ENVIRONMENTAL MANAGEMENT

| Paper 0680/11 |
| Paper 1 |

Key messages

Candidates should carefully study any resource provided, e.g. a map, graph or diagram, before writing a response to a question. Evidence from the resource is often required in the answer.

Candidates should read each question carefully and take note of the command word. Questions with the commands 'describe', 'explain' or 'suggest' need longer answers with more detail than commands with 'name' or 'state'.

Attention should be paid to any specific detail in the question. 'Name **one**' used in **Question 1(c)** required one answer, not several answers. **Question 5(b)** was about strategies for conserving ecosystems other than biosphere reserves; answers about biosphere reserves could not gain credit.

The mark allocation (shown in square brackets) and the answer space should be taken into account before starting to write a response to a question. Sometimes, a framework is provided for an answer, for example the answer space for **Question 1(b)(i)** had numbers and lines for describing three ways in which oil spills damage ecosystems.

General comments

Most candidates demonstrated a good knowledge and understanding of the syllabus and were able to complete the paper in the time provided. Many answered all the questions with specific detail and within the spaces provided.

The stronger answers focused on the questions asked, used subject-specific vocabulary and were concise.

Candidates should try to write as neatly as possible to ensure that their answers are legible.

Comments on specific questions

Question 1

(a) (i)   Many candidates correctly calculated 85% as the percentage of marine pollution that comes from the land. The most common incorrect answer was 65%. This was often because either run-off from farms or air pollution from land was not included in the calculation.

(ii)   Candidates completed the table by matching one source of marine pollution from the pie graph with each type of pollution. The most common errors were naming industrial waste water from land or sewage from land as the sources of acid rain.

(b) (i)   Almost all candidates were able to describe at least one way in which oil spills damaged ecosystems. Most answers described how oil spills can cause the death of plants and fish. Some candidates wrote about how oil covered the feathers of birds so they were unable to fly, others described how oil covered the fur of mammals reducing their ability to maintain their body temperatures. There were descriptions of the lack of oxygen, the toxicity of oil and how oil blocked sunlight and prevented photosynthesis. Some candidates repeated the same idea of oil causing death for different species of wildlife. Others gave vague answers about 'contamination', 'pollution' and 'damage'. The answer lines were provided to support descriptions of three different ways that oil spills can cause damage.

(ii)   The responses to this question were variable. Some candidates described in detail a number of strategies for dealing with oil spills. There were many excellent answers about the ways booms, detergent sprays and skimmers can be used to deal with an oil spill. A number of candidates suggested getting to the oil spill quickly and others wrote about how setting fire to a spill was a possible strategy, although this would cause air pollution. Other candidates did not answer the question asked and instead wrote about reducing dependence on oil or different ways of managing the movement of oil such as the use of pipelines. The use of tankers or ships with double hulls, described by a number of candidates, is a strategy to reduce the possibility of leaks of oil into the oceans.

(c)   Some candidates found naming one source of radioactive waste in oceans challenging. The most common correct answer was nuclear power stations.

Question 2

(a) (i) Nearly all candidates correctly named the Atlas Mountains as the fold mountains on the African plate.

(ii)   Most candidates were able to name the Eurasian and Indo-Australian plates as the two plates that are forming the Himalayan Mountains.

(iii)   Many candidates found this question, asking them to state how the plate boundaries forming the Andes Mountains differ from those forming the Himalayan Mountains, challenging. The most successful answers were comparisons based on the map. For example, 'The Himalayan Mountains are formed by two continental plates. The Andes Mountains are formed by an oceanic plate and a continental plate'. Some candidates wrote that one was a convergent plate boundary and the other was a divergent plate boundary. Close inspection of the map would have shown that they were both moving towards each other.

(iv)   This was another challenging question for candidates. Most were able to describe how plates move towards each other to form fold mountains. This was often followed by descriptions of the processes at destructive plate margins, or the mechanism of subduction, which were not made relevant to the formation of mountains. Very few candidates mentioned the accumulation of sediments, or their compression, folding and uplift, to form fold mountains.

(b)   Most candidates were able to name **X** as a destructive or convergent plate boundary and **Y** as a constructive or divergent plate boundary.

(c)   This question was well answered with many candidates gaining full credit for suggesting three ways volcanic activity can benefit people. Fertile soils for farming, volcanic scenery encouraging tourism, and geothermal energy generated using the heat from volcanic rocks underground, were the most frequent ways suggested. Employment opportunities available in the tourist and mining industries were other suggestions. Good use was made of the framework of lines provided for the answer. There were very few one or two word responses or candidates adding lines to the framework so they could suggest a fourth way.

Question 3

(a) (i) Most candidates were able to name coal, natural gas and oil as the three fossil fuels in the bar graph.

(ii)   Almost all candidates were able to use the bar graph to determine that aluminium ore would last 30 years. Fewer candidates were able to determine that tin ore would last 14 years.

(iii)   Most candidates successfully named tin or gold as the ore in the bar graph that was expected to last the shortest time. Fewer named iron as the ore expected to last the longest time. Coal was a common incorrect answer, although coal is not an ore.

(iv)   There were many good answers giving reasons why there were still deposits of all the natural resources shown in the bar graph in 2016. The most common reason was that more of the natural resources named in the graph had been discovered. Other reasons were about improvements in technology or more efficient use.

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(b)   Many candidates gave good descriptions of the opencast (open-pit) method of mining. The most successful answers described the various stages in the process beginning with clearing vegetation and ending with the rock or mineral being loaded on to trucks and taken away from the mine. Some candidates added detail about restoring the site after mining had finished, which was not relevant to this question.

(c)   All candidates were able to suggest at least one disadvantage of wind power as a source of energy. The most common disadvantage was that wind energy is not a constant energy source as sometimes there is no wind to turn the turbines. Other suggestions were that the turbines can be noisy and are often regarded as visual pollution. A number of candidates described the various expenses associated with turbines and how birds have been killed by flying into spinning turbine blades.

Question 4

(a)   Most candidates were able to complete the five gaps in the table correctly using the diagram. The most common error was reversing **C**, the 'stratosphere' and **D**, the 'troposphere'.

(b)   Many candidates were able to describe how human-produced chlorofluorocarbons (CFCs) and halons, used in products such as refrigerators and aerosol products, have damaged the ozone layer. Other statements could not gain credit; some included descriptions of the build-up of carbon dioxide and methane released from the burning of fossil fuels by industry and transport, others referred to all types of air pollution, greenhouse gases and global warming. A number of responses confused ozone depletion with global warming. These candidates needed to understand that, although both problems are caused by human activities that release pollutants into the atmosphere, ozone depletion does not cause global warming.

(c)   Few candidates were able to suggest that an international agreement was needed to ban the production of the chemicals that caused damage to the ozone layer because ozone depletion was a global problem. Many wrote about the need to raise awareness or to stop some countries from using CFCs. Some answers suggested CFCs moved around in the lower atmosphere like acid rain. Others gave reasons for banning the use of CFCs.

(d)   Most candidates were able to suggest at least one reason why people living in Australia and Argentina are advised to keep their skin covered and wear a hat when out in the sun. The most successful answers explained how people who are exposed to a lot of ultraviolet radiation from the Sun are at greater risk of skin cancer. Some went on to state that the Sun's UV rays also increase a person's risk of cataracts. There were some vague answers about cancer, sunburn and health.

Question 5

(a)(i)   Most candidates correctly matched the letters **P**, **Q**, **R** and **S** on the diagram showing the structure of a biosphere reserve, to the descriptions of the four areas in the boxes.

(ii)   Most candidates found determining the length of the path from the laboratory to the nearest education and training facility straightforward. Some candidates used a ruler to measure the distance on the map, and then did not use the scale on the map to give their answer in kilometres.

(iii) Candidates found suggesting ways the local people would benefit from the biosphere reserve challenging, with few gaining full credit. Suggestions about conservation of the ecosystem, jobs, education and income benefiting the local people were often vague. The strongest responses were accompanied by a brief description. For instance, 'there are jobs for local people in the tourist facility and in the education and training facility', 'the ecosystem is conserved and the local people are able to use the resources of the biosphere reserve sustainably', 'tourists spend money visiting the reserve and this improves the local economy and the standard of living for the local people' and 'improvements to the infrastructure for ecotourism, e.g. roads, clean water and sanitation also benefit the local people'.

(b) A variety of different strategies for conserving ecosystems were described with many candidates gaining credit. The most common strategies described national parks or other types of wildlife reserve, education about the importance of conserving ecosystems, restricting access to vulnerable ecosystems and conservation laws to reduce damaging activities such as deforestation and poaching. A number of candidates mentioned gene banks, zoos and breeding programmes.

Question 6

(a) (i) Most candidates correctly gave 2007 as the year on the graph when the urban and rural populations were the same.

(ii) The trend for urban population was usually described correctly as increasing over time. Some candidates found describing the rural trend challenging; the more successful answers split the time period into two or three sections and described the trend in each. Some candidates wrote descriptions with reference to specific data points on the graph, which was not required for this question asking for trends.

(b) (i) Most candidates defined the term migration correctly as the movement of people from one area to another. Some candidates added extra detail to their answers, e.g. push and pull factors. A number of candidates did not answer the question asked, and instead described reasons why people might migrate from rural to urban areas. This did not gain credit.

(ii) Few candidates were able to suggest birth or death rates as a reason, other than migration, why urban populations change. The most common incorrect answers were reasons why people migrate or examples of push and pull factors. Some wrote about migration although reasons other than migration were requested.

(c) Many candidates were able to describe two problems caused by the rapid growth of urban populations in developing countries. The most common problems were about deforestation to increase the size of the urban area, the growth of squatter settlements and slums and the shortage of jobs. Other problems were related to the air being polluted by emissions and noise from factories and vehicles, the water being polluted by sewage and other waste and the need for more supplies of clean water and electricity. Some answers were vague and referred to 'pollution'; more detail, such as the source or type of pollution was needed for credit.

(d) Most candidates were able to suggest a number of strategies that can be used to limit population growth. There were frequent references to government policies, with references to the one child policy in China and, less often, the two child policy. Other strategies suggested were family planning, education (especially the education of girls and women), later marriages, better health services to reduce infant mortality, free contraception and controlling immigration.

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Paper 1

Key messages

Candidates should carefully study any resource provided, e.g. a map, graph or diagram, before writing a response to a question. Evidence from the resource is often required in the answer.

Candidates should read each question carefully and take note of the command word. Questions with the commands 'describe', 'explain' or 'suggest' need longer answers with more detail than commands with 'name' or 'state'.

Attention should be paid to any specific detail in the question. **Question 3(c)** was about ways in which people could reduce their contribution to carbon dioxide emissions; a number of candidates wrote about what governments could do. 'Name **one**' used in **Question 6(b)(ii)** required one answer not two.

The mark allocation (shown in square brackets) and the answer space should be taken into account before starting to write a response to a question. Sometimes, a framework is provided for an answer, for example, the answer space for **Question 2(b)** had numbers and lines for suggesting two advantages and two disadvantages.

General comments

Most candidates demonstrated a good knowledge and understanding of the syllabus and were able to complete the paper in the time provided. Many answered the questions within the spaces provided.

The stronger answers focused on the questions asked and were often very concise.

Candidates should try to write as neatly as possible to ensure that their answers are legible.

Comments on specific questions

Question 1

(a) (i) Most candidates were able to use the diagram to describe the core of the Earth as having two parts, a solid inner core and a liquid outer core.

   (ii) Most candidates were able to correctly calculate the approximate thickness of the Earth's crust as 50 km.

(b) Almost all candidates were able to name igneous, sedimentary and metamorphic as the three main types of rock found in the Earth's crust.

(c) The explanations of how heat in the Earth's crust can be used to generate electricity in a geothermal power station were variable. Full credit was gained by answers that began with cold water being pumped underground, explained how the hot rocks change the water to steam and how the steam rotates a turbine that activates a generator, which produces electricity.

(d) Most candidates were able to suggest a number of benefits of living near a volcano. There were many references to fertile soils being good for farming and how tourists would visit the area to look at the scenery and that this would create jobs for the locals and improve the economy. There were also references to mining valuable minerals such as sulfur and the availability of building materials such as basalt. A small number of candidates wrote about geothermal energy although the question referred to 'other benefits'.

Question 2

(a) (i) All candidates attempted the five gaps in the passage using words from the diagram. The most common error was reversing the 'warm' and 'cold' currents.

(ii) Most candidates found using the diagram to describe why upwelling occurs challenging. Few were able to describe how upwelling occurs when wind blowing from east to west moves the surface water in the Pacific Ocean to the west and cold water rises up to take its place.

(iii) There were some very detailed responses suggesting reasons why few fish are caught in an El Niño year. Many candidates wrote about the cold current being replaced by a warm current low in oxygen and nutrients. The stronger responses went on to explain that there were less plankton, so less food for fish and less fish to catch because the fish either died or moved away to colder regions.

(b) Most explanations of disadvantages of using modern technology for ocean fishing were more successful than the explanations of advantages. The most common disadvantage explained well was overfishing. There were also good accounts of the use of large nets and the problem of bycatch dying. Many of the advantages were ideas that needed more detail to gain credit. There were references to radar, sonar, satellites and large ships without the detail needed to explain why these were advantages for ocean fishing.

Question 3

(a) (i) Most candidates were able to use the pie graph to name China as the country responsible for almost one quarter of global greenhouse gas emissions in 2012. The most common wrong answers were the USA and 'other countries'.

(ii) Most candidates were able to name the USA as the developed country responsible for the largest percentage of global greenhouse gas emissions in 2012. The most common wrong answer was China.

(iii) Most candidates correctly calculated 39% as the total greenhouse gas emissions from the developing countries named in the pie graph.

(b) There were many good answers explaining why the amount of carbon dioxide in the atmosphere is increasing. Most answers made reference to deforestation. Many answers explained that the increase was caused by the burning of fossil fuels and went on to give examples such as in power stations, factories and vehicles. A number of successful responses began by explaining how the increase was the result of the increasing world population and how this led to more burning of fossil fuels today and more deforestation.

(c) Most candidates were able to describe at least two ways in which people could reduce their contribution to carbon dioxide emissions. There were frequent references to walking, cycling or using public transport instead of cars. Ways of using less energy in the home included the use of insulation, solar panels, energy saving appliances and switching off items such as lights when not in use. Some candidates wrote about things a government could do, rather than what people could do.

Question 4

(a) (i) Nearly all candidates were able to name two hot deserts south of the Equator. A small number of candidates incorrectly named the Sahara and the Thar.

(ii) Most candidates gained full credit for describing the location of the Sahara Desert.

(iii) Candidates found this question, asking them to explain why location **X** on the map is a good place for a solar power station, more challenging. Most wrote about the Sahara Desert having high levels of solar radiation all year. Few mentioned the lack of clouds or large areas of desert land available that was not used for farming or settlements.

(b) (i) Most candidates were able to name two renewable energy sources other than solar power.

(ii) This question proved more challenging with some candidates unable to name nuclear power as a source of energy that is an alternative to fossil fuels and to renewable energy.

(c) Most candidates were able to suggest at least one valid disadvantage of solar power as a source of energy. There were descriptions of how solar energy is not always available as no power is generated at night and less is generated when the sky is cloudy. The problems of storing solar energy and the need for another source of energy as a backup were mentioned by a few candidates. There were also descriptions of how large numbers of solar panels in fields took up land which could be used for agriculture. It was also suggested that solar panels caused visual pollution.

Question 5

(a) (i) Most candidates were able to name Oceania and North America as the two continents where there has been no change in the number of megacities between 2005 and 2015. A small number of candidates named Africa and North America.

(ii) Many candidates found the calculation of the percentage increase demanding. Those who showed their working were sometimes able to gain partial credit.

(b) (i) Most candidates were able to explain what is meant by the terms push factor and pull factor.

(ii) Most candidates were able to explain at least two pull factors that would result in rapid population growth in megacities. There were frequent references to megacities having more jobs, higher wages, better health services, better opportunities for education and better living conditions. Some candidates could have made better use of the framework provided for the answer. Instead of using the explanation lines to develop a factor, they repeated what they had already written or wrote vague ideas about 'things' being 'better'. Specific advantages of life in a megacity were needed. General statements such as ''better health' needed to mention more doctors and/or hospitals; 'education' needed the naming of establishments such as schools, colleges or universities and 'more jobs' needed development with the idea of more opportunities for employment in factories, shops and offices.

(c) Most candidates could describe at least one environmental problem caused by rapid population growth in cities. There were good descriptions of deforestation to provide the urban areas with space for houses, factories and infrastructure. Air, water and land pollution were described with reference to vehicles, industry and waste.

Question 6

(a) (i) Most candidates gained full credit for naming one natural and one artificial store of water shown in the diagram. A small number of candidates either did not use the diagram to answer the question or did not name the reservoir as an artificial store of water.

(ii) A small number of candidates gained full credit for using the diagram to describe the work of the water treatment company. Some candidates only described one aspect of the work of the water treatment company; others wrote about water treatment using their own knowledge instead of using the diagram.

(b) (i) This question was well answered with many candidates gaining full credit for explaining why untreated water from rivers may not be safe to use. There were clear responses explaining how bacteria in rivers can cause water-borne diseases, such as cholera and typhoid. Some responses focused on the pollution caused by fertilisers and pesticides in run-off from farms; others on industrial waste dumped by factories containing heavy metals or toxic chemicals, such as lead and mercury.

(ii) Most candidates named malaria as one disease transmitted by mosquitoes.

(c) Most candidates were able to suggest several reasons why only a few countries use desalination to supply fresh water. Many candidates wrote that few countries could afford desalination because it was very expensive, especially for developing countries. The need for access to oceans or seas was another reason with a number of candidates showing familiarity with the term 'landlocked'. The requirement for a lot of energy or electricity to power the desalination plant was also suggested. Some candidates wrote about water rich countries, where there were plentiful supplies of fresh water from rainfall, rivers and groundwater, not needing to build desalination plants. A number of candidates began their answers by suggesting that desalination was only used by countries that were water poor and went on to explain the reasons why desalination is very expensive.

ENVIRONMENTAL MANAGEMENT

| Paper 0680/13 |
| Paper 1 |

Key messages

Candidates should carefully study any resource provided, e.g. a map, graph or diagram, before writing a response to a question. Evidence from the resource is often required in the answer.

Candidates should read each question carefully and take note of the command word. Questions with the commands 'describe', 'explain' or 'suggest' need longer answers with more detail than commands with 'name' or 'state'.

Attention should be paid to any specific detail in the question. 'Suggest **one**' in **Question 3(c)** required the suggestion of one strategy not several strategies. The use of 'other' with 'strategy' meant that a strategy that was not tree planting was needed for credit. **Question 4(b)** was about physical factors; credit was not available for writing about human factors.

The mark allocation (shown in square brackets) and the answer space should be taken into account before starting to write a response to a question. Sometimes, a framework is provided for an answer, for example, the answer space for **Question 1(c)** had numbers and lines for suggesting three hazards.

General comments

Most candidates demonstrated a good knowledge and understanding of the syllabus and were able to complete the paper in the time provided.

Some candidates began an answer by repeating the question, this is not necessary. Answers should be concise and focused on the question.

Candidates should try to write as neatly as possible to ensure that their answers are legible.

Comments on specific questions

Question 1

(a) (i)   Most candidates were able to match the letters on the diagram to the features in the table. The most common error was reversing **B**, 'lava and mud' and **D**, 'magma'.

   (ii)   Many candidates found naming the type of plate boundary shown in the diagram challenging. The correct answer was destructive (or convergent). Some candidates gave the wrong type of plate boundary; others gave answers which were not plate boundaries, for example crust and troposphere.

(b) There was a mixed response to this question. Some candidates gained full credit for describing in detail how volcanoes are formed at the plate boundary shown in the diagram. The most successful answers began by stating that the oceanic and continental plates moved towards each other. This was followed by a description of the processes that result in the formation of a volcano: magma rising through a crack or weakness in the Earth's crust, pressure building up then being released, magma exploding onto the Earth's surface causing a volcanic eruption and lava flows, then over time, after several eruptions, the lava building up to form a volcano. Some candidates described processes at constructive plate boundaries with details of why two plates move apart. By looking at the diagram carefully before answering the question, candidates should have been able to describe the direction of plate movement correctly.

(c) Most candidates were able to suggest at least one hazard for people living on the slopes of an active volcano. Credit was gained by candidates who named a hazard and wrote about how it affected people. There were good descriptions of gases and ash causing breathing problems, lava burning people, lava and mudflows destroying houses and ash covering houses and causing the roofs to collapse.

Question 2

(a) (i) Nearly all candidates stated correctly that 1979 was the year with the greatest maximum area of sea ice.

(ii) Most candidates stated that the minimum area of sea ice in 2012 was 3.0 million km^2. Some wrote 3.0 without 'million' and 'km^2', others missed out 'km^2'.

(iii) This was a challenging question with a small number of candidates circling the correct answer, September. The sea ice minimum in the Arctic Ocean occurs at the end of the summer; the melting usually begins in March and ends sometime during September.

(b) Most candidates correctly suggested at least one impact of rising sea levels. The most common impact given was the flooding of either farmland or cities near the coast. Loss of homes, the destruction of coastal habitats, the breaching of coastal defences and surges caused by tropical storms were other impacts suggested.

(c) Candidates found this question, asking them to explain how human activities alter the composition of the atmosphere, more challenging. The strongest responses explained how burning fossil fuels, deforestation and the use of vehicles increased the carbon dioxide in the atmosphere. There were good explanations of livestock and rice farming increasing the release of methane and the production of chlorofluorocarbons destroying the ozone layer. A number of candidates wrote vague answers about 'human activities' producing 'gases' and 'pollution' that could not gain credit.

Question 3

(a) Most candidates described three reasons for floods in Bangladesh using the information on the map.

(b) This question proved more challenging for many candidates. Credit was gained by those who explained how deforestation led to a reduction in interception and infiltration and an increase in surface run-off. There was also reference to how, when tree roots no longer held the soil in place, soil was taken by run-off to the rivers where it was deposited and caused them to overflow.

(c) Most candidates were able to suggest one strategy to reduce the impact of flooding. Many answers focused on dams and embankments. River straightening, dredging and flood relief channels were other suggested strategies.

(d) Various strategies to control water-related diseases were suggested. The most common strategies involved provision of safe water supplies, controlling vectors, eradicating vectors and the provision of medicines or vaccines.

Question 4

(a) Nearly all candidates were able to name a predator, consumer and producer from the food chain diagram.

(b)   Few candidates were able to achieve full credit by correctly naming four physical factors that affect an ecosystem. Many answers included human factors or activities.

(c)   This question was well answered. Many candidates gained full credit for suggesting ways wildlife might be affected by deforestation. The strongest answers began by explaining that once species lost their habitat, they were likely to lose their food supply, and went on to describe how this would impact on food chains.

Question 5

(a)   Most candidates described the distribution of areas with a hot desert climate shown on the map with reference to the Tropic of Cancer and the Tropic of Capricorn. There were also references to locations on the western sides of continents and to the large areas of hot desert in Africa.

(b)(i) The strongest answers suggested that being economically poor was a reason why few countries in hot desert areas used desalination for fresh water supplies as it is an expensive process. Many of these went on to explain why desalination is expensive. Some candidates described how some hot desert countries could not use desalination because they did not have access to ocean water as they were landlocked.

(ii)   Few candidates were able to suggest one environmental problem caused by desalination. The most successful answers were about damage to marine ecosystems caused by fish and other organisms being killed in the machinery used by desalination plants. Some responses also suggested that the waste from desalination plants increased the salinity and temperature of the nearby ocean, reducing water quality for local ecosystems.

(c)   A variety of ways were described for improving the quantity of fresh water available. There were good descriptions of the use of aquifers, wells and dams, pipelines from neighbouring countries and rainwater harvesting. Some answers focused on ways of conserving water so that more was available. A small number of candidates described ways of improving the quality of fresh water when the question was about the quantity of fresh water.

(d)   There were many sound explanations of why some countries have plentiful supplies of fresh water with reference to annual rainfall, rivers, lakes and groundwater. Some candidates wrote about how some countries had fewer people needing to use the water that was available.

Question 6

(a)(i) Most candidates were able to name China as the country with the largest population under 15 years of age. Some candidates did not make effective use of the scale lines 'population in millions' on the population pyramids in the diagram and gave Ethiopia as the answer.

(ii)   Most candidates were able to name Ethiopia as the country with a steadily increasing birth rate.

(iii)   Most candidates were able to rank the three countries in the correct order of population of males in the age group 25 to 29. A small number of candidates ranked a different age group or ranked from lowest to highest, when highest to lowest was indicated at the side of the table.

(b)   There were many vague answers about the meaning of the term *infant mortality rate*. Most candidates referred to the death of babies, children or young people. Reference was needed to children or babies under the age of one.

(c)(i) Candidates who performed well on this question, asking for reasons why China ended its one-child policy, made some good suggestions. These included the problems caused by: few young people, few women, single male children, large numbers of males, few workers and an ageing population with many elderly people (parents and grandparents) who expected to be looked after by their children in their old age. There were a number of vague answers about the Chinese people protesting about the policy and problems caused by migration from the country. There were also descriptions of why the one-child per family policy was introduced; these descriptions did not answer the question set.

(ii) Most candidates were able to describe at least two strategies, other than a one-child policy, for managing population growth. There were frequent references to family planning and contraception, education (especially the education of girls and women) and controlling migration.

ENVIRONMENTAL MANAGEMENT

Paper 0680/21
Paper 2

Key messages

Most candidates attempted all the questions in the paper, although some needed to pay greater attention to the command words within questions, such as 'describe' and 'explain'. Factually correct information that did not apply to the question asked could not be awarded credit.

A greater proportion of candidates were able to use appropriate technical terms, although they were not always able to define them accurately.

The quality of responses within the extended writing questions showed good improvement; candidates demonstrated skills in developing a reasoned response. These skills should continue to be encouraged in centres. Candidates could have benefited from including specific examples to support their statements.

General comments

Candidates showed evidence of good preparation for some subject areas and many were able to respond confidently on many topics.

There was a general weakness in the understanding and labelling of plate boundaries and equally a weak understanding of the development of geothermal energy. Similarly, candidates were challenged when requested to provide an accurate definition of an ecosystem.

Candidates showed good evaluative skills when evaluating the response of the authorities to a natural disaster, providing justifications for their views.

There has been a general improvement in the quality of writing for the extended responses – candidates relied less on a series of bullet points. This is good practice and provided scope to meet the higher demands of some of these questions, particularly where candidates backed up their statements with examples.

Comments on specific questions

Question 1

(a) (i)   Most candidates showed a clear understanding of the potential benefits and negative impacts of tourism on national parks. Many identified the opportunity for income or employment and many also stated the opportunity for education. The negative impacts were less clearly stated, although many identified the risk of litter and the potential impact on the natural behaviour of animals.

(ii)   Most candidates showed a good understanding of the ways in which the impact of tourism could be reduced.

(b)   Candidates appeared to have good knowledge of the reasons why people continue to live in earthquake zones; citing a range of economic, employment and cultural reasons.

(c) (i)   Most candidates plotted the missing points on the graph and were able to apply the correct scale to their plots.

(ii)   Very few candidates were able to calculate the temperature range correctly. Some candidates mistakenly read the lowest point as –4 °C.

(iii)   This calculation, requiring the addition of a selection of data from the table, proved less problematic to candidates.

(iv)   While many candidates made an attempt to describe the trends within the data, some responses showed confusion and some lacked detail. There was a general understanding of the need to quote specific data to support the answer; this was achieved with a variety of success.

(v)   Most candidates were able to identify the element of weather being measured by each instrument. Fewer candidates could name the instruments.

(vi)   Most candidates were able to describe the types of problems people would experience after a flood. The question related to floods in general so responses were credited even if they were not typical within the scenario described in the previous parts of this question.

(d)   Most candidates were able to identify the impact of global warming and the melting of the ice. The most common incorrect answer was to link the change to the movement in plate boundaries.

(e) (i)   Many candidates found the labelling of the diagram challenging, most commonly incorrectly identifying the location of the oceanic plate.

(ii)   Many candidates correctly identified the subduction zone at point **X**.

(iii)   Indicating the movement of the plate boundaries proved challenging for many candidates. Most identified the correct general direction but did not clearly show the movement of the oceanic plate in the subduction zone.

(f)   A longer response question marked using a level of response mark scheme. Responses gaining credit looked at the potential of geothermal energy and evaluated its suitability to meet future demand. Many responses could have gained further credit by providing greater detail and including specific examples. The strongest responses provided a balance of views from a global perspective, for example, the fact that not all areas have ready access to geothermally heated groundwater.

Question 2

(a) (i)   Most candidates correctly identified bitumen from the information provided in the resource.

(ii)   While most candidates were able to identify one reason, only a small number were able to provide two suggestions to obtain full credit. Some candidates were unable to link their reasons to economic factors.

(b)   Candidates appeared well prepared for a question on crude oil formation. Many answers were detailed and achieved full credit.

(c) (i)   Many responses showed good knowledge of the impacts of deforestation.

(ii)   A significant number of responses described ways of developing forests, such as through replanting, rather than focusing on the efficiency of use of the existing trees.

(iii)   Many candidates found it difficult to provide a comprehensive answer relating to the sustainable management of forests. Few identified that increased demand for timber would have an impact on sustainable cultivation. Many responses were vague and would have benefited from greater detail.

(d) (i)   Responses showed an understanding of the issues that would impact people during a wildfire. The stimulus material provided a framework, which candidates enhanced with their own knowledge.

(ii)   Definitions of the term 'ecosystem' were variable. Some candidates had clearly prepared and learned the definition whereas many others were vague and did not demonstrate a good understanding of the term. Descriptions were often more closely linked to the definition of a 'habitat'.

(iii) The impacts of the fire on the environment were generally well understood, with most responses focusing on habitat destruction, and stronger responses extending to acid rain and loss of trees resulting in soil erosion. The best responses also linked the ash and soot in the atmosphere to the reduction in plant growth.

(iv) This question gave scope for candidates to form an opinion on the effectiveness of the local government's response to the emergency. Using the information, it was possible to conclude that this response was either effective or not effective. Those scoring maximum credit provided an answer which highlighted both positive and negative effects.

(e) (i) Most candidates were able to use the bar graph to identify the amount of oil available in Canada.

(ii) Most candidates were able to use the graph to identify a country with more oil reserves than Canada.

(iii) Many candidates were able to calculate the percentage of oil stored as oil sand successfully. Credit was allowed for correct calculations using the response from **Question 6(e)(i)** if that answer was incorrect.

(f) (i) This question was attempted with some success by most candidates. The command word was 'describe', which meant a description of the restoration method was needed to gain full credit. A number of the responses only stated a method of restoration.

(ii) This was the second longer response question marked using a level of response mark scheme. There was clear evidence of candidates being prepared for this type of longer response question; answers having a logical structure, developed ideas and forming a conclusion rather than producing lists or bullet points, which could have limited the potential credit available.

The phrasing of the question gave candidates scope to look at a wide range of environmental and social issues, highlighting the challenges faced in providing employment and developing the economy while conserving the environment. A range of conclusions could be drawn as a result; the best responses identified both positives and negatives and supported their arguments with specific examples.

ENVIRONMENTAL MANAGEMENT

Paper 0680/22
Paper 2

Key messages

Most candidates attempted all of the questions within the paper. Some candidates needed to have read the questions more carefully to ensure that they understood what was being asked. Factually correct information that did not apply to the context of the question could not be awarded credit.

The application of mathematics within the paper was generally good, although candidates were challenged by percentage increases.

A greater proportion of candidates were able to use appropriate technical terms, although they were not always able to define them accurately.

The quality of responses within the extended writing questions showed good improvement; candidates demonstrated skills in developing a reasoned response. These skills should continue to be encouraged in centres. Candidates could have benefited from including specific examples to support their statements.

General comments

Candidates showed evidence of good preparation for some subject areas. Responses also showed a good understanding of concepts such as habitat loss.

There was a general weakness in the understanding and application of agricultural practice, for example, relatively few candidates were able to describe intensive production accurately and similarly did not clearly describe the impact of pesticides, the alternatives available or the application of genetically modified crops.

There were some instances of candidates missing out on the requirements of the task or question, most notably when a response was required to be circled on the paper as in **Question 1(a)(ii)**.

There has been a general improvement in the quality of writing for the extended responses – candidates relied less on a series of bullet points. This is good practice and provided scope to meet the higher demands of some of these questions, particularly where candidates backed up their statements with examples.

Comments on specific questions

Question 1

(a) (i)   Describing the distribution of coffee growing areas on a world map was attempted by most candidates, and most identified the significance of the tropical regions. Some responses also included the naming of specific countries where coffee was grown and these were also given credit.

(ii)   Using the data in the table, most correctly identified that *Coffea canephora* was the species most tolerant of the widest range of soil pH. Incorrect responses were spread between the other coffee species. A few candidates did not provide a response and may have benefited from reading the question more carefully.

(iii) While many candidates were able to interpret the widest pH range in the previous question, few understood the reasons why an incorrect soil pH would impact on plant growth. The strongest responses identified the inability of a plant to take up key nutrients or their lack of availability at a different soil pH.

(iv) Relatively few candidates understood the factors that affect soil pH. The most common correct factor cited was the impact of acid rain. Some identified the impact of agriculture. The application of fertilisers gained credit; however, the application of pesticides is unlikely to have a significant impact on soil pH and did not gain credit.

(v) This question required the candidates to make a recommendation based on using the information in the table together with a description of a growing site. While there was only one species that fitted the criteria best, candidates were given credit where they identified a suitable attribute of another coffee species.

(b)(i) Candidates were required to identify the type of farming shown in the photograph. The photograph did not show any livestock and included coffee in plantations (labelled). This meant the correct response was commercial croplands.

(ii) Many candidates had difficulty in adequately defining 'intensive farming'. The key features required were an indication of high inputs and high yield from an area of land.

(iii) This question, requiring candidates to identify both an advantage and a disadvantage of increasing mechanisation of harvesting, was found to be challenging. Some responses identified 'cost'. This needed contextualisation to be creditworthy. The most common error was a lack of focus on harvesting and relating the answer to farming in general.

(c)(i) Most candidates provided responses which gained some of the credit available and the more comprehensive answers gained full credit. These typically included a range of different ways to control pests.

(ii) A calculation requiring the addition of a percentage to a value. The most common error was for candidates to omit to add their increase to the original amount.

(iii) Many responses correctly identified the risk of toxic effects on humans, although many incorrectly suggested that the use of pesticides would impact on the flavour of the coffee. Wider issues, such as the impact on the environment, were less commonly commented upon.

(iv) While many candidates were able to identify the opportunity to provide disease resistance with genetic modification, few were able to describe the process by which this took place.

(v) Candidates had difficulty in providing three distinct reasons why people might not be in favour of the introduction of genetically modified crops. Most commonly, responses identified people's concerns that the long term impact is not fully known. Many incorrectly identified a change in taste.

(d)(i) Most candidates were able to identify some of the impacts of the removal of trees on the local ecosystem. Many focused answers on the reduction of habitats. Some also identified the broader impacts of changes to weather patterns. These were credited if they were related back to the local ecosystem. Most responses included some links to soil erosion.

(ii) Candidates were required to produce answers which related to the preservation of the specific trees in the area. This meant that responses which linked to replanting were not given credit within this situation. Stronger responses identified the need for farmers to have land and suggested providing other areas for crops, which would preserve the current trees.

(e) A longer response question marked using a level of response mark scheme. The strongest responses from candidates looked at a range of sustainable agricultural techniques and evaluated their suitability to meet future demand. Many responses lacked sufficient detail and could have benefited from including specific examples. The best answers provided a balance of views and a global perspective. Few responses were written in bullet point format which is an important development in the way this type of question is answered.

Question 2

(a) (i)   Many candidates found this question challenging. Candidates needed to circle their estimate. A number of candidates estimated the percentage of the final total rather than the percentage increase.

(ii)   Most responses correctly named construction materials as showing the greatest growth and were able to link this to the growth in world population and either the need for more houses or infrastructure.

(iii)   Relatively few responses adequately suggested reasons for the change in proportion of different metals used and most did not convey the idea that global use of all metals had increased greatly. The strongest responses included the change in demand due to new technologies and the ability to recycle existing materials. Cost was credited if the response was suitably contextualised.

(b) (i)   The reduction of waste from industrial processes was poorly described. Credit was awarded for stating a method and additionally for providing a suitable example.

(ii)   Candidates needed to calculate the missing data on a pie graph. Most candidates correctly added up the percentages provided to calculate the percentage required. Some attempted to measure the angle of the segment which was a more complex method. Both methods were capable of providing a suitable answer.

(iii)   Using the pie graphs, most candidates were able to rank type of waste in order of size. Some candidates incorrectly used the middle income countries data.

(iv)   Using the data, candidates were required to provide trends that included how the proportion of the specified wastes changed with income.

(v)   The pie graphs showed data on household waste so responses needed to relate to household waste rather than other waste generated within a country. Most candidates gained some credit, either for the organic waste or the paper and cardboard waste. A small number of responses gave both similar consideration and gained maximum credit.

(vi)   Most candidates were able to use the information in the text to identify how the new scheme would benefit local people.

(vii)   Few candidates understood how the organic matter would reduce the need for water through acting as a mulch or suppressing weeds which might compete with the crop. Many candidates suggested that greater soil nutrients or a faster growing plant would need less water.

(viii)   Most candidates correctly identified the opportunity for the organic waste to provide methane or biogas as a fuel.

(c) (i)   Good examples of building design features were seen, which related to both cold and warm climates. A number of candidates did not focus on the requirements of the question and described how building design might make the building resistant to earthquakes rather than design features which would reduce the use of future resources such as electricity.

(ii)   A diverse range of scenarios were accepted as suggestions for reasons why building regulations might not be as strict, the most common responses including the cost implication in building, the abundance of energy resources or the lack of enforcement of regulations.

(d) (i)   While many candidates could see the advantages of importing gas from a neighbouring country, many did not fully grasp the risks this might involve linked to international relations, the risk of significant price rises or continuity of supply.

(ii)   While many responses contained an idea relating to waste emissions, this was poorly articulated in many answers. Some incorrectly stated that methane use did not produce carbon dioxide. The best responses made a comparison between coal and methane.

(e) This was the second longer response question marked using a level of response mark scheme. As with **Question 1(e)**, there was evidence of a general development in the structuring of answers rather than the production of a list or bullet points, which could limit the potential credit awarded.

The phrasing of the question gave the candidates scope to look at a wide range of waste disposal methods as well as their impact on the environment. Many candidates were able to do this well and provided suitable examples. Weaker responses lacked supporting evidence to back up their statements. Most answers demonstrated a good command of language.

ENVIRONMENTAL MANAGEMENT

Paper 0680/23
Paper 2

Key messages

Most candidates attempted all of the questions within the paper. Some candidates needed to have read the questions more carefully to ensure that they understood what was being asked. Factually correct information that did not apply to the context of the question could not be awarded credit.

Most candidates dealt confidently with interpreting data within graphs and were able to quote information correctly, although sometimes candidates were unable to interpret what the information meant or how it could be applied.

In **Question 1(e)(i)** and **Question 2(f)**, the extended writing questions, many candidates showed evidence of taking time to structure their answers and provide responses that represented both viewpoints. There was still opportunity for greater success within these questions by providing examples to support a viewpoint.

General comments

Candidates showed evidence of good preparation for some subject areas for example, eutrophication. Others areas were weaker amongst the cohort, for example, the way in which a soil could be improved and the nitrogen cycle. Descriptions of the process of photosynthesis were also lacking in detail.

While there was a general confidence with interpreting diagrams and graphs, there was a weakness in understanding what the data meant: notably few candidates were able to describe and explain what was happening to electricity generation at different wind speeds.

Candidates responded well to the requirements of the extended writing questions, marked on the quality of the whole response using a level of response mark scheme. Answers relied less on a series of bullet points. This is good practice and provided scope to meet the higher demands of some of these questions, particularly where candidates backed up their statements with examples.

Comments on specific questions

Question 1

(a) (i)   Most candidates were able to rank the greatest increases in production by interpreting the information in the table.

   (ii)   Most candidates were able to identify the crop with the largest decrease in both area and total production.

   (iii)   This question proved to be more difficult for candidates. Most identified the key reason was lack of demand, although many candidates focused on local reasons rather than world total production.

   (iv)   Some candidates seemed well prepared with several possible reasons for the increase in rice production.

(b) (i)   Many responses showed a lack of knowledge on the practical ways a soil may be adapted to change its properties to suit a crop. While many achieved credit for referring to fertilisers, fewer candidates were able to describe a way of changing soil pH or improving drainage.

(ii)   Few candidates were able to explain why good aeration is needed for plant growth. Many answers related to water rather than the requirement for oxygen for successful root growth.

(iii)   Few candidates understood ways the aeration of the soil may be damaged. More able candidates were able to identify an example such as use of machinery or trampling by livestock. Many incorrectly assumed that the application of pesticides would be an issue.

(c) (i)   Interpretation of part of the nitrogen cycle proved challenging for many candidates, although the provision of four answers to choose from made it more accessible. This was a topic that was generally poorly understood.

(ii)   Most candidates understood that animals need to eat either plants or animals to obtain protein.

(iii)   Candidates were able to identify the impact nitrates would have on rivers and lakes, naming eutrophication and describing the processes involved.

(d) (i)   Most candidates correctly identified grass as the producer in the food chain.

(ii)   While generally correctly calculated by the more able candidates, weaker responses mostly calculated a cumulative loss of energy through the trophic levels.

(iii)   Well prepared candidates readily identified three ways in which energy may be lost between trophic levels. Other responses were more variable in their success.

(iv)   The description of the process of photosynthesis proved to be difficult for many candidates. Most achieved some credit, but responses were too limited to achieve all of the credit that was available.

(e) (i)   A longer response question marked using a level of response mark scheme. The strongest responses gave a balanced view covering both sides of the argument and reached a conclusion. These responses also covered a number of issues such as freedom of choice as well the environmental impacts. Some answers also identified the issue that not all areas are suited to crop production but could support livestock.

(ii)   Stronger responses identified a range of reasons that governments might still allow for deforestation, citing the needs of a growing population, the use of timber itself or the need to access resources to improve the country's economy.

Question 2

(a) (i)   Most candidates were able to identify suitable economic advantages for mineral extraction either to individuals, the local community, or the nation.

(ii)   Most candidates were able to identify different reasons why mines might close. Responses that were too general, such as 'pollution', were not given credit unless they were clearly linked to the specific question.

(iii)   This was generally well answered. Some candidates needed to use suitable descriptive responses, such as 'North' rather than phrases such as 'above' or 'on top'.

(iv)   Many candidates were able to identify one reason for an inability to detect a reserve. Reasons for inability to mine a reserve were not given credit.

(b) (i)   Many candidates found the focus of this question, linked to economic issues, more challenging. The impact on the economy was commonly cited and a few candidates also mentioned the risk of conflict or war.

(ii)   A number of candidates identified valid reasons for the decision not to extract oil from Antarctica. Reasons varied from the ownership of areas through to environmental damage.

(c)   This proved challenging for many candidates, requiring them to identify an environmental and an economic advantage for fuel types that they may often refer to negatively. More able candidates gave some good reasons. Weaker responses cited 'cost' and 'clean' with no context, which was not awarded credit.

(d)(i)   Most candidates were able to use the diagram to identify benefits of chimney design **A** over design **B**. Most identified the height of the chimney putting gases higher into the atmosphere. A small number identified the taller chimney might prevent gases being caught in a temperature inversion nearer the ground.

(ii)   A wide range of potential answers were given credit, from reforestation to counteract the carbon dioxide emissions, through to the use of coal with lower sulfur content. Other technologies known to reduce chimney particulate emissions, such as spraying the smoke with water, were also given credit. Credit was limited if no explanation was given for named strategies.

(e)(i)   While many candidates identified the output in the two zones, relatively few were able to provide valid reasons, namely the turbine reaching maximum output and the need to switch off to prevent damage when wind speeds were too high.

(ii)   A relatively challenging question for many candidates who were unable to conclude that at the expected wind speeds the turbine would not be working at maximum efficiency and would have been generating lower amounts of electricity during part of the period.

(iii)   Many candidates were able to interpret the diagram and justify reasons for the best location of a wind turbine.

(iv)   Almost all candidates were able to recall two other renewable energy sources.

(f)   This was the second longer response question marked using a level of response mark scheme. There was considerable variation in the quality of answers, the strongest were well structured and provided examples to support the ideas presented. Many answers were brief and provided little detail thus limiting the credit awarded. Few responses were written in bullet point format which is an important development in the way this type of question is answered.

ENVIRONMENTAL MANAGEMENT

> **Paper 0680/03**
> **Coursework**

Centres should be aware that this is the <u>last</u> assessment series for this component. <u>From 2019, the new assessment model for Environmental Management 0680 comes into effect.</u> Skills contained in this component will now be assessed in written examinations. For more information please refer to the new syllabus https://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-igcse-environmental-management-0680/

General comments

Candidates continue to demonstrate their enthusiasm about their own local environment, through their investigations of issues in their localities.

Some interesting environmental topics were explored with some very thorough reporting of the issues involved. Some candidates chose topics which would have been ideal for environmental management coursework, but needed to go on to look at choices available for sustainable development of the resource, in order to fulfil the requirements for Domain C.

Comments on specific questions

Domain A

The credit awarded for Domain A illustrated that the basic processes continue to be taught well and that the specification continues to engage candidates with local environmental issues.

Domain B

Most candidates employed a variety of investigative skills; consequently, the credit awarded for Domain B was generally high. There was also some extremely proficient presentation of data, using a wide range of techniques.

Domain C

A thorough review of possible choices available for sustainable development should be the main focus for Domain C. For criterion 7, all interested parties need to be canvassed as to their opinions and a thorough assessment of the factors behind their value positions needs to be carried out. This data can then be worked into a management plan with a consideration of constraints and advantages.

Domain C continues to be the weakest of the three domains. It would benefit candidates to look ahead when they begin their investigation and consider in advance the options which are available to achieve sustainability.

Cambridge Assessment
International Education

ENVIRONMENTAL MANAGEMENT

Paper 0680/41
Paper 4

Key messages

- Candidates should read the source material and the question carefully.
- Data from graphs or tables should be used to help describe trends or patterns.
- Candidates should always make statements using precise terminology.
- Both axes of any graph should be fully labelled with units.

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one country, Mexico. 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.

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

Comments on specific questions

Question 1

(a) Most candidates described at least one problem associated with rural to urban migration.

(b)(i) This calculation was usually carried out by an appropriate method that produced a correct answer.

(ii) Nearly all candidates identified some possible benefits to the government. Some answers made a general comment about the benefits to a farm rather than identifying a clear benefit to farm workers.

(iii) Most candidates gave at least one good reason for farm workers leaving their job and moving to the city. All of the points on the mark scheme were seen regularly.

(c)(i) Nearly all candidates completed the calculation correctly.

(ii) Most candidates correctly calculated the average number of strawberries per tray.

(iii) Only a small number of candidates clearly stated that **method one** was not representative of the whole strawberry field.

(iv) Many candidates made at least one suggestion as to why **method three** was better than **method two**. A number of candidates gained full credit.

(v) Most candidates completed the sampling grid correctly from the information given.

(vi) Nearly all candidates presented a table that gained full credit.

(d)(i) Some candidates misread the question and calculated the average temperature rather than the average temperature range.

(ii)   Most candidates gave descriptions of the data without explaining why plant growth could occur all year round in this region. A small number of candidates showed very good understanding and suggested all of the creditworthy points.

(iii)   Nearly all of the candidates stated the six months when irrigation would be needed. There were a small number of answers that only gave five months so they could not gain credit.

(iv)   About half the candidates named a water saving method of irrigation.

(v)   There were many good descriptions of how over-watering can damage soils. The key points of dissolving salts followed by evaporation and salt deposition at the surface were made by at least half the candidates.

(vi)   The problems associated with growing the same crop year after year were described; in some cases candidates needed to be more precise in their answers to gain full credit.

(e) (i) Candidates suggested sensible risks to human health from cooking on open fires.

(ii)   Most candidates calculated the percentage of the population cooking on open fires correctly.

(iii)   Most candidates gave at least one sensible reason why people did not want to change to the new cooking stove.

(iv)   Almost all candidates gave at least one sensible method the government could use to encourage more families to use the new cooking stove.

(v)   Nearly all candidates gained some credit for suggesting how using the new cooking stoves could reduce the impacts on the environment. All the points on the mark scheme were seen regularly, although only a small number of candidates made three clear points to gain all of the credit available.

Question 2

(a) (i) Candidates often made suggestions that only partly answered the question. The information given in the question was an indication that overfishing was unlikely in this location.

(ii)   Most candidates found it difficult to suggest basic sampling methods that could be used at each of the sites **A** to **F** in the same way.

(iii)   Candidates had little difficulty plotting the data for this bar graph. Full credit could have been achieved more frequently if more responses had included both axis labels and ensured they were complete.

(iv)   Most candidates selected the appropriate sample site and gave a reason for their choice.

(v)   Many candidates gained some credit for describing the impact of raw sewage on a lake ecosystem. However, only a small number of candidates described the impacts in a logical order, gaining maximum credit.

(b)   Candidates suggested a range of strategies for development around a lake without damaging the lake ecosystem. A small number of candidates gave four different suggestions that gained all of the credit available.

ENVIRONMENTAL MANAGEMENT

> **Paper 0680/42**
> **Paper 4**

Key messages

● Candidates should read the source material and the question carefully.
● Data from graphs or tables should be used to help describe trends or patterns.
● Candidates should always make suggestions using precise terminology.
● Both axes of any graph should be fully labelled with units.

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one country, Mexico. 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.

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

Comments on specific questions

Question 1

(a) (i) Many candidates correctly calculated the temperature range. Others misread the question and calculated the average temperature.

(ii) The temperature difference between the two locations was calculated correctly by many candidates.

(iii) This calculation required candidates to work out the expected temperature at Farm **A**. Farm **A** was at a lower altitude so candidates needed to work out the difference in temperature between the two farms and then add this to the April temperature. Most candidates gained some credit, with a few gaining full credit.

(b) (i) Only a small number of candidates correctly identified photosynthesis as the process that captures carbon dioxide.

(ii) Some candidates clearly identified that Farm **A** would be warmer than Farm **B**. Candidates who recognised the temperature difference usually gave a correct suggestion to explain why the fruits ripened more quickly on Farm **A**.

(iii) Most candidates identified that the time period between January and May had low rainfall, and many of these went on to explain the implications on the absorption of fertiliser. A small number of candidates focused on temperature from the table of data and, therefore, could not explain why fertiliser was added.

(iv) Many candidates suggested that some fertiliser would be washed away from the trees. In some cases the impact on the trees was described rather than the impact on the environment. The candidates who realised that fertiliser may enter water bodies nearly always gained maximum credit for some description of the events leading to eutrophication.

(v)   Nearly all candidates gained at least some credit for suggesting reasons why crops were not grown between the trees. Some candidates were able to provide three distinct reasons and gained full credit.

(c)   Most candidates gave at least two benefits of exporting avocado fruits that were worthy of credit. Candidates needed to consider benefits for farmers and benefits for the government to gain full credit.

(d)(i) Candidates found this challenging. A small number of candidates performed a correct calculation to give the correct percentage increase.

(ii)   Almost all of the candidates displayed some knowledge of how deforestation can lead to soil erosion. A small number were able to give sufficient details to gain maximum credit.

(iii)   Most candidates gave at least one method of developing new varieties of plants. Many candidates showed awareness that plants could be modified by transferring genes.

(e)(i) Most candidates completed the calculation correctly.

(ii)   Most candidates completed the calculation correctly.

(iii)   About half the candidates described a suitable safety instruction that should have been included in the method.

(iv)   Nearly all candidates gave two correct uses of the seeds and skin of avocado fruits on a farm.

Question 2

(a)(i) Many candidates plotted the data correctly as a bar graph, although some candidates did not label both axes correctly.

(ii)   The trend was correctly described by most candidates.

(iii)   Candidates had little difficulty in suggesting at least one reason for the trend in copper price.

(b)(i) Many candidates gave one correct suggestion as to why development at mine **F** was stopped. Some candidates incorrectly suggested that all the copper had already been extracted from the mine.

(ii)   Many candidates had difficulty in describing the need for an environmental impact assessment before a mine is developed.

(iii)   Most candidates suggested at least one strategy for reducing the impact on the environment after a mine has closed. Some candidates were able to fully describe the strategies and gain all of the credit available for this question.

(c)(i) Most candidates provided at least one reason why local people would want mining to start again.

(ii)   Most candidates made some suggestion as to how starting mining could reduce the impact of logging in the area; however, only a small number of candidates gained full credit.

(iii)   Many responses gave some possible reasons for water pollution caused by mining; however, many answers needed greater clarification to achieve full credit.

(d)(i) Many candidates found it difficult to describe a suitable sampling method.

(ii)   Most candidates were able to suggest at least one benefit of tourism to local people.

(iii)   Candidates needed to use the information given. Those that did so were able to suggest why local people considered this example of tourism to be a sustainable activity.

(iv)   Most candidates presented one further question to add to the questionnaire that was worthy of credit. The question needed to be about tourism.

(e)   Many candidates made at least one sensible suggestion as to how the festival could help conserve the monarch butterfly.

ENVIRONMENTAL MANAGEMENT

> **Paper 0680/43**
> **Paper 4**

Key messages

- Candidates should read the source material and the question carefully.
- Data from graphs or tables should be used to help describe trends or patterns.
- Candidates should always make suggestions using precise terminology.
- Both axes of any graph should be fully labelled with units.

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one country, Tanzania. 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.

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

Comments on specific questions

Question 1

(a) Many candidates suggested at least two appropriate reasons why the government might want crop production to increase.

(b)(i) Nearly all candidates displayed a good understanding of how trees help to prevent soil erosion.

(ii) Most candidates understood the term profitability, although many candidates found it difficult to describe how the profit could be used on the farm.

(iii) Most candidates could describe at least one way of improving crop production without damaging the environment.

(c) Nearly all candidates used the scale correctly to state a distance between the two locations shown on the map.

(d)(i) Nearly all candidates correctly calculated the total number of households sampled.

(ii) Most candidates found it difficult to explain why a large number of households were sampled. Many referred to reliability rather than the sample being representative.

(iii) Candidates found this challenging. A small number of candidates suggested a credible method for selecting a sample of 30 households from the 75 households.

(e)(i) Nearly all candidates correctly calculated the total average household income.

(ii) Candidates found this challenging. A small number of candidates performed a correct calculation of the percentage.

(iii) Almost all the candidates gave a sensible use for each natural resource.

(iv) Many candidates used an appropriate linear scale to plot the bar graph. Some candidates gave incomplete axis labels, especially for the *y*-axis.

(f) (i) Many candidates had difficulty giving reasons as to why the villagers were paid for collecting plants. Responses gained credit for an advantage for either the scientist or the villagers.

(ii) Many candidates gave one sensible advantage of knowing the scientific names of plants. Some candidates were able to give two distinct advantages and gained full credit.

(g) (i) Most candidates were able to gain some credit for explaining why **plan two** was better than **plan one**, although a number of answers repeated their explanation rather than giving any further explanation.

(ii) About half the candidates gave an advantage of taking photographs of the plants.

(iii) Nearly all candidates presented a table that gained full credit.

(iv) Most candidates considered the information given to them and selected the variable that the student did not record.

(v) Many candidates suggested a suitable piece of information the student could have recorded.

Question 2

(a) (i) Many candidates explained at least one benefit of the new roads to the people in Tanzania, although only a small number explained three different benefits of the new roads.

(ii) Nearly all candidates attempted completing the diagram as the question asked. Many candidates gained most of the credit. The position of the bridge was sometimes not indicated.

(iii) Successful candidates used the information given and their knowledge to explain why the road and bridge should be located through the narrowest area of wetland and connect to the main road. Most candidates suggested at least one reason.

(iv) Many candidates gave at least one appropriate suggestion as an instruction to road builders to reduce the environmental impact of road building. Only a small number of candidates gave three different reasons.

(b) (i) Many candidates fully described the changes in plant species and gained full credit. Some candidates did not distinguish between plant species and number of plants and so could not gain all of the credit available.

(ii) Most candidates identified the unexpected result and gave a suitable reason for their choice.

(iii) Only a small number of candidates described the use of the equipment shown in the question with sufficient attention to detail to gain maximum credit. There were a significant number of responses that were unable to gain credit.

(iv) Candidates who used the information from the table had little difficulty in describing the changes in plant biodiversity that supported the conclusion. A small number of candidates made generic statements without reference to the information given.

(v) Many candidates gave two clear ways of improving the survey. A small number of candidates made generic statements which were not always worthy of credit.