especially in questions worth two or more marks. This allows examiners to award partial credit for correct methods, even if the final answer is incorrect.

Questions involving graphs and pie charts were generally well answered, with candidates demonstrating a sound grasp of the required techniques. For pie charts specifically, candidates should note that assessment is based on four key criteria: sectors must be arranged in clockwise rank order starting at the 12 o'clock (zero-degree) position; a key must be included with sector shading that accurately matches; and sector plotting must be precise within a tolerance of ±4 degrees.

Comments on specific questions

Section A

Question 1

(a) Many candidates gained the credit for knowing that shaft mining was the method of coal extraction being illustrated in the photograph.

(b) Many candidates knew that coal was formed from vegetation or mentioned peat. The majority also knew that the process took millions of years; some could have added that both a high temperature and pressure were also needed in its formation.

(c) The most common correct response for a benefit of a mine to the local community was more jobs being available. Some also knew that the new mine would improve the local economy or would result in new infrastructure.

Question 2

(a) This mathematical question, where the correct answer of 0.567, with 0.57 and 0.6 accepted. Many candidates rounded correctly, but some lost the mark by rounding up to 0.7.

(b) Many candidates scored credit for a limitation of using landfill sites for waste disposal, often stating that there would be visual or air pollution. Candidates who just wrote pollution without any qualification were not credited.

(c) (i) Stronger candidates correctly identified bioremediation as the use of microorganisms to break down toxins in soil. Others found the question challenging, with some referring to landscaping or leaving it unanswered.

(ii) Many knew that the organic matter would add mineral ions to the soil. Some gained further credit for stating that the organic matter would improve the water holding capacity of the soil.

Question 3

(a) Most candidates gained credit for this question, usually for precipitation. Many knew that process **B** was transpiration. A significant number wrote evaporation or transportation and so missed out on full credit.

(b) The sources of fresh water were well known by candidates.

(c) This was a well-answered question; many knew that sewage in water would result in diseases, and many gave the examples of cholera or typhoid. Some candidates incorrectly gave malaria as an example of a disease caused by sewage.

Section B

Question 4

(a) (i) This was a well-answered question with candidates plotting the point correctly and keeping the width of their bar exactly the same as the other bars on the graph.

(ii) Most candidates identified that Earth overshoot day was getting earlier. Some candidates had appreciated that the first data on the diagram showed the day occurring in December whilst the last piece of data showed the day occurring in July.

(b) (i) Candidates knew at least one method of reducing the birth rate. Popular correct responses included providing free contraceptives and family planning. Some suggested that abortions would be a suitable method of reducing the birth rate, which was not credited.

(ii) Candidates found this part of the question challenging. Many suggested that the main reason why the strategies did not work was because people ignored the government. Some candidates gained full credit as they knew that there would be religious reasons and that in some areas children were used to help with jobs such as in agriculture.

(c) (i) This extended answer question gave candidates an opportunity to discuss the benefits of recycling. It was important that candidates did not repeat the information from the table but used this information to describe the benefits.

(ii) Many candidates knew that increasing recycling points would help increase recycling. A number knew that it was necessary to educate people about the importance of recycling. Those who wrote ‘education’ needed to give further qualification to gain the credit.

Question 5

(a) This was a well-answered question with the most common correct changes given for North America, Europe and Africa. Candidates who missed out on credit were very general in their answers, such as stating 'below the Tropic of Capricorn' or 'above the Equator'.

(b) (i) There were many good explanations of intensive agricultural practices.

(ii) Many answers were credited for a loss of nutrients. Many responses were very limited and needed further development to give enough points for the credit available.

(c) Majority of Candidates knew that the water needed to be directed to the roots of the plant, however, many wrote about regular watering rather than providing the correct quantity of water. Answers for contour ploughing were often too general, with many candidates writing about the technique of contour ploughing rather than how the technique maintains crop yields.

Question 6

(a) (i) Many knew that Nitrogen made up 78% of the gases in the atmosphere.

(ii) Many responses gave at least one other gas found in the atmosphere.

(b) Many candidates knew that oxygen was used in respiration, although a number linked the oxygen to photosynthesis.

(c) Amongst the many who gained the credit here, stratosphere was the most common correct answer.

Question 7

(a) Most candidates gained some credit here. The most common correct answers were core and igneous.

(b) (i) Many candidates were able to identify three flood management techniques and could explain how the technique reduced the risk of flooding. Some candidates wrote about the village being moved and needed to suggest that the village was relocated to the hills to prevent the water from reaching it for the credit to be awarded.

(ii) Candidates demonstrated their knowledge about evacuation plans and the use of shelters and food stores to reduce the impacts of flooding.

(iii) A number of candidates thought that the benefit of flooding would be to refill water stores rather than its real benefit of adding nutrients to the soil**.**

Question 8

(a) Candidates generally knew that the biotic factors were the living components of the ecosystem. Stronger candidates were able to define niche.

(b) (i) The pie chart was completed by most of the candidates. Many gained credit for the plotting and the use of a key.

(ii) Many candidates knew that the introduction of non-native species would result in competition for space and food.

(c) This extended response question, worth six marks, required candidates to address the question with knowledge from different areas of the specification. Many of the candidates wrote that it would be easier and less expensive to continue to support less damaged ecosystems. Stronger candidates discussed ways of restoring ecosystems with the use of, for example, captive breeding programmes and ecological corridors.

ENVIRONMENTAL MANAGEMENT

Paper 0680/12
Theory

Key messages

Candidates should ensure that numerical data is used accurately and appropriately to support their responses, particularly where this is explicitly required by the question.

Where a question asks for more than one example, it is important that each example is clearly distinct and not simply a variation of the same point. This allows candidates to demonstrate a broader understanding and meet the full requirements of the question.

Candidates are encouraged to show their working when completing mathematical calculations. In questions where multiple marks are available, credit may still be awarded for correct methods and processes, even if a final error occurs. Showing working also helps examiners follow the candidate's reasoning.

When constructing line graphs, candidates should ensure that a logical linear scale is used, with axes correctly orientated and clearly labelled.

General comments

Stronger candidates demonstrated a clear understanding of the scenarios presented by providing detailed and contextually relevant responses, rather than relying on generic statements. These answers reflected thoughtful engagement with the material and an ability to apply knowledge effectively.

The line graph task was attempted by the vast majority of candidates. While many completed it successfully, some overlooked the uneven time intervals in the data table and did not apply a linear scale appropriately. A few candidates also struggled to connect data points in chronological order using lines, as instructed. Nevertheless, there were several well-executed graphs within the cohort, and fewer instances of lines being drawn without the use of a ruler and pencil, indicating improved attention to presentation.

Candidates were required to describe specific locations on a map, in this case the sites of oil spills. Although most attempted this task, a notable number found it challenging to describe locations accurately. There was also some confusion between the Atlantic and Pacific Oceans, which affected the precision of responses.

The final extended response question was handled well by many candidates. There was clear evidence of planning in several scripts, with structured answers that demonstrated substantial knowledge of climate change and its associated challenges. The strongest responses were balanced, well-reasoned, and supported by relevant examples, showcasing both analytical skill and subject understanding.

Comments on specific questions

Section A

Question 1

(a) Many candidates understood that tsunamis are caused by undersea activity; a few needed to add the fact that they form very large waves.

(b) Candidates were generally able to name at least one way an early warning system saves lives. Some ideas were more suited to longer term preparations and therefore were not credited. A few

responses described ways in which early warnings could be made which was not the focus of the question.

(c) Most candidates provided an answer to this question. A common error was to state only the percentage rather than using this to calculate the total number for full credit.

(d) (i) Less well understood, a wide range of names were provided. Labelling part **C** proved to be the most challenging.

(ii) There was a noticeable lack of consistency in the incorrect responses, suggesting that many candidates either did not recall the location of the subduction zone or were unable to apply their knowledge effectively to the diagram.

Question 2

A good proportion of candidates were able to use the words provided to score some credit by completing the sentences, although relatively few completed all five statements correctly.

Question 3

(a) (i) The idea of bycatch was generally understood within this cohort, although some struggled to express their ideas clearly.

(ii) Generally well answered, most responses showed an understanding of the benefits of a closed season, the majority linking it to allowing the fish to reproduce.

(iii) Slightly more challenging, some responses lacked clarity with regards to the role of international agreements in reserving fish stocks.

(iv) A wide range of other methods of conserving stocks were awarded credit. The idea of quotas proved to be the most frequent.

(b) A wide range of responses were provided; some linked to production systems located in the ocean rather than the ocean itself as a source of energy.

Section B

Question 4

(a) The majority of candidates attempted this question describing the locations of oil spills on a map. A large number of answers referred to ‘above’ or ‘below’ rather than using the correct phrases of North and South, which in many cases limited the credit achieved.

(b) (i) This was completed correctly by most candidates. The most common error was not subtracting the other components from the bar.

(ii) A very accessible question. Most responses gave the correct answer.

(iii) This was found to be more challenging. Credit was awarded for ideas relating to human error, expressed in a variety of ways, although ‘tanker collisions’ was already recorded separately within the information provided in the question for the candidate to evaluate so was not given credit.

(c) The role of booms was generally well understood, although a common error was to describe them as collecting oil rather than containing an oil spill and preventing its further spread.

(d) (i) The more able candidates were successful in constructing the line graph. Weaker candidates often did not construct linear scales and plotted the data evenly. Less common errors included omitting labels for axes (including units) and forgetting to draw a line between plots commencing at day zero.

(ii) Most candidates correctly identified that the concentration of oil in the mussels decreased. Further credit was available for the accurate use of data from the table.

(iii) Candidates found this question on bioaccumulation very challenging despite a wide range of potential words being awarded credit.

Question 5

(a) (i) Many correctly calculated the range from the bar chart and gained full credit. Where candidates showed their working, credit could be achieved for a correct calculation, even if the wrong data had been read off the graph. Where working was not provided, it was not possible to make a relevant observation on the accuracy of the calculation.

(ii) The majority of responses provided the correct answer: 8.

(iii) This question was attempted by all candidates and most understood some information about the impact of excess water on crop yields to gain some of the credit available. Fewer were able to provide a sufficient range of impacts to obtain full credit.

(b) (i) The interpretation of the information on the graph was a skill that was demonstrated well with a high proportion of candidates obtaining the correct answer.

(ii) Many candidates correctly determined that the student's statement was incorrect; many missed out on the credit by counting the number of instances incorrectly.

(iii) Most responses identified the roles of global warming and climate change leading to more droughts in the future. A common misconception was that population growth would cause more droughts whereas it would cause more water shortages.

(iv) Candidates often struggled to link high temperature and lack of rainfall with the availability of combustible materials that would burn in a fire.

(v) The majority of candidates were able to successfully complete this percentage calculation to achieve the answer of 97%. Some answers needed rounding to an appropriate level of accuracy.

(vi) A wide range of relevant strategies for managing the impact of drought were seen and worthy of credit. In a few cases the ideas suggested needed to be more precise, for example, trickle drip irrigation rather than simply 'irrigation'.

(c) Many correctly named the first and second stages in the production of drinking water; the latter two proved to be more challenging for many.

(d) (i) A wide range of potential water sources were worthy of credit. Candidates found this question very accessible.

(ii) Many candidates showed great awareness of the needs of the question and focused on relevant reasons why a dam may not be built. The lack of a water source was commonly cited as well as the potential cost. Some mentioned the inability to produce electricity which was not a core feature of this question.

(e) (i) There was generally a good understanding of the role of turbines in the production of electricity, although some needed to add that the turbine rotated. Some responses described the heating of water or the use of geothermal energy which were not relevant to this specific question.

(ii) Multiple different examples of additional uses for the dam and reservoir were cited, although some variants of the direct use of fresh water were suggested, such as the use for irrigation.

Question 6

(a) In this question candidates were expected to apply their knowledge to an unfamiliar situation, in this case the release of carp into a new environment. They were usually able to do this successfully, often identifying the risk of predation of existing species and also the competition for existing resources in the locality.

(b) Candidates were generally able to interpret the scenario and deduce a valid reason for the increase in the numbers of carp caught.

(c) (i) This question was well answered. Candidates understood that there are risks in introducing another non-native species into the locality, citing the unknown impact on existing species as well as the potential harm to humans. Some also identified that the reduction in carp numbers might also have a financial impact for those catching fish.

(ii) Many candidates were unfamiliar with the term biological control and there were numerous incorrect answers.

(d) Most candidates were able to identify the correct answer from the information presented in the question.

(e) (i) The concept of ecological corridors was generally not well understood. Many incorrectly stated that they protected animals from hunting or other forms of predation. The stronger responses were able to include ideas such as the fact that linking two areas allowed for greater genetic diversity in offspring and the corridors meant there was less risk of collisions with vehicles.

(ii) The responses from candidates for this question provided a diverse range of creditworthy answers, often focusing on the provision of reserves or protected areas for the mammals. There was some confusion between captive breeding and the ideas of selective breeding or genetic modification. Many responses included ideas relating to the curtailing or banning of hunting.

(f) This final question offers candidates the opportunity to explore a topic in greater depth, allowing for extended written responses. The mark scheme outlines descriptors for different levels of performance, along with indicative content that may be included. Candidates are not limited to these suggestions and are encouraged to introduce other relevant ideas, supported by appropriate examples, to strengthen their arguments.

Most candidates gained credit on this question, demonstrating a sound understanding of climate change. However, some responses revealed confusion between climate change and atmospheric pollution, which affected the accuracy and relevance of their explanations.

The strongest responses were well-balanced and analytical. These candidates considered multiple perspectives, reached thoughtful conclusions, and supported their viewpoints with relevant examples and accurate use of subject-specific terminology. In contrast, weaker responses tended to be generic, often focusing narrowly on a single issue without sufficient development.

It was evident in many scripts that candidates had taken time to plan their answers before writing. These planned responses were typically more coherent and structured, enabling candidates to access higher levels of credit by presenting their ideas clearly and logically.

ENVIRONMENTAL MANAGEMENT

Paper 0680/13
Theory

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Candidates should pay close attention to the command words used in each question, such as *'explain'*, *'describe'*, or *'state',* and ensure their answers are structured appropriately to meet the requirements of these terms and gain credit.

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(b) Many candidates knew that coal was formed from vegetation or mentioned peat. The majority also knew that the process took millions of years; some could have added that both a high temperature and pressure were also needed in its formation.

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(ii) Candidates found this part of the question challenging. Many suggested that the main reason why the strategies did not work was because people ignored the government. Some candidates gained full credit as they knew that there would be religious reasons and that in some areas children were used to help with jobs such as in agriculture.

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Question 8

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(b) (i) The pie chart was completed by most of the candidates. Many gained credit for the plotting and the use of a key.

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(c) This extended response question, worth six marks, required candidates to address the question with knowledge from different areas of the specification. Many of the candidates wrote that it would be easier and less expensive to continue to support less damaged ecosystems. Stronger candidates discussed ways of restoring ecosystems with the use of, for example, captive breeding programmes and ecological corridors.

ENVIRONMENTAL MANAGEMENT

Paper 0680/21
Management in Context

Key messages

Candidates are expected to understand the distinctions between command words such as *describe*, *explain*, *state*, and *suggest*, as each requires a different type and depth of response.

Careful reading of question instructions is essential to ensure that answers focus precisely on what is being asked, rather than offering general or unrelated information.

When completing calculations, candidates should show their working clearly. This is especially important for multi-mark questions, where credit may still be awarded for correct methods even if the final answer is inaccurate.

Accurate graph work is important, and candidates are advised to use a sharp pencil and ruler when drawing line graphs to ensure clarity and precision.

The number of marks available and the space provided for responses should guide how many points or ideas are included. This is particularly relevant for longer, open-ended questions where more developed answers are expected.

Where numerical data is provided, candidates are encouraged to use it to support their responses, as this strengthens the quality and relevance of their answers.

A confident understanding of key definitions is also beneficial, as accurate use of terminology can help secure marks and demonstrate subject knowledge effectively.

General comments

Candidates were invited to explore environmental issues and approaches to data collection and interpretation within the context of a single country. Many demonstrated thoughtful engagement with the source material, using it effectively to support their responses. Written answers were generally well communicated, with sufficient clarity to allow credit to be awarded for relevant points.

However, the mathematical and graphical elements of the paper proved more challenging for a minority of candidates. Some responses revealed uncertainty in applying appropriate techniques or interpreting visual data accurately. In these cases, greater attention to detail and more consistent application of basic principles would have strengthened performance.

Overall, responses reflected a good level of subject awareness, though further development in handling quantitative and visual information would benefit some candidates. A more confident and methodical approach to these aspects of the assessment would help ensure that understanding is fully demonstrated and marks are maximised.

Comments on specific questions

Question 1

(a) (i) Most candidates were able to measure the distance accurately and use the scale to give a value between 110 – 130 km. Some did not use the scale and stated the answer as 9.6.

(ii) The majority knew how population density is calculated and scored the credit for this calculation.

(iii) Most candidates understood they were being asked to state the advantages of living in an urban settlement and focused on employment opportunities and/or specific services more likely to be provided there. Weaker responses focused too heavily on the background information about the fishing industry and tried to explain how the coastal location would facilitate this when any coastal settlement would be just as good.

(b) (i) Many candidates recognised the relevance of the sea's shallowness but focused their responses on aspects such as visibility, ease of fishing, or the presence of sunlight. While these ideas were related to the context, they did not fully address the intended impact, which includes a greater fish population, more species, and increased availability of fish to catch.

(ii) Most candidates answered the range question correctly by subtracting the lowest value from the highest. A small number, however, attempted to calculate the mean instead, which was not required.

(iii) Many candidates gave more than the three required abiotic factors. Many weaker candidates included 'water' as one of their factors while some wrote lengthy answers about overfishing which was not relevant.

(iv) Many candidates calculated this correctly or gained partial credit for the correct subtraction.

(v) Most candidates gained credit by identifying that fish were being caught faster than they could reproduce. More able responses went further, explaining the longer-term impact of catching immature fish as bycatch on future breeding. Habitat loss was mentioned only occasionally.

(vi) Most candidates were able to correctly define the term bycatch.

(c) (i) Most candidates read off the correct year; some needed to read the graph more carefully as they stated 1982.

(ii) Most scored credit by describing the way cod catches and net migration mirrored each other closely. Many could state a correct peak or lowest year or amount of fish or migration. A few gained full credit by spotting that there was a lag between changes in the two.

(iii) Most understood the importance of cod catches in terms of food supply and/or employment. A few weaker candidates repeated their answer to **Question 1(c)(ii)** describing how the changes were linked which was not relevant.

(iv) Most candidates could read off the numbers of both males and females in the age group and give a total in the range 3900 – 4100. Some just quoted one of the constituent values instead of doing the sum, e.g. 2100.

(v) Most candidates correctly identified general trends, such as a higher proportion of young people and fewer elderly, or referred to contributing factors like higher birth rates or lower life expectancy. However, many responses lacked clarity about whether they were referring to a more or less economically developed country. A number of candidates focused instead on describing the shape of population pyramids or the relative size of age groups, which was not relevant to the question's focus.

(d) The most common answers referred to the economic productivity and income of the fish farms and the high cost of setting them up or providing necessary inputs. The environmental aspects were less well understood. Good points made were about preventing overfishing and the recovery of wild fish stocks and the water pollution issues fish farms create.

Question 2

(a) (i) Most could put the four organisms into a sequence with arrows indicating the correct energy flow. Some with the correct order lost credit because their arrows went back through the trophic levels, while some omitted an organism or transposed organisms out of sequence.

(ii) Most candidates demonstrated a basic understanding of chlorophyll's role in photosynthesis. A common mistake was failing to specify which organism contained the chlorophyll. Another frequent

error involved listing feeding relationships without recognising that these interactions represent energy transfer through trophic levels. Additionally, some candidates gave confused explanations suggesting that chlorophyll itself moves through the food chain and ends up in organisms like pilot whales.

(iii) Many could identify at least one difficulty of accurately counting a migratory whale species in a large sea/ocean with different sampling methods.

(iv) Most could state the huge order of difference in whale numbers in week 2 compared to the other values. A few identified week 4 because it was the highest despite it being quite close in size to weeks 1 and 3.

(v) Most candidates knew some key terms about sampling from a full population and stated terms such as grid, quadrat or systematic/random sampling. Few candidates were able to apply these ideas to a large area of sea and some inappropriately suggested laying 1 m x 1 m quadrats onto the sea and counting these large aquatic mammals which do not spend their lives at the surface. There were a few good ideas about methods for counting including drones and satellite pictures.

(b) (i) Most candidates scored full credit with accurate plotting of the two values with a reasonably neat line joining them. There were a few responses where the plots were clearly connected by hand, or connected incorrectly.

(ii) Stronger candidates effectively interpreted the background information, identifying the cultural tradition involved, and some also noted that whale populations were high and not at risk of extinction. However, many responses earned only limited credit as they focused on multiple economic justifications—such as employment and food—without addressing the key evaluative point. Weaker responses included misconceptions, such as the belief that whales were being culled to protect jellyfish populations.

(iii) Most responses identified at least one aspect of there being toxic chemicals in the water, that they would be absorbed by lower organisms in the chain and then consumed in larger quantities by those at higher levels with a higher ingestion rate than egestion rate. The strongest candidates were able to give three of these aspects.

(c) (i) Most understood and could apply at least one aspect of ecotourism to the protection of pilot whales such as the small size of tourist groups, being led by a guide to ensure minimal interference, and the use of the income from tourism to set up conservation schemes. A few responses gained full credit by covering a range of valid points. Often, points related to, for example, quotas or small boat sizes were stated which were irrelevant to this question.

(ii) Some candidates understood that pilot whales could be protected in a marine national park or biosphere. Despite the clear statement in the question stem that they should not write about hunting, many answers stated closed seasons, fines or quotas.

Question 3

(a) (i) Almost all candidates calculated the difference numerically. Many needed to include the million from the units although some wrote the value out in digits fully and accurately.

(ii) Many scored for the idea that the excess energy could be exported or that it made blackouts highly unlikely.

(iii) Candidates struggled to express ideas with precision about the likely reasons for the lower electricity consumption per person in the Faroe Islands. More able candidates could suggest that the use of electric vehicles and household appliances would be higher in a richer country like the USA. Many imagined the people of the Faroe Islands to be more energy conservation aware, turning off all appliances not in use, which was not credited.

(b) (i) Most candidates knew of at least one renewable energy resource, such as geothermal or some type of biofuel. Weaker candidates restated types of energy listed in the table.

(ii) Most knew what fossil fuels were but many stated gas instead of natural gas and so missed out on full credit. Some weaker candidates described what fossils were – the remains of plants or animals from long ago – or stated two or three types of fuel derived from oil.

(iii) Most candidates understood that renewable resources would produce no CO_2 in operation and/or would not run out or would be sustainable. Some weaker answers wrongly referred to wanting to preserve fossil fuel sources for the future.

(iv) Most were able to refer back to the background information about the climate of the Faroe Islands being cloudy and cool which would limit solar power output and many understood an island nation would be surrounded by sea which would facilitate wave power.

(v) Most candidates could describe features present or not visible in the image which would facilitate the success of the wind farm such as it being hilly, windy, away from settlement and a large site. A few referred to there being no birds despite the possibility of them flying into the area and possibly into the turbines.

(vi) Good points were made about the loss of habitats where the turbines were sited on the seabed or the noise, while some mentioned the very real possibility of sea birds flying into them. There were many weaker answers which did not gain credit with suggestions about wind turbines leaking oil, rusting into the water, fish swimming into them or their blades killing the fish.

(vii) The majority of candidates' understanding was limited to turbines being rotated or moved by the wind. The need to translate this motion or kinetic energy into electrical energy was included only by the more able candidates who mentioned the rotating of the generator and the use of gears. A great proportion of candidates used the term 'mechanical' energy instead of kinetic energy which did not score.

(c) Most understood that extracting fossil fuels from beneath the seabed was both difficult and expensive and some suggested that the reserves might be small in size and therefore not cost effective to mine. Very few suggested that this might be left untouched due to an international agreement or Faroese government policy on climate change.

(d) Most candidates had a very basic understanding of the greenhouse effect, and a few were able to clearly and precisely explain the concept. A significant number of candidates stated a whole range of greenhouse gases including those which would not be produced by burning fossil fuels such as methane, which meant that they were unable to gain the credit for CO_2. The actual mechanism of global warming often contained many inaccuracies with candidates mixing up short wave/UV radiation and long wave/infrared radiation. Some wrote about the CO_2 being trapped and unable to escape the atmosphere. Many incorrectly mentioned the ozone layer.

ENVIRONMENTAL MANAGEMENT

Paper 0680/22
Management in Context

Key messages

Candidates should aim to use examination time efficiently by avoiding unnecessary repetition, such as restating the question in their response. For example, in **Question 2(e)(iii)**, beginning an answer with *"Selective breeding can be used to obtain the lemons the farmer wants by…"* does not contribute meaningfully to the response and can limit time available for more substantive content.

Reading each question carefully before writing is essential. This helps ensure that responses are focused and relevant. Candidates should also follow the rubric precisely, for instance, if a question asks for three reasons, providing a fourth may introduce contradictions and risk losing marks.

Higher-performing candidates often use the mark allocation as a guide to structure their responses, recognising that more marks typically require multiple distinct points. Using bullet points can support clarity and help ensure that enough separate ideas are included.

Candidates should always show their working in calculation questions. Even if the final answer is incorrect, marks may still be awarded for correct methods and processes.

When drawing diagrams, charts, or graphs, candidates should use a sharp pencil and ruler. This improves presentation and allows for easier correction of errors. For line graphs, a logical linear scale and correctly labelled axes are essential.

Extended responses benefit from planning. Candidates who take time to organise their thoughts are more likely to produce well-balanced answers that explore multiple perspectives and use relevant examples to support their arguments. A conclusion should summarise the main findings rather than focus narrowly on one aspect.

Finally, candidates should be encouraged to check their question paper thoroughly before submitting, to ensure that every question has been attempted.

General comments

Candidates should avoid vague statements such as: 'impacts' or 'damages', 'causes harm', 'causes pollution', 'affects the environment', 'reduces resources', 'causes death', 'environmentally-friendly'; these unspecific statements are unlikely to gain credit.

Candidates should avoid using terms that have a specific meaning in science unless they are used in an appropriate context, for example in **Question 1(c)(ii)**, accurate, reliable, valid.

This examination paper assesses environmental management in context and a key aspect of this is understanding how data is collected, how fieldwork is carried out and how the data obtained is presented and analysed. Many candidates would benefit from more experience with fieldwork or lab work. Systematic sampling was not well known. Many could not name a balance. Most candidates could not provide a results table and writing conclusions was found to be challenging. Identifying limitations and anomalous results was also difficult for many candidates.

The terms 'selective breeding' and 'bioremediation' were not well understood.

There was a general misconception that the term surface run-off related to speed of rock movement down a slope.

Comments on specific questions

Question 1

(a) Many stronger candidates showed their working for this calculation. Some power of ten errors were seen with 6200 used instead of 62 000. Some candidates needed to follow the instruction to give their answer to the nearest whole number.

(b) (i) The plotting of the bars was often correct. Many of the bars drawn did not have straight edges and a ruler had not been used. Bars should be equal widths and spaces between bars should be the same. Candidates who used pen rather than pencil were then unable to correct their mistakes.

(ii) Most responses were correct showing that many candidates could read and process the data from the population pyramid to give the answer of 140.

(iii) A common error was to divide by 17 348 instead of 16 597. Some candidates rounded incorrectly.

(c) (i) Some candidates knew the purpose of a pilot survey; others gave vague responses such as 'to compare to the main one'.

(ii) Candidates were generally able to give two correct limitations of using a questionnaire. A common approach that did not score credit was to state data collected is 'not accurate', 'not valid' or 'not precise'.

Question 2

(a) (i) Almost all responses interpreted the graph correctly and selected 2020.

(ii) Almost all responses correctly selected March. The use of 'M' was not credited as this was ambiguous and could have referred to May.

(b) Good responses referred to competition for a stated resource such as water or nutrients. The reasons for candidates' suggestions were not always given. 'Branches or roots get tangled' was insufficient as this did not provide a reason.

(c) (i) 'Systematic sampling' was not well known. Many incorrect spellings were seen such as 'systemic'.

(ii) Most candidates determined the total number of trees correctly. A common incorrect approach was to state '3' – the number of circled sampled trees shown in the diagram.

(d) (i) It was insufficient to repeat the information in the question, 'to see the impact when fertiliser is not used' without explaining this with 'and compare this to the yield with fertiliser'. A minority of responses correctly identified that this was the control.

(ii) Some vague answers stated 'because of the ions'. Stronger responses clarified that this was due to mineral ions or nutrients being depleted from the soil.

(iii) Candidates who performed well referred to yield in their responses. Many gave the same conclusion for each, that the yield fluctuated, whereas the question asked for a different conclusion for each row.

(e) (i) 'Weighing machine' was a common response but is not the name of the instrument used to record mass. 'Tape' was also seen. Candidates are expected to be familiar with basic equipment used to carry out fieldwork.

(ii) Most candidates found drawing a table too challenging. Those who did provide a table often did not include units in the headings.

(iii) Candidates struggled to give a concise answer, and many were not familiar with the term selective breeding. It was common for candidates to repeat the stem of the question in their answer, taking up space in the response area without gaining credit.

(iv) Most candidates could give two techniques to increase yield.

Question 3

(a) Through-flow was sometimes confused with run-off.

(b) (i) Some candidates needed to read the question, which asked for other impacts, more carefully and repeated impacts already given in the stem of the question. The question also required impacts on people, which was missed by some candidates.

(ii) There was a general misconception that the term surface run-off related to speed of rock movement. The role of vegetation in interception and infiltration was rarely referred to.

(iii) Many good suggestions as to why illegal construction makes landslides more likely to happen were seen.

(c) (i) Most candidates could suggest negative impacts of tourism. Weaker responses repeated illegal construction and increased use of vehicles, which had been given in the question. 'Pollution' was too vague and needed to be qualified with the type, e.g., water pollution.

(ii) Weaker responses did not give a policy that related to transport or could not explain how the policy reduced the impact of tourists on the island.

(d) (i) Candidates found it challenging to identify a limitation with the investigation based on column 1 of the table.

(ii) Many recognised that units should not be included in the body of a table and that the use of km was a contradiction to the units in the heading of the column which was given in metres.

(iii) A number of candidates thought that there were two anomalies in the data despite the question asking for one anomalous result.

(iv) Many good safety considerations were suggested with reference to wearing gloves or a mask a common answer. Weaker responses stated 'the *E. coli*' without elaborating further.

(v) Good conclusions recognised the aim of the investigation and gave an appropriate conclusion. Weaker conclusions could not have been understood without reference to the results tables, such as 'column 3 gets lower as column 2 gets further'. This is insufficient as a conclusion should be understandable without reference back to the data.

(vi) Most responses stated typhoid or cholera. A few gave viral diseases or malaria. Weaker answers gave more than one disease where the second answer was often incorrect.

(vii) Good answers recognised that the addition of chlorine makes water safe to drink. Filtration and desalination are not sufficient to make water safe to drink as microbes would still be present after these processes.

Question 4

(a) Many good suggestions for the benefit of the location of the solar panels in the image were given. A common answer was that they provide shade for the cars.

(b) (i) The majority suggested a pie or bar chart. A few contradicted these correct answers with a line graph.

(ii) The vague response 'they can be reused' and 'cost' were not sufficient for a benefit of recycling batteries. Many struggled to suggest any valid benefits.

(iii) The majority could suggest one reason why batteries are not recycled in some locations. Fewer could give two correct reasons.

Question 5

(a) (i) Some good descriptions for the formation of igneous rocks were seen.

(ii) Granite and basalt were usually given. Weaker responses gave more than one answer which often contradicted each other, such as 'granite and slate'. 'Graphite', another incorrect answer, was also sometimes seen.

(b) (i) Many candidates could state three factors that affect the decision to extract rocks. Weaker responses repeated the same point in different ways, such as deep underground, too challenging to extract due to the depth, or a lot of overburden above the ore.

(ii) Most responses identified the risk of rock collapse.

(iii) The creation of jobs and an improvement in infrastructure were the most common correct answers.

(iv) Candidates were confident in identifying negative impacts of rock extraction shown in the photograph.

(v) The term bioremediation was not well known. Many described the restoration of land following mining, which was not asked for.

(c) Some responses were not explanations, such as 'nutrients'. Stronger responses referred to an increase in nutrient content in the soil due to previous eruptions.

(d) (i) Very few candidates referred to the logarithmic scale of the Richter scale. Imprecise terminology was also used, such as measures the strength of a volcano, rather than magnitude or intensity.

(ii) Most candidates could state at least three valid aspects of a disaster plan. 'Stockpile resources' was too vague – the type of resource should be stated, such as food, water or medical supplies.

ENVIRONMENTAL MANAGEMENT

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Key messages

Candidates are expected to understand the distinctions between command words such as *describe*, *explain*, *state*, and *suggest*, as each requires a different type and depth of response.

Careful reading of question instructions is essential to ensure that answers focus precisely on what is being asked, rather than offering general or unrelated information.

When completing calculations, candidates should show their working clearly. This is especially important for multi-mark questions, where credit may still be awarded for correct methods even if the final answer is inaccurate.

Accurate graph work is important, and candidates are advised to use a sharp pencil and ruler when drawing line graphs to ensure clarity and precision.

The number of marks available and the space provided for responses should guide how many points or ideas are included. This is particularly relevant for longer, open-ended questions where more developed answers are expected.

Where numerical data is provided, candidates are encouraged to use it to support their responses, as this strengthens the quality and relevance of their answers.

A confident understanding of key definitions is also beneficial, as accurate use of terminology can help secure marks and demonstrate subject knowledge effectively.

General comments

Candidates were invited to explore environmental issues and approaches to data collection and interpretation within the context of a single country. Many demonstrated thoughtful engagement with the source material, using it effectively to support their responses. Written answers were generally well communicated, with sufficient clarity to allow credit to be awarded for relevant points.

However, the mathematical and graphical elements of the paper proved more challenging for a minority of candidates. Some responses revealed uncertainty in applying appropriate techniques or interpreting visual data accurately. In these cases, greater attention to detail and more consistent application of basic principles would have strengthened performance.

Overall, responses reflected a good level of subject awareness, though further development in handling quantitative and visual information would benefit some candidates. A more confident and methodical approach to these aspects of the assessment would help ensure that understanding is fully demonstrated and marks are maximised.

Comments on specific questions

Question 1

(a) (i) Most candidates were able to measure the distance accurately and use the scale to give a value between 110 – 130 km. Some did not use the scale and stated the answer as 9.6.

(ii) The majority knew how population density is calculated and scored the credit for this calculation.

(iii) Most candidates understood they were being asked to state the advantages of living in an urban settlement and focused on employment opportunities and/or specific services more likely to be provided there. Weaker responses focused too heavily on the background information about the fishing industry and tried to explain how the coastal location would facilitate this when any coastal settlement would be just as good.

(b) (i) Many candidates recognised the relevance of the sea's shallowness but focused their responses on aspects such as visibility, ease of fishing, or the presence of sunlight. While these ideas were related to the context, they did not fully address the intended impact, which includes a greater fish population, more species, and increased availability of fish to catch.

(ii) Most candidates answered the range question correctly by subtracting the lowest value from the highest. A small number, however, attempted to calculate the mean instead, which was not required.

(iii) Many candidates gave more than the three required abiotic factors. Many weaker candidates included 'water' as one of their factors while some wrote lengthy answers about overfishing which was not relevant.

(iv) Many candidates calculated this correctly or gained partial credit for the correct subtraction.

(v) Most candidates gained credit by identifying that fish were being caught faster than they could reproduce. More able responses went further, explaining the longer-term impact of catching immature fish as bycatch on future breeding. Habitat loss was mentioned only occasionally.

(vi) Most candidates were able to correctly define the term bycatch.

(c) (i) Most candidates read off the correct year; some needed to read the graph more carefully as they stated 1982.

(ii) Most scored credit by describing the way cod catches and net migration mirrored each other closely. Many could state a correct peak or lowest year or amount of fish or migration. A few gained full credit by spotting that there was a lag between changes in the two.

(iii) Most understood the importance of cod catches in terms of food supply and/or employment. A few weaker candidates repeated their answer to **Question 1(c)(ii)** describing how the changes were linked which was not relevant.

(iv) Most candidates could read off the numbers of both males and females in the age group and give a total in the range 3900 – 4100. Some just quoted one of the constituent values instead of doing the sum, e.g. 2100.

(v) Most candidates correctly identified general trends, such as a higher proportion of young people and fewer elderly, or referred to contributing factors like higher birth rates or lower life expectancy. However, many responses lacked clarity about whether they were referring to a more or less economically developed country. A number of candidates focused instead on describing the shape of population pyramids or the relative size of age groups, which was not relevant to the question's focus.

(d) The most common answers referred to the economic productivity and income of the fish farms and the high cost of setting them up or providing necessary inputs. The environmental aspects were less well understood. Good points made were about preventing overfishing and the recovery of wild fish stocks and the water pollution issues fish farms create.

Question 2

(a) (i) Most could put the four organisms into a sequence with arrows indicating the correct energy flow. Some with the correct order lost credit because their arrows went back through the trophic levels, while some omitted an organism or transposed organisms out of sequence.

(ii) Most candidates demonstrated a basic understanding of chlorophyll's role in photosynthesis. A common mistake was failing to specify which organism contained the chlorophyll. Another frequent

error involved listing feeding relationships without recognising that these interactions represent energy transfer through trophic levels. Additionally, some candidates gave confused explanations suggesting that chlorophyll itself moves through the food chain and ends up in organisms like pilot whales.

(iii) Many could identify at least one difficulty of accurately counting a migratory whale species in a large sea/ocean with different sampling methods.

(iv) Most could state the huge order of difference in whale numbers in week 2 compared to the other values. A few identified week 4 because it was the highest despite it being quite close in size to weeks 1 and 3.

(v) Most candidates knew some key terms about sampling from a full population and stated terms such as grid, quadrat or systematic/random sampling. Few candidates were able to apply these ideas to a large area of sea and some inappropriately suggested laying 1 m x 1 m quadrats onto the sea and counting these large aquatic mammals which do not spend their lives at the surface. There were a few good ideas about methods for counting including drones and satellite pictures.

(b) (i) Most candidates scored full credit with accurate plotting of the two values with a reasonably neat line joining them. There were a few responses where the plots were clearly connected by hand, or connected incorrectly.

(ii) Stronger candidates effectively interpreted the background information, identifying the cultural tradition involved, and some also noted that whale populations were high and not at risk of extinction. However, many responses earned only limited credit as they focused on multiple economic justifications—such as employment and food—without addressing the key evaluative point. Weaker responses included misconceptions, such as the belief that whales were being culled to protect jellyfish populations.

(iii) Most responses identified at least one aspect of there being toxic chemicals in the water, that they would be absorbed by lower organisms in the chain and then consumed in larger quantities by those at higher levels with a higher ingestion rate than egestion rate. The strongest candidates were able to give three of these aspects.

(c) (i) Most understood and could apply at least one aspect of ecotourism to the protection of pilot whales such as the small size of tourist groups, being led by a guide to ensure minimal interference, and the use of the income from tourism to set up conservation schemes. A few responses gained full credit by covering a range of valid points. Often, points related to, for example, quotas or small boat sizes were stated which were irrelevant to this question.

(ii) Some candidates understood that pilot whales could be protected in a marine national park or biosphere. Despite the clear statement in the question stem that they should not write about hunting, many answers stated closed seasons, fines or quotas.

Question 3

(a) (i) Almost all candidates calculated the difference numerically. Many needed to include the million from the units although some wrote the value out in digits fully and accurately.

(ii) Many scored for the idea that the excess energy could be exported or that it made blackouts highly unlikely.

(iii) Candidates struggled to express ideas with precision about the likely reasons for the lower electricity consumption per person in the Faroe Islands. More able candidates could suggest that the use of electric vehicles and household appliances would be higher in a richer country like the USA. Many imagined the people of the Faroe Islands to be more energy conservation aware, turning off all appliances not in use, which was not credited.

(b) (i) Most candidates knew of at least one renewable energy resource, such as geothermal or some type of biofuel. Weaker candidates restated types of energy listed in the table.

(ii) Most knew what fossil fuels were but many stated gas instead of natural gas and so missed out on full credit. Some weaker candidates described what fossils were – the remains of plants or animals from long ago – or stated two or three types of fuel derived from oil.

(iii) Most candidates understood that renewable resources would produce no CO_2 in operation and/or would not run out or would be sustainable. Some weaker answers wrongly referred to wanting to preserve fossil fuel sources for the future.

(iv) Most were able to refer back to the background information about the climate of the Faroe Islands being cloudy and cool which would limit solar power output and many understood an island nation would be surrounded by sea which would facilitate wave power.

(v) Most candidates could describe features present or not visible in the image which would facilitate the success of the wind farm such as it being hilly, windy, away from settlement and a large site. A few referred to there being no birds despite the possibility of them flying into the area and possibly into the turbines.

(vi) Good points were made about the loss of habitats where the turbines were sited on the seabed or the noise, while some mentioned the very real possibility of sea birds flying into them. There were many weaker answers which did not gain credit with suggestions about wind turbines leaking oil, rusting into the water, fish swimming into them or their blades killing the fish.

(vii) The majority of candidates' understanding was limited to turbines being rotated or moved by the wind. The need to translate this motion or kinetic energy into electrical energy was included only by the more able candidates who mentioned the rotating of the generator and the use of gears. A great proportion of candidates used the term 'mechanical' energy instead of kinetic energy which did not score.

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(d) Most candidates had a very basic understanding of the greenhouse effect, and a few were able to clearly and precisely explain the concept. A significant number of candidates stated a whole range of greenhouse gases including those which would not be produced by burning fossil fuels such as methane, which meant that they were unable to gain the credit for CO_2. The actual mechanism of global warming often contained many inaccuracies with candidates mixing up short wave/UV radiation and long wave/infrared radiation. Some wrote about the CO_2 being trapped and unable to escape the atmosphere. Many incorrectly mentioned the ozone layer.