

ENVIRONMENTAL MANAGEMENT

Paper 0680/11
Paper 1 Theory

Key messages

- Candidates are reminded of the need for precision and accuracy in drawing charts and graphs, using appropriate equipment where needed.
- Candidates should be encouraged to show their working when completing calculations even if this is not specifically asked for in the question.
- Some responses lacked sufficient detail to achieve the full range of credit available at this level. Some candidates needed to be more specific in their responses.
- Descriptions of trends sometimes focused on individual changes rather than the expected overall trends.
- Opinions or conclusions should be supported by relevant examples where possible.

General comments

It was clear that in general candidates were well prepared for the examination, with responses to new specification areas completed with confidence and authority.

In both **Sections A** and **B**, candidates are expected to not only recall key pieces of information but also to use this information to apply to unfamiliar situations.

There was evidence of good planning for longer response questions although candidates should be prepared to provide specific examples to support their answers.

Most candidates showed confidence in completing the mathematical tasks. It is beneficial to show working as in some cases there is still the opportunity to gain some credit even if there is an error in achieving the final answer.

Comments on specific questions

Section A

Question 1

- (a) Many candidates gained some credit for suggesting the increased field of view or efficiency in covering a large area as reasons why aerial surveys would assist in the location of mineral deposits. Gaining full credit proved to be more challenging. The difference in soil colour or vegetation was the most common second response.
- (b) Satellites and prospecting were fairly common answers. Mining was not credited unless it was given an appropriate context.
- (c) (i) Most candidates were able to use the bar chart to identify which metal was predicted to run out first.
- (ii) Most candidates stated the correct metals. A few weaker responses gave only one of the two answers required.

Question 2

- (a) Classification of biotic and abiotic factors was well understood. Most candidates were able to classify them into the correct groups. Some candidates reversed the answers.
- (b) Many candidates recognised the role of water in photosynthesis and used their own phrasing to describe the impacts on plant growth, including death. Fewer candidates attempted to describe the impacts of an excess of water. Some responses also described the impacts on other organisms within the ecosystem, which was not required in this question and did not gain credit.

Question 3

- (a) (i) Many candidates did not correctly interpret the diagram within the context of the question; the most common error was to identify **X** as surface run-off whereas the question required the naming of the water store rather than a process.
 - (ii) Most candidates were able to identify the correct process from the diagram.
- (b) Most candidates were able to name two distinct types of precipitation.

Question 4

- (a) The topic of smog formation proved to be more challenging for many candidates. To gain further credit, responses needed to identify the source of smog formation, notably the impact of fossil fuels, and state the environmental or climate conditions required for smog to form.
- (b) Most candidates were able to identify at least one way smog is harmful to health. Some responses required greater precision to be awarded credit, e.g. lung cancer rather than just cancer.

Section B

Question 5

- (a) The process of electricity generation from nuclear power was generally well understood. The stimulus material proved useful and many candidates gained high levels of credit on this question.
- (b) Many candidates were well prepared for this question. Credit was most likely to be gained by identifying that no carbon dioxide is produced and that this means no contribution to global warming. Some candidates stated that there would be 'no pollution' or that it was 'kinder to the environment' which were not detailed enough to gain credit.
- (c) The strongest responses provided a range of ways energy use could be reduced, such as the use of more energy efficient equipment, switching off appliances or use of more natural light rather than using artificial light. Some candidates did not answer the question asked and focused on using renewable resources as an alternative to fossil fuels.
- (d) (i) Most candidates were able to calculate the missing information in the table.
 - (ii) Partial credit was available for correct working even if the final answer was incorrect. Commonly, candidates needed to check that their answer was in a suitable order of magnitude (billion).
 - (iii) This calculation proved less challenging to most candidates and was completed correctly by the majority.

Question 6

- (a) (i) Most candidates were able to calculate the missing information in the table.
 - (ii) This proved to be a more challenging question. The best responses reviewed the overall trends. Less successful answers attempted to describe each small rise and fall over the years concerned. Some candidates needed to make it clear whether they were describing wild fish catch, farmed fish catch or the total fish catch at specific points in their answers.

- (iii) Many responses showed a weakness in the understanding of the nature of fish farming, often incorrectly citing the greater efficiency or size of fishing boats within their answers.
- (b) Candidates were well prepared to provide alternative ways wild fish stocks can be maintained. A wide range of different strategies were cited.
- (c) Many candidates gained some credit by identifying the impact of illegal fishing on the true size of the fish catch. Most candidates struggled to provide additional reasons.

Question 7

- (a) Candidates were generally able to find the relevant information from the newspaper article to complete the table although some did not provide the units for the area of crops damaged (hectares) which limited the final credit achieved.
- (b) This was generally well answered, with many candidates achieving full credit. Some candidates did not answer in terms of 'long term' increases or did not explain their answers, e.g. referring to Malawi being an LEDC without further detail.
- (c) A well-answered question by many candidates. The most common error was focussing on one aspect, such as containing the water rather than providing a range of different methods.

Question 8

- (a) The pie charts were quite variable across the cohort. The strongest responses were correctly plotted, had a clear key and ordered the segments in size order. Poorer responses often did not label the key or did not plot the segments accurately. It is strongly recommended that candidates are equipped with appropriate equipment to facilitate accurate plotting of graphs and charts.
- (b) A large number of candidates focused on the purpose of adding phosphate fertiliser rather than the reason for the increase in its use. Many responses did not identify the increase in demand for food due to the increase in global population.
- (c) (i) Most candidates were able to select the correct information from the fact sheet to calculate the difference in carbon dioxide emissions.
(ii) Many candidates correctly identified the need for less grain when producing chicken. Some found the ratios in the fact sheet challenging.
(iii) Most candidates were able to complete the calculation for the volume of water required to produce the beef; the most common error was a miscalculation of the order of magnitude of the answer.
(iv) A wide variety of potential answers were given credit for the reasons why farmers may continue to raise livestock. Most candidates identified the opportunity for greater profit or the suitability of the soil or land.

Question 9

- (a) (i) Most candidates correctly commented on the decrease in the centre of the country and the increase in the North or East. Some candidates, rather than describing the changes, attempted to explain or suggest reasons for the changes, which was not required in this question.
(ii) Most candidates gained credit, considering employment opportunities most frequently. A wide range of responses were given credit as it was not a pre-requisite for candidates to have a detailed knowledge of specific countries such as Australia.
- (b) This question required candidates to state three distinct ways a country could manage the growth of its population. Generally this was attempted well with many candidates able to identify more than three ways. Weaker answers sometimes re-stated a method using slightly different wording, which did not gain credit.

- (c) This extended-answer question was marked using a Level of Response mark scheme. This focuses on the quality and depth of the response rather than simply the number of points made and allows for a more extensive or detailed answer. Candidates were able to provide a broad discussion or a more targeted response if supported by relevant examples. This question was structured to allow candidates to argue from either point of view, although the strongest responses contained developed, balanced arguments citing both sides before providing a conclusion. Weaker answers tended to lack specific details, giving generalised statements without the support of specific examples to support arguments.

ENVIRONMENTAL MANAGEMENT

Paper 0680/12
Paper 1 Theory

Key messages

- Some responses lacked sufficient detail to achieve the full range of credit available at this level. Some candidates needed to be more specific in their responses.
- Candidates should be encouraged to show their working when completing calculations even if this is not specifically asked for in the question.
- Descriptions of maps should be precise to prevent potential ambiguity, using compass points in answers rather than terms such as 'above' or 'below'.
- Opinions or conclusions should be supported by relevant examples where possible.

General comments

It is important that candidates are confident in all subject areas covered in the syllabus and are also able to combine their knowledge from different subject areas to form opinions. There was evidence of candidates planning questions prior to completing their final submission which can be useful in longer response questions.

Most candidates were able to apply skills in plotting data in **Question 7**, although there were a number of candidates who appeared to have missed the instruction and did not complete the bar chart.

Some candidates showed a lack of understanding of ecological reserves and how they may be protected in **Question 8**.

Candidates were generally competent at mathematical tasks although some struggled with calculating the annual increase in height (**Question 5(a)(ii)**) and expressing information as a ratio (**Question 6(a)(iii)**).

Most candidates attempted all questions with a good volume of written work provided in the more extensive questions.

Comments on specific questions

Section A

Question 1

- (a) The concept of terracing was not generally well understood by candidates and many described the presence of vegetation as being the reason for reduced soil erosion rather than the reduction in gradient and slowing down of water flow rate.
- (b) Most candidates were able to state two other methods of reducing soil erosion.

Question 2

- (a) A significant number of candidates were unfamiliar with the interpretation of the growth curve. Those who showed understanding tended to achieve full credit.
- (b) Most responses successfully described two methods of controlling the birth rate of a population.

Question 3

- (a) (i) In this question, candidates were required to interpret the photograph to answer the question. This was generally achieved to a good standard, with a wide range of potential responses given credit.
- (ii) Many candidates were able to provide two distinctly different ways a supply of safe drinking water could be provided.
- (b) Most candidates were able to calculate the percentage increase. The importance of showing working was illustrated here as candidates were able to gain partial credit for the intermediate arithmetic step even if the final answer was incorrect.
- (c) While this question proved to be accessible to all candidates, some responses required further clarity to gain full credit.

Question 4

Candidates were required to describe the damage they could see in the photograph. Some answers did not fully respond to the question posed and gave responses related to the impacts on humans or the design of buildings to reduce the impacts of earthquakes.

Section B

Question 5

- (a) (i) Most candidates were able to correctly interpret the data in the table to identify the age a teak tree reaches its maximum height. The most common error was to quote a range of ages rather than a single age.
- (ii) Candidates needed to divide the height reached at 50 years by 50 to calculate the annual increase in height. This calculation proved challenging for many candidates.
- (iii) Most candidates were able to explain that the data showed the diameter of the tree continued to grow while the height of the tree had peaked.
- (iv) Candidates were generally very competent at using the formula to calculate the circumference of the tree trunk.
- (v) This calculation of the yield of timber from an area proved to be accessible to most candidates.
- (b) Candidates gained credit for many different observations, for example the change of the area from many to one tree species. Weaker responses identified that biodiversity would be affected but needed to go on to provide specific details as to how or why. A few stronger responses also identified the opportunity the extensive planting of a new tree would have to allow new species to colonise an area.
- (c) There was a lack of clarity in many responses regarding the technique of selective logging. A few successful candidates suggested a range of reasons such as the retention of biodiversity and the opportunity of selective logging to allow an income from the forest.

Question 6

- (a) (i) This question required candidates to review the newspaper article to extract relevant information and complete a calculation. Most candidates were able to complete this competently; some candidates used incorrect data relating to low and middle income countries.
- (ii) Some candidates did not fully answer the question, missing the issues facing low and middle income countries. Few mentioned the causes of indoor air pollution.
- (iii) This calculation involving ratios proved to be more challenging for many candidates.

- (b) Most candidates were able to state that air pollution caused a form of lung disease. Other responses were too generalised and needed to be more specific to gain credit.
- (c) There were a good range of responses to this question exploring why governments have difficulty in reducing air pollution. These included the need for retaining economic growth, the difficulty in enforcing legislation, the challenges faced by persuading individuals as well as the impacts of the actions in other countries.

Question 7

- (a) (i) Most candidates were able to interpret the data correctly and plot the information on the bar chart. There were a number of candidates of all abilities who appeared to have missed the instruction and did not complete the bar chart.
 - (ii) Many candidates were able to identify the year with the highest number of large oil spills. The most frequent error was to quote the year with the highest total number of oil spills.
 - (iii) Most candidates were able to quote the correct number of small oil spills. The most frequent error was to quote the total number of oil spills.
 - (iv) Generally, candidates did well in this question requiring them to describe the trends in oil spills, most notably the reduction in oil spills over the stated period. The most common error was to focus on the differences in specific years rather than the overall trends.
 - (v) Most responses correctly identified the impact of the introduction of double-hulled oil tankers. Some responses required greater clarification, for example there were references to new technology without clarifying what type.
- (b) Candidates appeared to be well prepared for this question on the impact of oil spills in the marine environment, often referring to the impact of the lack of light on photosynthesis. Stronger responses linked this to an impact on the food webs.
 - (c) Candidates were well prepared for this topic. A wide range of potential answers were available, with the focus on major sources of oil pollution.

Question 8

- (a) This question was attempted by most candidates, although many responses used language such as 'above' or 'below' rather than using the points of the compass to describe the locations.
- (b) (i) Many candidates suggested that the decrease in the area of the coral reef was due to tourists (human damage). Some candidates also suggested climate change.
- (ii) Most candidates were able to complete this calculation correctly, with few examples of errors.
- (c) Many candidates understood the concept of ecological reserves, and needed to apply their ideas to the marine environment. Many incorrectly suggested that there would be problems in relocating a coral reef and its associated organisms, which in reality would not be needed. The strongest responses identified the challenges in patrolling a large area, the impact the designation may have on tourism or fishing and the problem of water pollution entering the area from nearby areas.

Question 9

- (a) A well-answered question in which candidates needed to make sure that they expressed their ideas with sufficient detail. It was important that statements were made in comparison to subsurface mining to provide context.
- (b) While most candidates attempted this question, there was a large variance in their abilities to classify the rocks according to the three categories provided. It was incorrect for candidates to assume there would be an equal number of rocks in each category.
- (c) Most responses showed a good knowledge of the formation of metamorphic rocks, citing their origin in other rock types and the requirements for heat and pressure.

- (d) This extended-answer question was marked using a Level of Response mark scheme. This focuses on the quality and depth of the response rather than simply the number of points made and allows for a more extensive or detailed answer. The strongest responses identified the strengths and weaknesses of the opposing points of view and were able to put together a coherent response with examples to support their comments. They also provided a conclusion related to their point of view. Weaker responses often discussed the issues in general terms and tended to put forward a narrow view of the topic. Answers were generally well laid out and presented in a logical and clear order, demonstrating that responses had been planned prior to starting the answer.

ENVIRONMENTAL MANAGEMENT

Paper 0680/13
Paper 1 Theory

Key messages

- Some responses lacked sufficient detail to achieve the full range of credit available at this level. Some candidates needed to be more specific in their responses.
- Candidates should be encouraged to show their working when completing calculations even if this is not specifically asked for in the question.
- Opinions or conclusions should be supported by relevant examples, particularly in the extended response questions.
- Candidates should remember to include units when providing answers to mathematical questions.

General comments

Candidates should refer to the maximum number of marks available for a question and the space provided for the answer as this will provide a guide to the length of response required.

When plotting graphs or charts, it is expected that axes are fully labelled and a suitable linear scale is used to ensure that accurate plotting can take place. Candidates would benefit from using a sharp pencil and ruler for all types of graph work.

Candidates generally showed a good knowledge of the new syllabus, although there were specific areas where responses would benefit from additional detail. The process of photosynthesis and the role of chlorophyll were areas where additional study could be needed.

Where questions require the candidate to provide an opinion, ideas in responses should be supported with relevant evidence or examples.

Candidates were generally well equipped for questions with a mathematical context, although some candidates needed to remember to include units in their responses.

Comments on specific questions

Section A

Question 1

- (a) This opening question required candidates to complete the sentences about the Earth's atmosphere. There was variability across the cohort, with most candidates achieving at least some credit.
- (b) Most candidates were able to describe at least one effect of acid rain. Some responses lacked detail, which limited the potential to gain credit.

Question 2

- (a) Candidates were generally able to identify the type of mineral extraction shown in the photograph.
- (b) The strategies for using minerals sustainably were less well known across the whole cohort. The most common correct responses included the reuse or recycling of materials and greater efficiency in extraction of the raw materials.

- (c) Most candidates attempted this question. Some candidates focused on the benefit to the individual rather than the economy of a country.

Question 3

- (a) A number of candidates were able to use the photograph as a stimulus to respond to the question. The strongest responses gave distinct, clear and different reasons. Weaker responses tended to repeat concepts or were written in very general terms.
- (b) While most responses identified the impact of the difference between richer and poorer countries, fewer were able to expand their answers to give precise examples which would have been creditworthy.
- (c) Many candidates were able to identify a suitable opportunity linked to flooding, most commonly linked to the fertility of soils.

Section B

Question 4

- (a) Most candidates were able to use the diagram to help explain how electricity is generated in a hydro-electric power station. The role of the turbine and generator were sometimes confused in responses. The most successful responses produced a clear account in a logical order.
- (b)(i) Most candidates were able to extract the relevant information from the newspaper report to complete the calculation correctly.
- (ii) This question was attempted by most candidates. Some responses were too general, for example, 'provides electricity' was not given credit unless further detail was given such as improves the reliability of the electricity supply.
- (iii) A wide range of potential reasons were given credit, the most common being the loss of farmland, impacts on wildlife and need for a settlement to be relocated.
- (c)(i) Candidates were able to classify most types of energy resource. The most common error was to misclassify biomass as being non-renewable.
- (ii) Most candidates were able to interpret the data in the table. The strongest responses identified the main trends and also differences.

Question 5

- (a) Most candidates correctly calculated the percentage from the data in the article.
- (b) Candidates often found it challenging to identify two distinct ways in which the development of this technology would benefit the country. Some candidates identified the potential to sell the expertise in developing GM plants as well as the opportunity to sell the product itself.
- (c) A wide variety of different techniques were given credit and many chose the application of herbicides, which was mentioned in the article itself and was a valid answer. Some incorrectly listed insecticides or the use of fertilisers which demonstrated a lack of understanding of weed control.
- (d)(i) While most candidates were confident in the calculation of an average, some used all the data instead of applying the technique to the time period outlined in the question and so missed out on the credit.
- (ii) Almost all the candidates described the overall trends to gain credit. Some candidates focused on the annual changes.
- (e) Some candidates found it challenging to provide both environmental advantages and disadvantages of introducing GM crops, tending to focus more on the economic reasons. Common

disadvantages included the risk of resistant genes spreading into the wild population and the risk of overuse of herbicides if the crop were herbicide-resistant. Fewer candidates were able to identify environmental advantages, which included the potential use of less insecticides if a crop is insect resistant or the reduction in area needed to grow crops if less are wasted.

Question 6

- (a) Candidates needed to interpret the diagram of the carbon cycle and identify the processes at different points. This was completed successfully by most of the cohort.
- (b)(i) Some candidates were able to complete the photosynthesis equation correctly whereas others found this challenging. Some candidates confused the reactants and products.
 - (ii) The role of chlorophyll proved far more difficult for candidates to explain, with a large number gaining little credit. References to providing the plant with its green colour were not given credit.
- (c) Many candidates were able to write at length about the impacts of deforestation, although some candidates referred to increased carbon dioxide which was provided in the question and did not gain credit.
- (d)(i) The most successful candidates used the key to plot the line and were accurate in their plotting of the data. A few candidates missed out the drawing of the graph.
 - (ii) Most candidates were able to use the graph to correctly answer the question.
 - (iii) Many candidates were able to calculate the percentage increase. The importance of showing working was illustrated here as candidates were able to gain partial credit for the intermediate arithmetic step even if the final answer was incorrect.
 - (iv) Candidates needed to use the information in the student's notes to calculate the answers. Units were required to gain full credit.

Question 7

- (a) Most candidates attempted to describe the distribution on the world map and many were able to use the names of the continents or name specific countries. When referring to places, candidates needed to use the points of the compass rather than using the terms 'above' or 'below'.
- (b) A wide range of potential reasons for water shortage were given credit. Weaker responses were very general citing, for example, a 'lack of money' with no further detail.

Question 8

- (a) Most candidates calculated this percentage correctly.
- (b) Some candidates assumed that there would be a rapid depletion of tuna stocks, whereas the actual catch was less than the allowable catch. Those who interpreted the data correctly identified the likelihood of increased breeding opportunities due to the higher number of tuna fish available.
- (c)(i) Most candidates completed a bar chart to show the actual catch of bluefin tuna. There were a number of common errors; to improve, candidates should ensure that they fully label the axes of the chart and use a linear scale. A ruler should be used when completing graphs, care should be taken to plot each bar accurately, and the width of bars should be consistent.
 - (ii) Most candidates were able to select the three countries and put them in the correct rank order.

- (d) This extended-answer question was marked using a Level of Response mark scheme. This focuses on the quality and depth of the response rather than simply the number of points made and allows for a more extensive or detailed answer. It was clear that some candidates had prepared well for this type of question.

While it is possible for the candidate to either agree or disagree with the statement, it is expected that they present a coherent argument.

The strongest responses were able to appreciate different viewpoints and provided specific examples to support their answers. These responses often showed some pre-planning by the candidate, identifying key points prior to their final draft. This often resulted in a well-structured and logically ordered answer.

Weaker responses often provided only general statements and these were not always tightly linked to the specific question.

ENVIRONMENTAL MANAGEMENT

Paper 0680/21
Paper 2 Management in Context

Key messages

- Candidates should read the whole of each question carefully. For instance when plotting graphs, they should check whether the type of graph, line or bar, is specified.
- Not all questions are answered on answer lines so candidates should check if answers have to be written elsewhere, for example, in a table or on a diagram.
- Candidates should be encouraged to show their working when completing calculations even if this is not specifically asked for in the question.
- Candidates should study the command word, mark allocation and the number of answer lines provided for a question before starting to write a response as these will give an indication of the length of response necessary.

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one country, Madagascar. Many candidates understood and made good use of the source material and their written responses were clearly expressed.

The mathematical and graphical questions posed some difficulties for a small number of candidates. It is beneficial to show working as in some cases there is still the opportunity to gain some credit even if there is an error in achieving the final answer.

Comments on specific questions

Question 1

- (a) (i) There were many different explanations of the meaning of the term 'sustainable tourism'. Most included the idea of tourism that did not damage the natural environment. Few mentioned that by minimising the impact on the environment sustainable tourism will also be available for future generations.
- (ii) Most candidates were able to suggest at least one reason why the government and one reason why the local people of Madagascar want the number of tourists to increase in the future. Many answers referred to tourism improving the economy and increasing opportunities for employment.
- (iii) The most common environmental problems listed as being caused by large numbers of tourists were different types of pollution (e.g. atmospheric) and various ways the natural environment could be damaged.
- (b) Many candidates correctly calculated the percentage of all lemur species in Madagascar at medium or low risk of extinction. Those candidates who showed correct working were able to gain partial credit even if their final answer was incorrect.
- (c) (i) Some responses repeated sections of the text without suggesting why the tourists visiting this reserve only have a low impact on the natural environment. The stronger answers suggested that few tourists travelled to the reserve and that there was no tourist infrastructure such as hotels and restaurants.

- (ii) Most candidates found describing two ways in which sustainable farming can take place in this reserve challenging. The stronger responses referred to the use of organic fertilisers, and often referred to other valid points such as agroforestry or harvesting fruits from the forest.
- (iii) Many candidates made at least one sensible suggestion about the benefits to local people of using the solar-powered cooking stoves and fuel-efficient wood-burning stoves.
- (d)(i) Most candidates plotted the data correctly as a line graph and fully labelled both axes correctly.
- (ii) Most candidates were able to successfully predict the estimated reduction in carbon dioxide emissions in year 8.
- (iii) Many candidates suggested that the reduction in carbon dioxide emissions is important to Madagascar because of the problems climate change would cause. Few mentioned international agreements.
- (iv) Few candidates were able to name two types of biofuel other than wood.
- (e) Many candidates did not complete the grid correctly and some did not attempt the question.
- (f)(i) Most candidates were able to interpret the data in the table and correctly stated that group of orchids **C** has lost the largest number of species over four years.
- (ii) Most responses correctly identified group of orchids **A** as least affected by human activity with an appropriate reason.
- (iii) Most candidates suggested that group of orchids **B** is most likely to be being collected illegally because there had been a large decrease in the number of plants.
- (iv) Many candidates found explaining why the survey method is likely to show if illegal collecting of orchid plants has happened challenging.
- (v) Few candidates were able to gain full credit for suggesting reasons why it is difficult to stop illegal plant collecting in the wildlife reserve.
- (g)(i) Most candidates correctly named the green pigment in leaves as chlorophyll.
- (ii) Most candidates gained some credit for suggesting why the leaves of the orchid plant have a large quantity of the green pigment. Few candidates related this to photosynthesis.
- (h)(i) Very few candidates correctly calculated the average annual rainfall at the weather station. Most candidates calculated the average monthly rainfall.
- (ii) Many candidates gained some credit for explaining that the constant warm temperature made it possible for orchid plants to grow and flower all year round in the wildlife reserve. The stronger responses made effective use of the temperature and rainfall data from the table. A few candidates made good use of calculations to support their responses.

Question 2

- (a)(i) Most candidates were able to suggest at least one reason why the government wants to encourage small farms to grow lychee trees.
- (ii) Most candidates were able to suggest why lychees are exported to Europe by sea. There were many references to Madagascar being an island.
- (b)(i) There were many detailed suggestions about why killing the bacteria and fungi is important.
- (ii) Few candidates were able to describe the process of respiration. The strongest answers included the word equation for respiration. Many responses appeared to confuse respiration with photosynthesis.

- (c) (i) Most candidates calculated the average mass of skin correctly. The calculation of the range for the mass of skin proved challenging for some.
- (ii) Many candidates found calculating the average number of lychees in one box to the nearest whole number challenging.
- (iii) The calculation of the average percentage of the whole fruit that is seed was often more successful. Some candidates gave their answer to three decimal places instead of to three significant figures.
- (iv) Many candidates used the labels on the diagram showing the stages of air layering to answer this question rather than their own ideas of selection.
- (d) (i) There were detailed answers describing how a tropical cyclone is formed with many gaining full credit. A number of candidates wrote about ocean currents and some referred to El Niño.
- (ii) Most candidates were able to describe four ways tropical cyclones cause damage.
- (iii) Responses describing three ways of managing the impacts after a tropical cyclone has hit a coastal region were less successful. The most common descriptions were about the provision of food and water, medical assistance and shelters for people whose homes had been destroyed.
- (e) Candidates found suggesting one way farmers could reduce the risk of damage to their lychee trees challenging. The best suggestions were about planting other trees as windbreaks or shelter belts. There were frequent references to covering the trees, moving the trees and putting them in greenhouses that were not given credit.
- (f) (i) Many candidates had difficulty explaining why the candidate did a pilot survey with a few farmers before giving the questionnaire to a larger sample of farmers. There were frequent references to the candidate wanting to confirm the agricultural adviser's opinion.
- (ii) Rewriting question 4 in the same style as questions 1, 2 and 3 proved challenging for many candidates. Some left out the word 'new', others did not make the numbers they put in the options consecutive and some candidates wrote a question of their own.
- (iii) Few candidates were able to explain the advantages of collecting information using the new style of questionnaire. Many wrote about the farmer's finding it easier to answer the questions.
- (iv) Almost all candidates explained that growing lychee trees will not contribute to the availability of food for the population of Madagascar because the lychees are grown for export. There were some references to the land used for lychee trees not being available for growing food. There were very few references to cash crops.
- (v) Most candidates were able to suggest one way farmers can earn money from the old lychee trees when they stop producing fruits.
- (g) There were many comprehensive descriptions of how insects help flowers develop into fruits.

ENVIRONMENTAL MANAGEMENT

Paper 0680/22
Paper 2 Management in Context

Key messages

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- Not all questions are answered on answer lines so candidates should check if answers have to be written elsewhere, for example, in a table or on a diagram.
- Candidates should be encouraged to show their working when completing calculations even if this is not specifically asked for in the question.
- Candidates should study the command word, mark allocation and the number of answer lines provided for a question before starting to write a response as these will give an indication of the length of response necessary.

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one country, Madagascar. Many candidates understood and made good use of the source material and their written responses were clearly expressed.

The mathematical and graphical questions posed some difficulties for a small number of candidates. It is beneficial to show working as in some cases there is still the opportunity to gain some credit even if there is an error in achieving the final answer.

Comments on specific questions

Question 1

- (a) (i) Most candidates were able to calculate the percentage of people living in rural areas correctly.
- (ii) Most candidates were able to suggest at least one reason why local people in Madagascar do **not** think they will benefit from sustainable tourism.
- (iii) Most candidates were able to identify at least some services required by tourists. Some candidates repeated their ideas.
- (iv) The most common environmental problems listed as being caused by large numbers of tourists were named examples of pollution (e.g. atmospheric) and various ways the natural environment could be damaged.
- (b) (i) Many candidates correctly calculated the percentage of all lemur species in Madagascar that are **not** at risk of extinction. Those candidates who showed correct working were able to gain partial credit even if their final answer was incorrect.
- (ii) Most candidates could define the term habitat correctly.
- (iii) Most candidates were able to gain partial credit for explaining why deforestation can occur in less economically developed countries.
- (iv) Many candidates gave detailed accounts of how soil erosion can occur after trees have been removed to gain maximum credit.

- (v) Although most candidates were familiar with the term consumer, some had more difficulty distinguishing between a primary and secondary consumer.
- (c) (i) A small number of candidates gained full credit here. Some candidates did not appreciate that surveys need to be repeated to discover if the populations are declining, maintaining numbers or increasing over time.
 - (ii) Those candidates who took note of the word 'sustainable' in the question usually described ways in which sustainable farming can take place successfully. Only a small number of candidates named farming methods that were not suitable.
- (d) (i) Most candidates plotted the data correctly as a line graph and labelled both axes correctly.
 - (ii) Most candidates were able to successfully predict the estimated sales of stoves in year 8.
 - (iii) Many candidates suggested at least one advantage to local people of using fuel-efficient stoves.
- (e) (i) Most candidates identified that producers are able to photosynthesise or gave an appropriate description of the process.
 - (ii) Many candidates found describing a method to monitor the population of orchids challenging. The pieces of equipment were shown to prompt candidates to think about survey methods that could be used in the field. A small number of candidates gained maximum credit.

Question 2

- (a) (i) Most candidates were able to identify the type of mining shown in the drawing.
 - (ii) Most candidates were able to suggest at least one benefit of surface mining.
 - (iii) Many candidates gave detailed descriptions of how igneous rock is formed and gained maximum credit. A small number of candidates described metamorphic rock formation.
 - (iv) A small number of candidates made appropriate suggestions as to why the ore was processed at the mine. Reducing transport costs was the most frequent correct response.
 - (v) Nearly all the candidates gave sensible descriptions of the environmental impacts of starting a new mine, gaining full credit.
 - (vi) Many candidates identified at least one economic impact of mining.
- (b) (i) Most candidates completed the calculation correctly. Those candidates who showed correct working were able to gain partial credit even if their final answer was incorrect.
 - (ii) Most candidates gave at least one reason to explain why the world price of chromite might decrease.
 - (iii) Many candidates suggested that recycling could contribute to the sustainable use of chromite. Some candidates gave further sensible suggestions.
- (c) (i) Most candidates made some use of the information shown in the graph to suggest why there was a high risk of toxic chemicals being washed out of the mining waste. Further detail was needed in most responses to gain full credit.
 - (ii) Many candidates displayed some knowledge and understanding of the process of bioaccumulation but needed to give further detail to gain full credit.
- (d) (i) Most candidates gave a suitable reason as to why there were very few large fish in the lake.
 - (ii) Most candidates found it difficult to describe the possible changes in the food chain in a logical sequence.

- (iii) Most candidates suggested that fishing in the lake was not a sustainable activity. Some explanations lacked the clarity required to be awarded credit. A wide range of points were made and some candidates gained full credit.
- (e) Candidates usually suggested a suitable use for the water hyacinth removed from the lake.
- (f) (i) Nearly all candidates completed the table correctly.
(ii) Most candidates appreciated that pot **A** was required in the method to act as a control or to be used as a comparison.
(iii) Many candidates identified suitable factors to keep the same during the experiment. A small number of responses stated two factors that had already been keep the same in the method described in the question.
(iv) Almost all candidates described the pattern of results adequately. Careful use of the information given allowed many candidates to gain full credit.
- (g) Most candidates gave a sensible reason as to why sample **R** was likely to have the highest concentration of toxic chemicals. Only a small number of candidates supported their answer using data from the table.
- (h) (i) Many candidates correctly suggested that high temperatures and rainfall would lead to high rates of evaporation.
(ii) Most candidates identified the correct months with a supporting reason to explain the highest and lowest concentration of toxic chemicals.

ENVIRONMENTAL MANAGEMENT

Paper 0680/23

Paper 2 Management in Context

Key messages

- Candidates should read the whole of each question carefully. For instance when plotting graphs, they should check whether the type of graph, line or bar, is specified.
- Not all questions are answered on answer lines so candidates should check if answers have to be written elsewhere, for example, in a table or on a diagram.
- Candidates should be encouraged to show their working when completing calculations even if this is not specifically asked for in the question.
- Candidates should study the command word, mark allocation and the number of answer lines provided for a question before starting to write a response as these will give an indication of the length of response necessary.

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one country, Madagascar. Many candidates understood and made good use of the source material and their written responses were clearly expressed.

The mathematical and graphical questions posed some difficulties for a small number of candidates. It is beneficial to show working as in some cases there is still the opportunity to gain some credit even if there is an error in achieving the final answer.

Comments on specific questions

Question 1

- (a) (i) Many candidates were able to calculate the percentage of people living in urban areas correctly. A small number of candidates did not read the question carefully and calculated the number of people living in rural areas.
- (ii) Most candidates were able to suggest at least one reason why an increase in the rural population can cause deforestation.
- (iii) Many candidates gave incomplete accounts of how trees can protect against soil erosion. A small number of candidates gained maximum credit.
- (iv) Many candidates gave two sensible reasons as to why the government wanted to encourage tourism.
- (b) (i) Many candidates correctly calculated the percentage of all species of chameleon that are endemic to Madagascar. Some candidates were able to gain partial credit when the final answer was not stated to three significant figures.
- (ii) Most candidates attempted to state a ratio. The ratio 22:66 was credited as well as the simplified answer of 1:3.
- (iii) Most candidates gave a somewhat muddled definition of the term niche, commonly confusing it with the term habitat. Some clear accounts gained full credit.

- (iv) Although most candidates were familiar with the term secondary consumer, some responses needed to distinguish more clearly between a primary and secondary consumer.
- (c) (i) A small number of candidates gained full credit. Others needed to make the link between planting more trees and an increase in the habitat and food supply for chameleons.
 - (ii) Candidates who took note of the word 'sustainable' in the question usually explained how sustainable farming can help maintain biodiversity successfully. Many answers did not consider the importance of a farming method being sustainable.
- (d) (i) Most candidates plotted the data correctly as a line graph and labelled both axes correctly.
 - (ii) Most candidates were able to successfully predict the estimated sales of stoves in year 8.
 - (iii) Many candidates needed to focus specifically on the potential improvements to human health of using a rocket stove. Vague suggestions about pollution were unable to gain credit.
- (e) (i) A small number of candidates completed the sampling diagram to gain full credit. Candidates needed to use the information, the diagram and the key.
 - (ii) Nearly all the candidates completed the table successfully.
 - (iii) Many candidates described the distribution of orchids successfully. A small number of candidates were able to add the point that all three transects showed a similar pattern.
 - (iv) Candidates needed to refer to the average numerical value given in the question to support their statement about illegal collecting of orchids.
 - (v) Some candidates gave sensible reasons as to why the survey needed to be repeated in many areas of the wildlife reserve. The need for repeat surveys to allow a representative picture of the population could have been included by many for further credit.
- (f) Some candidates gave detailed, specific explanations of the role of insects in pollination and gained maximum credit.

Question 2

- (a) (i) Most candidates were able to suggest at least one thing to invest in that could make farming sustainable. Responses that focused on the word 'sustainably' frequently gained full credit.
 - (ii) Nearly all the candidates completed the calculation correctly.
 - (iii) Many candidates gave good reasons why the average family size might be smaller in urban areas.
 - (iv) Many candidates found it difficult to appreciate that the climate data represented a hot and wet climate in which the lychee fruits could rot or become overripe very quickly.
 - (v) Many candidates correctly suggested that transport by air would be too expensive, or that there would be no profit in exporting by this means.
- (b) (i) Most candidates completed the table correctly.
 - (ii) Many candidates did not convert between kilograms and grams correctly, leading to an incorrect answer.
- (c) (i) Most candidates gave suitable descriptions of the weather conditions during a tropical cyclone. Some candidates gave answers that were too vague to gain credit.
 - (ii) Most candidates demonstrated limited knowledge of the lifecycle of the malaria parasite and could not suggest a reason why the rate of malarial infection might increase after a tropical cyclone.
 - (iii) Most candidates gave very poor descriptions of the lifecycle of the malaria parasite.

- (iv) Most candidates found it difficult to give more than one reason why malaria cannot be eradicated from a location such as Madagascar.
- (v) Most candidates described at least one way the government could manage the impacts of a tropical cyclone. There were many descriptions of the damage done by cyclones without then describing management of these impacts.
- (d)(i) Many candidates needed to use the scale of the diagram correctly. Some candidates did not include the unit or gave an incorrect unit.
 - (ii) Candidates who appreciated the direction of tropical cyclone impact gave sensible answers that gained full credit.
 - (iii) Nearly all the candidates completed the table successfully.
 - (iv) Only a small number of candidates could describe three different ways of reducing soil erosion on farms. A small number of answers were too vague to gain credit. Responses needed to consist of more than a simple list to describe creditworthy methods.
- (e)(i) Most candidates gave a question in the same style as the questionnaire. Some had difficulty giving a consecutive tally sequence.
 - (ii) Many candidates gave sensible descriptions of a random method that could be used to select the farmers for the questionnaire.
 - (iii) A small number of candidates were able to interpret the diagram and suggest reasons why some farmers do not use this method to produce new trees.
 - (iv) Most candidates suggested at least one way the government could encourage lychee farmers to plant new trees.