ENVIRONMENTAL MANAGEMENT

Paper 0680/11
Theory

Key messages

- Candidates should read questions carefully to ensure their responses provide appropriate detail, as indicated by the mark allocation for each question.
- Answers should link to the command verbs within the question (describe, explain etc.).
- Graphs should include labelled axes with appropriate units as well as an appropriate linear scale.

General comments

The majority of candidates attempted all questions on the paper and there was no evidence of candidates running out of time. Candidates should use the number of marks allocated to a question as a guide to the number of points they should make in their responses. Command words such as 'describe' or 'explain' will also provide key information about the style of response required and the level of detail needed to gain credit. There was evidence of appropriate and accurate use of scientific terminology within some scripts.

There was generally a good standard of mathematical work. Candidates should show their working wherever possible as they may gain some credit for appropriate working even with the incorrect answer.

Candidates should use a ruler for drawing graphs.

When answering the six-mark, level of response question, candidates should consider a range of points and support them with examples where relevant. It is important that candidates reach a conclusion based on the range of points that they have considered.

Comments on specific questions

Section A

Question 1

(a) This question was attempted by the majority of candidates. Many knew that bunds prevented soil erosion. Some candidates needed to look at the number of marks allocated and make sure that they wrote down two different reasons to enable themselves to achieve all of the credit available.

(b) This question was more challenging for many candidates. Many responses described the use of shovels and other means of moving the earth. For further credit, they needed to discuss the requirement to build up the earth in some way to form a higher layer than where the crops were being planted.

(c) This question required candidates to consider the work involved in making the bund, and in general the question proved challenging. Many candidates referred back to their responses for **Question 1(a)** and stated that the bunds would break down but did not then refer to the fact that they would need to be maintained as a consequence.

Question 2

(a) This question was generally answered well, with many candidates of all abilities correctly calculating the answer of 3%. Candidates who did not achieve credit usually quoted either the 2.5% or the 0.5%, having not realised that the two values together gave the total fresh water value.

Cambridge Assessment
International Education

(b) This was another well-answered question and candidates knew a large variety of sources of fresh water. The most common error was to write 'oceans' without qualifying that the water would need to be desalinated first.

(c) This question proved to be more challenging for candidates and most scored a portion of the credit available. More able candidates understood the question and were able to give reasons why the available water would decrease and also why it may increase with the melting of glaciers and ice sheets.

Question 3

(a) In this question, candidates needed to describe how the boom worked. Many knew that the boom collected the oil spill and needed to add that the boats were towing the boom, for full credit.

(b) This was a very well-answered question; many knew that skimmers and detergents were effective ways of dealing with oil spills.

(c) Candidates knew the impact of oil spills on birds.

Question 4

(a) The majority of candidates scored credit for completing the sentences, most commonly for sedimentation; deposition was the second most commonly known correct response.

(b) This question was well answered with most candidates stating that either limestone or sandstone were sedimentary rocks. Basalt or igneous rock were the most common errors.

(c) Many candidates found this question challenging. Weaker responses often stated that it was made up of sediments rather than giving a feature of the rock itself.

Section B

Question 5

(a) Many candidates scored credit on this question by stating that the oceans can be used for either transport or for tourism. Candidates who suggested that oceans could be used to provide drinking water often did not add that it had to be desalinated first and were therefore not credited. Candidates should use specific examples in questions such as this, as many who just wrote 'for jobs', for example, were too vague to gain credit.

(b) This question, based on the syllabus section 'Energy resources and the generation of electricity', proved to be an area requiring improvement for many candidates.

(c) (i) In general, most candidates were able to draw the correct bar for 2013. The most common error was reading the scale on the *y*-axis incorrectly.

(ii) Most of the candidates were able to read the graph and state the correct year.

(d) (i) This question was answered correctly by the most able candidates who knew that this type of energy source did not produce carbon dioxide gas and was not weather dependent. Those who stated that it was renewable did not gain credit as this was given in the stem of the question. Answers such as a 'clean source of energy' were not specific enough. Responses stating that it was cheap to build were not creditworthy.

(ii) Many candidates were able to suggest that fish getting caught in the equipment would be an environmental impact of tidal power generation. For full credit, some development of the idea was required, such as the machinery would be acting as a barrier to marine life and therefore fish would not be able to migrate or may get stuck in the machinery.

Question 6

(a) (i) The majority of candidates found this question challenging. Many knew that the pollutants were being emitted from the factories etc., and the more able candidates linked these pollutants to cold air being denser than warm air.

(ii) Many candidates wrote about other ways that pollution was put into the environment rather than the required examples of gases emitted. The most common incorrect gas that was cited was carbon dioxide. Many candidates knew that carbon monoxide was a pollutant and more able candidates were able to write VOC.

(b) This was a well-answered question by many of the candidates who discussed more than one way of reducing pollution by different transport policies.

(c) (i) Many of the candidates gained credit by reading the correct data from the graph to give the answer of 0.56.

(ii) Many candidates were able to discuss the trend from 1900 to 1939/40 and many were able to state that there was an overall increase in temperature throughout the whole of the data. Some candidates could have improved by being more precise when quoting data points.

(iii) Many candidates knew that the warmer conditions would cause evaporation of water and would lead to drought, although many then deviated from the question and wrote about loss of biodiversity and salinization. Many did not appreciate the impact of higher temperatures on photosynthesis. Some candidates were able to link the increase in temperature to changes in which crops might then be grown.

Question 7

(a) (i) Candidates needed to make three separate points to gain full credit. Many responses used the terms 'above' and 'below' and therefore did not gain the credit for referring to the area between the tropics of Capricorn and Cancer. Some candidates were able to correctly name the oceans and gained credit here.

(ii) Candidates were required to give information from the Further guidance and exemplification part of the syllabus on tropical cyclones for this question: between 5° and 20° north and south of the Equator, ocean surface temperature of at least 27 °C and ocean depth of at least 60 m.

(b) Candidates who showed their working were able to gain some credit for this calculation even if their final answer was incorrect. Answer: 33(.3%).

(c) (i) This was a well-answered question. The majority of candidates were able to give at least one impact of a tropical cyclone and many gave two or more.

(ii) Many candidates knew the strategies for managing the impacts of tropical cyclones. There were a range of strategies described, many focusing on the use of shelters and monitoring and communication.

Question 8

(a) (i) The majority of candidates were able to tabulate their results. Many responses demonstrated the correct way of presenting the headings and units in the headings of the table and not in the body of the table.

(ii) Candidates found this question challenging; the most common correct response was about the maintenance of culture and traditional practices.

(b) This question was based on the section of the syllabus: evaluate national and international strategies for conserving the biodiversity and genetic resources of natural ecosystems, further guidance and exemplification; extractive reserves.

Those candidates who knew this information answered the question very well, most gaining all of the credit available. It was evident that many candidates did not know this part of the syllabus and just used the diagram to try to obtain credit.

Question 9

(a) (i) The majority of candidates knew that the continent to be named was Africa.

(ii) Many of the candidates were able to state that the population had decreased. Reference to growth rate being negative was required for full credit.

(b) This was a well-answered question; most candidates knew that people in MEDCs were more focused on careers and that there was greater awareness about contraception and family planning.

(c) Another very well-answered question with many candidates citing war, drought or famine as reasons why people migrate.

(d) The six-mark, level of response question requires candidates to look at the topic to be discussed broadly and to use appropriate examples to support their views. It is important that candidates consider different points of view before deciding on a conclusion to the question.

The majority of candidates attempted this question and responses were well structured.

ENVIRONMENTAL MANAGEMENT

Paper 0680/12
Theory

Key messages

- Candidates should read questions carefully to ensure their responses provide appropriate detail and relate to the specific scenario of the question.
- The six-mark level of response question requires candidates to look at the topic broadly and use appropriate examples to support their views. This question benefits from a level of planning.
- When describing locations on maps, candidates should use the terms North and South rather than phrases such as 'above' and 'below'.
- Candidates showed confidence in completing the mathematical activities within the questions and were generally able to form valid conclusions.
- There was some uncertainty of the impact of the transition from fossil fuels towards biofuels, particularly the potential negative impacts.

General comments

Across the paper, there was a good understanding of the subjects within the syllabus. The majority of candidates attempted all questions on the paper. This strategy enabled weaker candidates to gain some credit for their responses even if their answers were incomplete.

Some questions required answers to be tailored to a specific context. This was sometimes not acknowledged within the answer provided; for example, with the impacts of the storm surge and strategies to reduce these impacts of flooding in **Question 8(a)**, responses were required to be suitable for the situation in the photograph.

Candidates should continue to use the number of marks allocated to a question as a guide to the number of points they should make in their responses. Command words such as 'describe' or 'explain' will also provide key information about the style of response required and the level of detail needed to gain credit.

There was evidence of appropriate and accurate use of scientific terminology within some scripts, although some responses to questions were too generic to receive credit, for example, the word 'pollution' needs to be qualified.

The responses to the six-mark level of response question were well structured. The stronger responses considered a range of points and supported them with examples, where relevant. Candidates should also ensure that these answers include a clear conclusion.

Comments on specific questions

Section A

Question 1

(a) This introductory question was very accessible to most candidates. A wide range of potential responses were given credit. Where pollution was mentioned, it was expected that the type of pollution was named.

(b) Many candidates were able to cite one good reason for how rock and mineral extraction can benefit the local community, with more able candidates able to provide two reasons for full credit.

(c)   This question provided a photographic stimulus which required the candidate to apply their response to the specific scenario presented. This was done successfully by many respondents; the majority identified the formation of a lake and the planting of trees.

Question 2

(a)   Candidates were required to interpret the activities taking place in the photograph. Most responses correctly stated that the bycatch was being returned to the sea; fewer showed understanding that the reason for this return was due to the bycatch being unwanted.

(b)(i)   There was a general understanding of the impact of overfishing, with the majority of responses identifying the impact on the food chain. Stronger candidates were able to provide a second impact to obtain full credit.

(ii)   Some good examples of strategies to reduce overfishing were given. The use of quotas and restrictions to fishing during the breeding season were common responses. Some candidates needed to be clearer when describing alterations to nets. Larger nets or smaller mesh would not have the desired effect.

Question 3

(a)(i)   This question, requiring candidates to interpret data, proved very accessible with most able to identify that transport and travel makes the largest contribution to the annual carbon footprint.

(ii)   The calculation was correctly completed by the majority of the cohort to achieve an answer of 20 (tonnes).

(iii)   This calculation was slightly more complex and was achieved competently by a good proportion of the candidates to achieve an answer of 14.

(b)   A varied range of strategies for reducing an individual's carbon footprint were suggested, with a wide range gaining credit. Stronger candidates identified the need to provide two distinct strategies to obtain all of the credit available.

Question 4

(a)   Candidates were required to describe the distribution of average life expectancy in Africa. This was attempted by most of the cohort, although the weaker candidates often missed out on credit for using terms such as 'above' or 'below' rather than using points of the compass in relation to the Equator or the tropics.

(b)   A wide range of valid responses were given credit, with reasoning not limited to the continent of Africa. Many identified the role improved health services and food availability could have on life expectancy; similarly, many identified the risks posed by climate change, war and the risk of an epidemic. Responses such as 'education' were considered to be too vague and not given credit unless the candidate provided clarity of the impact they would have.

Section B

Question 5

(a)(i)   This proved to be a more challenging question for many candidates. Whilst many made use of the diagram to interpret the pitfall trap, weaker candidates often stated only one feature, limiting the credit they could achieve. There was also some confusion with regards to the role of the cover; some responses suggested this closed on to the jar once an organism had fallen in.

(ii)   The limitations of using this type of trap for sampling proved to be more challenging. Some incorrectly suggested that the organism could burrow out, neglecting the glass jar shown in this example. Good responses included ideas of predation whilst in the jar, and the organisms trapped not being representative of the whole population.

(b)(i)   A question requiring candidates to complete a simple addition of data, this was completed accurately by most to achieve an answer of 61. There were a proportion of candidates who did not

attempt this question, suggesting that they needed to read the instructions more carefully and had missed the gap within the table.

(ii)   The majority of candidates attempted to complete the bar chart and achieved some credit. A common error was to omit the labelling of the axes. Most responses provided a suitable scale which covered over 50% of the graph paper, and plotted bars of the same width.

Question 6

(a) (i)   This question proved to be very accessible to candidates; the majority were able to determine the quantity of biofuel produced accurately to give an answer of 5.

(ii)   A wide range of responses were given credit and candidates generally showed understanding of the idea that biofuels were renewable, although many incorrectly stated that their use did not produce CO_2. More detailed responses which identified that biofuels had a smaller carbon footprint, or the fact that the carbon capture during growth, offset its release during burning, were considered to be creditworthy.

(iii)   This question proved to be more challenging for many candidates. Few identified the impact that growing these crops would have on food production or deforestation due to the large area that would be required to grow them.

(iv)   This was a more evaluative question, requiring the candidate to form a judgement. Either conclusion (yes, or no) was valid, with credit awarded for the reasons given for their decision. Higher achieving candidates often also identified the large difference between current gasoline production/consumption and that of biofuels.

(b) (i)   Candidates were required to interpret data and present it in a table. This was completed with variable effectiveness across the cohort. Common errors included missing headings for the two columns or the omission of one of the five sets of data. Some candidates had difficulty dealing with the range in the sizes of the number of vehicles in each class, and as a result there were some examples of candidates incorrectly inputting the data.

(ii)   Many candidates wrote enthusiastically about electric vehicles in this question and provided some extremely valid ideas for the increase in numbers. Many focused on the greater awareness of environmental issues and the improvements to technology which made this type of vehicle more practical. Some also spoke about government incentives such as subsidies or payment for scrapping older vehicles.

Question 7

(a) (i)   Some weaker candidates found linking the type of farming to its description challenging, confusing arable and pastoral, although this was not a problem with more able candidates.

(ii)   Credit was awarded for ideas of production being sold rather than consumed by the family. Responses that discussed the level of mechanisation or the types of crops grown were not considered to be worthy of credit.

(b)   Candidates were asked to state two problems caused by the mismanagement of irrigation. Whilst attempted by the majority, more able candidates were able to provide two distinct reasons, commonly mentioning the risk of waterlogging, salinisation and leaching of nutrients.

(c)   Both techniques to increase agricultural yield appeared to be familiar to most candidates, although they sometimes had difficulty describing how they would benefit cropping within their responses. Some of the correct responses included the reduction of pests and diseases and the opportunity for crop rotation to maximise nutrient use. Relatively few answers identified that selective breeding might also increase the rate of growth.

(d) (i)   Candidates were required to use the stimulus material to support their answers within this question. This enabled them to apply their existing knowledge to an unfamiliar scenario. This was achieved with varying levels of success. Many responses correctly identified that Australia provided favourable growing conditions for the cactus. Some of the stronger candidates also identified that as it was a non-native species, it was likely that there were no natural predators to slow its spread.

(ii) A wide range of potential answers were given credit; many included the idea that the spread of the cactus meant there was less available land to farm. Other common themes were the competition for nutrients and water that would take place as the cactus spread. A few responses identified the additional costs to the farmer spent to control the cactus. This was also given credit.

(iii) Many candidates found this question challenging; rather than stating the type of control (biological) they stated the agent used (the cactus moth).

Question 8

(a)(i) Candidates were required to name one impact of the storm surge seen in the photograph. This limited the range of answers and meant that items unrelated to the photograph were excluded. Responses such as damage to buildings and roads were amongst the answers commonly seen and given credit.

(ii) Candidates provided a broad range of suggestions for strategies to reduce the impacts of flooding. The question specified that responses should be appropriate to this location and this limited the credit achieved by some candidates. Responses included the development of flood defences, location of buildings in areas less likely to flood, and making structures more resistant to storm surges. Others focused on the development of monitoring and warning systems, linked to disaster preparation processes. Both types of answer were valid.

(b)(i) The majority of candidates were able to list at least one additional cause of flooding.

(ii) Whilst many knew the causes of flooding in the previous question, many found explaining why climate change might increase the impact of tropical cyclones more challenging. The stronger responses showed an ability to think of the issue of climate change more holistically and how this would impact on cyclones. Good responses identified that climate change might mean warmer seas which would increase the areas in which cyclones may form. Similarly, the increase in global temperatures might mean an increase in sea level as ice caps melt, making more land at risk from flooding. Weaker candidates had less structure to their responses and gained credit for ideas stated even if they did not show the same levels of linkage.

Question 9

(a) This question proved challenging for many candidates, although there were very few examples of scripts where there had been no attempt to produce an answer. Whilst many responses made the link between an increase in population and the increase in demand for drinking water, fewer made the link to other uses of this water and the competition this might bring. Many cited an increase in pollution, and these responses needed to identify the source of the pollution, e.g. industry or sewage, to gain credit.

(b)(i) Most candidates were confident in interpreting the data and obtained the correct answer (location 1).

(ii) Most candidates correctly calculated the range in concentration for potassium as 9.2.

(iii) Credit was awarded for the explanations provided. The majority of candidates correctly stated that location 3 had the highest level of N, P and K, although some needed to make the link that these components are those commonly found in fertilisers to gain full credit.

(c) The six-mark, level of response question allows a wide range of potential answers and provides the opportunity for candidates to utilise their knowledge across the broader syllabus and apply it to the scenario given. As a result, the mark scheme is indicative of the likely content, but it is not expected that candidates will cover all of these points and it is entirely possible for new ideas to be introduced and be awarded credit.

The stronger responses provided a balanced view as to whether dam construction was the most appropriate way to ensure a constant water supply, and in the best cases came to a conclusion. It is beneficial within this type of question for candidates to support their arguments with specific examples; in this case some used dams which were familiar to them, either locally or through case studies they had studied as part of their course.

Weaker responses were often too narrow in their focus, only gave one viewpoint, or limited their response to bullet points.

Higher performing candidates showed a level of planning before the start of their responses. This helped to ensure that their answers were balanced and presented in a logical order, making attainment at the higher levels more achievable.

ENVIRONMENTAL MANAGEMENT

Paper 0680/13
Theory

Key messages

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General comments

The majority of candidates attempted all questions on the paper and there was no evidence of candidates running out of time. Candidates should use the number of marks allocated to a question as a guide to the number of points they should make in their responses. Command words such as 'describe' or 'explain' will also provide key information about the style of response required and the level of detail needed to gain credit. There was evidence of appropriate and accurate use of scientific terminology within some scripts.

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Comments on specific questions

Section A

Question 1

(a) This question was attempted by the majority of candidates. Many knew that bunds prevented soil erosion. Some candidates needed to look at the number of marks allocated and make sure that they wrote down two different reasons to enable themselves to achieve all of the credit available.

(b) This question was more challenging for many candidates. Many responses described the use of shovels and other means of moving the earth. For further credit, they needed to discuss the requirement to build up the earth in some way to form a higher layer than where the crops were being planted.

(c) This question required candidates to consider the work involved in making the bund, and in general the question proved challenging. Many candidates referred back to their responses for **Question 1(a)** and stated that the bunds would break down but did not then refer to the fact that they would need to be maintained as a consequence.

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(b) This was another well-answered question and candidates knew a large variety of sources of fresh water. The most common error was to write 'oceans' without qualifying that the water would need to be desalinated first.

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(a) In this question, candidates needed to describe how the boom worked. Many knew that the boom collected the oil spill and needed to add that the boats were towing the boom, for full credit.

(b) This was a very well-answered question; many knew that skimmers and detergents were effective ways of dealing with oil spills.

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(a) The majority of candidates scored credit for completing the sentences, most commonly for sedimentation; deposition was the second most commonly known correct response.

(b) This question was well answered with most candidates stating that either limestone or sandstone were sedimentary rocks. Basalt or igneous rock were the most common errors.

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Section B

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(a) Many candidates scored credit on this question by stating that the oceans can be used for either transport or for tourism. Candidates who suggested that oceans could be used to provide drinking water often did not add that it had to be desalinated first and were therefore not credited. Candidates should use specific examples in questions such as this, as many who just wrote 'for jobs', for example, were too vague to gain credit.

(b) This question, based on the syllabus section 'Energy resources and the generation of electricity', proved to be an area requiring improvement for many candidates.

(c)(i) In general, most candidates were able to draw the correct bar for 2013. The most common error was reading the scale on the *y*-axis incorrectly.

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(ii) Many candidates wrote about other ways that pollution was put into the environment rather than the required examples of gases emitted. The most common incorrect gas that was cited was carbon dioxide. Many candidates knew that carbon monoxide was a pollutant and more able candidates were able to write VOC.

(b) This was a well-answered question by many of the candidates who discussed more than one way of reducing pollution by different transport policies.

(c) (i) Many of the candidates gained credit by reading the correct data from the graph to give the answer of 0.56.

(ii) Many candidates were able to discuss the trend from 1900 to 1939/40 and many were able to state that there was an overall increase in temperature throughout the whole of the data. Some candidates could have improved by being more precise when quoting data points.

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(a) (i) The majority of candidates were able to tabulate their results. Many responses demonstrated the correct way of presenting the headings and units in the headings of the table and not in the body of the table.

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(b) This question was based on the section of the syllabus: evaluate national and international strategies for conserving the biodiversity and genetic resources of natural ecosystems, further guidance and exemplification; extractive reserves.

Those candidates who knew this information answered the question very well, most gaining all of the credit available. It was evident that many candidates did not know this part of the syllabus and just used the diagram to try to obtain credit.

Question 9

(a) (i)   The majority of candidates knew that the continent to be named was Africa.

(ii)   Many of the candidates were able to state that the population had decreased. Reference to growth rate being negative was required for full credit.

(b)   This was a well-answered question; most candidates knew that people in MEDCs were more focused on careers and that there was greater awareness about contraception and family planning.

(c)   Another very well-answered question with many candidates citing war, drought or famine as reasons why people migrate.

(d)   The six-mark, level of response question requires candidates to look at the topic to be discussed broadly and to use appropriate examples to support their views. It is important that candidates consider different points of view before deciding on a conclusion to the question.

The majority of candidates attempted this question and responses were well structured.

ENVIRONMENTAL MANAGEMENT

Paper 0680/21
Management in Context

Key messages

- Candidates should remember that not all of the answers are on lines and should check if answers have to be written in a table or on a diagram.
- Working should be shown when completing calculations, as some credit may be achieved even if the final answer is incorrect.
- Candidates should look at the command word, mark allocation and the number of answer lines provided for a question before starting to write a response. For instance, a question asking for reasons with an allocation of three marks needs three reasons. A question with the command word 'Describe' and three marks needs at least three pieces of information.

General comments

Candidates were invited to consider environmental issues and methods of gathering and interpreting data in the context of some Spanish islands. Many candidates understood and made good use of the source material and their written responses were expressed clearly and effectively. The mathematical and graphical questions posed some difficulties for a minority of candidates.

Candidates had no problems completing the paper in the time available.

Candidates should:

- understand the use of direction and scale on maps and plans;

- read the whole of each question carefully so they understand what is required;

- check that every question is answered, particularly those that need to be written in tables or on maps or diagrams;

- look at the marks to be awarded for a question. Answers are expected to fit the lines provided. If candidates should need to write additional material elsewhere, they need to make it clear where this has been written;

- complete graphs carefully using a pencil with a point and a ruler if appropriate;

- practice interpreting graphs and photographs.

Comments on specific questions

Question 1

(a) (i)   Most candidates gained some credit for their responses to this question. Many showed some understanding of plate movement and knew that magma rises to the Earth's surface. Some candidates wrote about volcanoes forming at destructive plate boundaries where tectonic plates are colliding or pushing against each other. Few candidates developed their responses to include magma forcing its way to the surface and spilling out as lava. Some candidates confused magma and lava.

(ii) Most candidates were able to state the name of one rock, other than granite, formed by volcanic activity. Basalt, pumice and obsidian were the most common correct answers. The most common incorrect answer was 'igneous rock'. Sedimentary and metamorphic rocks were sometimes given as an answer.

(iii) Many candidates correctly suggested at least one reason why each island in the Canary Islands is smaller than when it first formed millions of years ago. Most correct answers were about sea level rising. Coastal erosion by waves, erosion by wind and weathering were also suggested. Some candidates wrote about earthquakes breaking apart the islands, or volcanic activity and landslides causing islands to increase in size. All of these ideas were credited. Some candidates misread the question and wrote about lava from volcanoes making the islands larger.

(b)(i) Many candidates did not know that 'tsunami' is the name given to a large wave in the sea. Some who did know also wrote about potential causes, which was not required.

(ii) Most candidates named the Richter Scale as the scale used to record the magnitude of an earthquake. The Moment Magnitude Scale was also credited as this uses the same logarithmic scale but measures the strength of larger earthquakes more accurately. There were many phonetic spellings of Richter.

(iii) Most candidates suggested that scientists think there is only a low risk of a large-scale landslide at La Palma because recorded earthquakes are only a low number on the Richter scale, between 1.5 and 2.7 magnitude. Very few went on to suggest that larger, more powerful or higher magnitude earthquakes are required to cause large landslides.

(iv) Many candidates gained full credit for describing the possible impacts of a landslide and tsunami on the island of La Palma. The most common impacts that gained credit were people being killed and injured by falling rocks or drowned by the tsunami, damage to buildings and agriculture, damage to infrastructure such as blocked roads and to water and sewage pipes causing waterborne diseases such as typhoid and cholera.

(v) Most candidates suggested at least one strategy for managing the impacts of a tsunami, with many gaining full credit. Suggested strategies included warning systems to alert people of the danger, evacuation plans and drills, emergency rescue teams and shelters, and medical aid, food and water. Some strategies such as 'walls' were too vague and needed more specific details to gain credit.

Question 2

(a)(i) In order to state the name of the Canary Island that is first to receive dust from the Sahara Desert in Africa when the wind blows from the east, candidates needed to look carefully at the maps provided on page two of the question paper. The correct answer was Lanzarote. Some candidates named Arrecife, a major city on Lanzarote. La Palma and El Hierro were frequently stated but they would be the last to receive the dust.

(ii) Many candidates gained credit for naming nitrogen, potassium or magnesium as one other important mineral found in a fertile soil.

(iii) Most candidates correctly calculated the area of the Canary Islands that is suitable for farming as 2247.9 km^2. A minority of candidates rounded their answer up to 2248 km^2.

(b)(i) The strongest responses suggested two correct factors that the student needs to keep the same in the investigation, such as temperature and the volume of water added to the seedlings. Some responses wrongly suggested the number of days and the amount of ash.

(ii) Most candidates explained that tray A was a control for the investigation or gave details of how it was needed for comparison to show that the volcanic ash affected the seedlings.

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(ii) Most responses gained full credit for one low stone wall drawn on the diagram to protect the Opuntia plants from the strong winds. The most common mistake was drawing the wall inside the field.

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(ii) Most candidates correctly determined that the cochineal beetles can be harvested four times in one year.

(iii) Most candidates explained that farmers call the red dye a cash crop because they sell it or export it to make a profit.

(iv) Many candidates wrote about the meaning of the word sustainable rather than linking it to the farming of cochineal beetles. Stronger responses suggested that the farming is sustainable because the cochineal beetles reproduce quickly and no chemicals, such as fertilisers, are used.

(e) (i) Most candidates gained partial credit for explaining why the three fields growing lemons on a steep slope in the Canary Islands is an example of good agricultural practice. Many realised that soil erosion was prevented by strategies such as planting trees and building walls. The fields, the lemon trees, the water channel and the reservoir were often referred to and needed to be linked to a description of how they provided water to, or irrigated, the fields where the lemon trees were growing. Some candidates identified the terracing and bunds, but few described how bunds trap rain so water infiltrates into the soil and prevent the soil from being washed away in surface run-off.

(ii) Many candidates correctly named sand as a particle size with fewer naming silt. Loam, dirt, mud and stone were common incorrect responses.

(iii) This question required candidates to explain the impact of waterlogged soil on crop production. Many gained partial credit for stating that waterlogging kills plants and this reduces crop yields, although explanations were often confused. The stronger responses explained that there is not enough oxygen for plants in waterlogged soil because water fills the air spaces. The roots of the plants cannot take up as much oxygen as they need for respiration, or the minerals needed for growth. The roots die and eventually the whole plant dies or drowns, so no crops can be harvested. Some candidates wrote about yields increasing because the crops had plenty of water.

Question 3

(a) (i) The responses to this question, requiring the identification of three uses of the land shown in the photograph, were variable. The stronger responses listed three of the following: housing, transport, agriculture and recreation. Some candidates gave uses related to the sea or water; others described things that could not be seen in the photograph.

(ii) Most candidates suggested that food production cannot be increased at the location shown in the photograph because most of the land is already being used so there is no space for farms. Some candidates focused their responses on the mountains which they described as too steep for farming with thin or infertile soils. Others interpreted food production as requiring sites for factories where food would be processed.

(iii) Many items were suggested as needing to be imported into the Canary Islands. Some candidates gave more than one answer.

(b)(i) This question proved challenging for many candidates. Many responses explained what an environmental impact assessment is or explained why it is needed for a mine and could not gain credit. The stronger responses explained that an assessment would be needed to find out people's opinions about the site of the turbine, and if habitat would be destroyed and the wildlife living there endangered. Some responses interpreted the question as about choosing a suitable site for a wind turbine.

(ii) Many candidates answered this question in terms of the benefits of wind power in general, not the benefit to the Canary Islands. This meant they often only gained credit for describing that there would be no carbon dioxide emissions so there would be no contribution to the greenhouse effect or global warming. Some also gained credit for stating that sulfur dioxide (SO_2) and nitrogen oxides (NO_X) would not be released so there would be no acid rain. Very few candidates referred to the islands having a wind that blows from the north-east most of the time, information provided on page three of the question paper.

(iii) Nearly all candidates correctly suggested two renewable energy sources, other than wind power, that can be used on the Canary Islands.

(c)(i) Nearly all candidates successfully completed the table to show the population of each island from highest to lowest.

(ii) Nearly all candidates completed the table with a correct calculation of the total number of tourists that visited the four Canary Islands in 2019.

(d)(i) There were good questions formulated about the tourist tax and the environment of Tenerife. Some candidates wrote a question that was not about the tourist tax. Others wrote questions that could not be answered with a 'yes' or 'no' or were very similar to the questions in the questionnaire.

(ii) There were many vague suggestions about why the questionnaire was used at the north airport and the south airport. The strongest answers suggested that large numbers of tourists could be questioned if both airports were surveyed.

(iii) More candidates suggested random sampling rather than systematic sampling as a suitable method for selecting tourists to answer the questionnaire. Descriptions of how they would randomly select the tourists were often vague with the strongest responses using a random number generator. Fewer candidates suggested systematic sampling, but they were more successful in how they would select tourists, for instance, every tenth tourist. Some candidates described methods for selecting tourists to answer the questionnaires that were not sampling techniques, focusing on how or where they would approach people and the importance of being polite.

(iv) This question required candidates to describe one benefit of using the questionnaire when tourists arrive and when tourists leave the island. The stronger responses described how this would show if the tourists changed their views about the tourist tax.

(v) Most candidates correctly calculated the total money raised in 2019 for a tourist tax of one euro per night as 53.01 (million euros).

(vi) The stronger responses showed a good understanding of sustainable tourism and explained several ways tourism can be made a sustainable activity. These included encouraging ecotourism, providing ways to reduce, reuse and recycle waste caused by tourism, setting up national parks and reserves to save endangered species and using geothermal, wind and solar power to generate electricity. Some responses interpreted the term 'sustainable' as ways to keep tourists coming to

Tenerife, which was not creditworthy in this context. Other responses focused on ways the infrastructure and the economy could be developed using money from the tourist tax.

(e)   This question required the candidates to discuss whether tourism contributes to climate change. Almost all candidates agreed that tourism does contribute to climate change. Relatively few achieved full credit. Those who did often started their response by naming the various forms of transport used by tourists that cause greenhouse gas emissions. They went on to describe how land was deforested to make space for tourist infrastructure which led to the destruction of carbon sinks. More food eaten by the tourists leads to more intensive agriculture and more methane from livestock. Weaker responses often only gained credit for referring to transport as they did not specify any greenhouse gases, instead referring to 'harmful gases' or 'toxic gases. The weakest responses referred to the different types of weather experienced by tourists on holiday.

(f)   Many candidates suggested that people living on small islands are very worried about climate change because global warming is causing glaciers and polar ice to melt which means sea levels are rising. Some went on to describe how rising sea levels cause flooding and how small islands could disappear under the sea. Some candidates suggested tropical storms would become more frequent, causing damage to buildings, infrastructure and the economy.

ENVIRONMENTAL MANAGEMENT

Paper 0680/22
Management in Context

Key messages

- Candidates are not required to repeat the question in their answer. This allows candidates to make best use of examination time.
- The mark allocation for a question can be used as a guide for candidates to indicate the number of separate marking points that are required in a response.
- The use of bullet points in a response helps to ensure concise answers that address a sufficient number of points.
- A conclusion should summarise the main findings of an investigation rather than focus on one aspect.
- Candidates should check their question paper to ensure they have attempted every question.
- Diagrams, charts and graphs should be drawn with a sharp pencil and ruler. The use of a pencil makes correcting errors easier.

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.

Some candidates would benefit from improving their field work skills as sampling techniques, how to interpret data and how to give a reasonable conclusion from data provided were not well known. Strategies or sampling descriptions should be clear enough that another student could follow the written method.

The drawing of graphs was an area for improvement for some. Candidates should focus on the correct labelling of axes and choosing of appropriate linear scales that occupy at least half the grid.

Systematic sampling was poorly understood.

Comments on specific questions

Question 1

(a) (i) Many candidates were not confident in naming a specific rock or rock type formed by volcanic activity.

(ii) Most responses included a benefit of geothermal energy; 'renewable resource' was the most common correct answer.

(iii) The majority of candidates were able to explain how the turbine rotates and state that water is sent underground and is heated to become steam. A minority linked the turbine causing rotation in the generator.

(b) (i) Many candidates described shaking of the earth. A few gave vague responses such as 'they felt it'.

(ii) A few candidates repeated information in the question and stated that the magnitude was less than 2 on the Richter scale. These responses did not add their own reasons and were not awarded credit.

(iii) Most referred to movement of tectonic plates. Fewer explained this movement by referring to convection currents. Many described a build-up and release of pressure. A minority referred to friction.

(iv) The impacts of a high-magnitude earthquake were well known. Stronger responses were guided by the mark allocation and used bullet points to ensure they described four impacts.

Question 2

(a) (i) The majority named El Hierro. Some stated Valverde which was not the name of the island.

(ii) Those who had learnt the names of the mineral ions found in fertile soil were able to gain credit.

(iii) The majority were able to calculate the area that cannot be used for farming. Some misread the question and determined the area that can be used.

(b) (i) Stronger candidates were able to give the amount of dust added or number of days after planting as the independent variable and the average height of seedlings for the dependent variable.

(ii) Many graphs were plotted in pen or with pencils that were not sharp. This resulted in difficulty in correcting errors and imprecise plotting. Some candidates chose challenging scales for the *y*-axis, increasing in 3 s intervals, that made the accurate plotting of points more difficult. Others did not use at least half the grid space. Units were often missing from the *y*-axis label. Many lines of best fit were drawn where the instruction was to join each plotted point, and lines were extended back to zero or extrapolated beyond 30 days.

(iii) Some responses needed to focus on the difference in the trends in the graph rather than on describing specific data points.

(iv) Creditworthy conclusions summarised the main findings of the investigation rather than focusing on one aspect. The weakest responses repeated their answer to **Question 2(b) (iii)**.

(v) Good suggestions included comparing the effect of the dust on growth from different species of plant.

(c) (i) 6.5 cm was a common incorrect response.

(ii) Candidates found this question challenging and many were unable to work with the scale. Some misread the question and despite determining that the distance was less than 200 m, went on to conclude that the house could not be built. A minority did not show working out. This was an essential part of the response as indicated in the question.

(d) (i) Most candidates knew that a producer creates its own food by photosynthesis. Some incorrectly answered in terms of the beetle. A few responses gave a correct equation for photosynthesis.

(ii) Many stated that collecting all the beetles would threaten extinction; weaker responses referred to the plant needing the beetle.

(iii) A minority confused commercial intensive farming with commercial farming.

(e) (i) Candidates are advised to be familiar with a range of agricultural techniques that they can then apply to specific scenarios presented.

(ii) Clay was well known. Common incorrect responses included dirt, salt and stones.

(iii) Many descriptions were confused and it was clear that the use of bunds to prevent soil erosion was not well understood.

Question 3

(a) (i) Many correct percentages were calculated to achieve the answer of 7(%). Some used an incorrect value for the total population of the Canary Islands. A minority simply divided 151 by 1000.

(ii) Many candidates completed the table with the correct answer of 178. 179 was a common incorrectly rounded answer.

(b) (i) Some candidates needed to address the full question and give a reason for their answers.

(ii) This was well answered with many candidates able to give four ways of controlling the number of blue marlin caught.

(c) (i) The conclusions needed to summarise the main findings of the investigation rather than focus on one aspect. Some responses focused on only one point of view, such as that of the tourists, and needed to consider the views of the local people.

(ii) The majority of responses described a random method when a systematic method was asked for.

(iii) Most responses gave a reasoned point of view, supported by good examples, on whether a tourist tax should be introduced.

(d) Many good responses used the photograph to suggest why the location was not developed.

(e) (i) The majority described water purification rather than desalination. Distillation was better known than reverse osmosis.

(ii) Most were able to suggest a sensible reason.

(f) (i) Factors to consider before installing solar panels were well known.

(ii) Most responses stated at least one environmental benefit. Stronger answers compared the benefits of solar power with another energy resource, such as burning fossil fuels.

(iii) The majority of candidates were able to suggest another renewable energy resource. A minority stated 'solar' or 'the Sun', despite this being ruled out in the question.

ENVIRONMENTAL MANAGEMENT

Paper 0680/23
Management in Context

Key messages

- Candidates should remember that not all of the answers are on lines and should check if answers have to be written in a table or on a diagram.
- Working should be shown when completing calculations, as some credit may be achieved even if the final answer is incorrect.
- Candidates should look at the command word, mark allocation and the number of answer lines provided for a question before starting to write a response. For instance, a question asking for reasons with an allocation of three marks needs three reasons. A question with the command word 'Describe' and three marks needs at least three pieces of information.

General comments

Candidates were invited to consider environmental issues and methods of gathering and interpreting data in the context of some Spanish islands. Many candidates understood and made good use of the source material and their written responses were expressed clearly and effectively. The mathematical and graphical questions posed some difficulties for a minority of candidates.

Candidates had no problems completing the paper in the time available.

Candidates should:

- understand the use of direction and scale on maps and plans;

- read the whole of each question carefully so they understand what is required;

- check that every question is answered, particularly those that need to be written in tables or on maps or diagrams;

- look at the marks to be awarded for a question. Answers are expected to fit the lines provided. If candidates should need to write additional material elsewhere, they need to make it clear where this has been written;

- complete graphs carefully using a pencil with a point and a ruler if appropriate;

- practice interpreting graphs and photographs.

Comments on specific questions

Question 1

(a) (i) Most candidates gained some credit for their responses to this question. Many showed some understanding of plate movement and knew that magma rises to the Earth's surface. Some candidates wrote about volcanoes forming at destructive plate boundaries where tectonic plates are colliding or pushing against each other. Few candidates developed their responses to include magma forcing its way to the surface and spilling out as lava. Some candidates confused magma and lava.

(ii) Most candidates were able to state the name of one rock, other than granite, formed by volcanic activity. Basalt, pumice and obsidian were the most common correct answers. The most common incorrect answer was 'igneous rock'. Sedimentary and metamorphic rocks were sometimes given as an answer.

(iii) Many candidates correctly suggested at least one reason why each island in the Canary Islands is smaller than when it first formed millions of years ago. Most correct answers were about sea level rising. Coastal erosion by waves, erosion by wind and weathering were also suggested. Some candidates wrote about earthquakes breaking apart the islands, or volcanic activity and landslides causing islands to increase in size. All of these ideas were credited. Some candidates misread the question and wrote about lava from volcanoes making the islands larger.

(b) (i) Many candidates did not know that 'tsunami' is the name given to a large wave in the sea. Some who did know also wrote about potential causes, which was not required.

(ii) Most candidates named the Richter Scale as the scale used to record the magnitude of an earthquake. The Moment Magnitude Scale was also credited as this uses the same logarithmic scale but measures the strength of larger earthquakes more accurately. There were many phonetic spellings of Richter.

(iii) Most candidates suggested that scientists think there is only a low risk of a large-scale landslide at La Palma because recorded earthquakes are only a low number on the Richter scale, between 1.5 and 2.7 magnitude. Very few went on to suggest that larger, more powerful or higher magnitude earthquakes are required to cause large landslides.

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