

ENVIRONMENTAL MANAGEMENT

Paper 0680/11
Paper 1

Key messages

Read each question carefully. Attention should be paid to the command word in the question before writing a response. Questions with the command words describe, explain or suggest need more detail than those that use name or state.

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 the answer, for example the answer space for **Question 1(c)** had numbers and lines for describing three benefits of living near a volcano.

When questions use resources (such as diagrams, graphs, maps or tables) the resource should be studied very carefully. This is particularly important when a question has more than one resource, for example **Question 6** had a map and a table.

General comments

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

The handwriting of some candidates was difficult to read. Candidates should try to write as neatly as possible.

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

Candidates should be reminded that the command words describe and explain have different meanings and require different kinds of answers. Many candidates did not gain any credit for **Question 3 (a)(iii)** because they described the trend shown on the graph instead of explaining it. Describe requires the candidates to write about the characteristics of something. Explain is about the causes of something, it is a way of asking for reasons.

Comments on specific questions

Question 1

- (a) (i) Most candidates completed the table of features correctly. Weaker responses included one or more of letters **X**, **Y** and **Z**, rather than using letters **A** to **F** as requested.
- (ii) Most candidates correctly identified **Z** as the oldest rock. **X** was the most common incorrect response.
- (b) There was a good understanding of the tectonic processes that occur at a constructive (divergent) plate boundary. Many candidates were able to provide a clear response gaining full credit. There were good descriptions of the non-violent gentle sided volcanoes formed at this type of plate boundary. A small number of candidates described processes at a destructive (convergent) plate boundary.

- (c) Most candidates correctly suggested at least two benefits for people living near volcanoes. Tourism, fertile soils for agriculture and geothermal energy were the most common benefits suggested. There was also reference to minerals such as sulfur and building materials such as basalt.

Question 2

- (a) (i) Most candidates were able to identify oceans as the largest water store that is saline.
- (ii) Candidates found this question more challenging. Ice and lakes were named most often as two world water stores that people can easily use for supplies of fresh water. The most common incorrect response was deep groundwater. A number of candidates seemed unsure about the relative accessibility of deep and shallow groundwater, although the depths were given in the table.
- (iii) Most candidates inspected the table carefully and stated correctly that 74.94% of fresh water is frozen. Some candidates gave the percentage of total water instead of the percentage of fresh water.
- (b) There were many competent answers suggesting a variety of ways a country could increase its supplies of fresh water, with most candidates making at least two good suggestions. Desalination was a popular response, along with aquifers, wells and dams. Other responses included boreholes, pipelines from neighbouring countries and rain water collection.
- (c) Most candidates gained credit for giving at least one reason why fresh water is often not safe to drink. The best responses saw candidates gaining full credit with detailed answers. Some reasons were about bacteria causing water-borne diseases, such as cholera and typhoid. Others were about the different ways water could be polluted. These included sewage, fertilisers and pesticides from agriculture, chemicals, and metals such as lead and mercury from industry. The best answers referred to danger in fresh water from named pollutants and diseases.

Question 3

- (a) (i) Nearly all the candidates correctly described the trend on the graph.
- (ii) Most candidates correctly calculated the change in carbon dioxide concentration in the atmosphere between 1960 and 2015.
- (iii) This question was not well answered. Many candidates described the trend shown on the graph instead of explaining it as the question asked. Those who understood the requirement of the question explained how the trend was caused by the burning of fossil fuels in power stations, factories and vehicles. There was also mention of the contribution made by deforestation and burning wood.
- (iv) This question proved challenging for many candidates. Some understood the question and wrote about the use of public transport and renewable sources of energy. Others seemed to misinterpret or misread the question. These candidates wrote about methods of reducing carbon dioxide, such as planting trees, rather than ways of reducing carbon dioxide emissions.
- (b) (i) The pie graph was completed successfully by most candidates; however, some candidates did not use some of the shading in the key correctly.
- (ii) This question required candidates to write about the extent to which limiting carbon dioxide emissions will reduce the warming of the atmosphere. Some candidates used the information in the table to provide a good answer. Others gave a general comment about the effect of carbon dioxide in the atmosphere which did not answer the question.

Question 4

- (a) (i) Nearly all the candidates were able to name two living components of an ecosystem from the diagram. The most common answers were people and animals.
- (ii) Some candidates found naming two physical components of an ecosystem from the diagram challenging. These candidates incorrectly named vegetation as a physical component.

- (b) (i) Many candidates found naming two of the world's natural vegetation zones challenging. All the vegetation zones in the syllabus appeared in various combinations in correct answers.
- (ii) The best answers gave three or four detailed reasons why people have destroyed much of the world's natural vegetation. The most common reasons given were to provide land for settlements, agriculture and mining and to provide wood for use as a raw material for industry.
- (c) Suggesting strategies for conserving a large forest area proved more challenging. There were many vague strategies involving stopping deforestation, banning poaching, education and fining or imprisoning people who caused damage. The more successful answers named strategies such as Biosphere Reserves, National Parks, selective logging, agro-forestry and community forestry and described these strategies.

Question 5

- (a) Most candidates were able to complete the six gaps in the passage using the diagram. The most common errors were in describing the areas heated by the Sun's rays and the distance the rays travelled through the atmosphere.
- (b) (i) Most candidates suggested that many countries are increasing their use of solar power because it is a renewable energy source. Many went on to say that solar power did not produce any greenhouse gases. Fewer candidates were able to gain credit for a third reason. There were a number of vague reasons that needed development to gain credit, such as solar energy being 'cheap', 'clean', 'available everywhere' and 'not causing pollution'.
- (ii) Many candidates realised solar energy could be a problem because solar panels use energy from daylight and so could not provide energy at night. Some explained that solar panels were not as effective if there were clouds or if it was raining. Very few mentioned that storing solar energy is a problem as the batteries are expensive and that another source of energy is needed at night, or that if a large amount of energy is needed a large area of land is required. As with the previous question, there were some vague responses, for example the Sun 'not being out' and 'the weather being too cold'.
- (c) Most candidates could name two other alternative energy sources.

Question 6

- (a) (i) Nearly all the candidates correctly named Canada, Australia and Russia as the three countries with underground mines.
- (ii) Nearly all the candidates correctly stated the type of mining in Africa as open-pit.
- (iii) Most candidates were able to use the table to correctly calculate the percentage of world uranium production that comes from mines in Kazakhstan. A small number of candidates calculated the percentage of world uranium production from mines in Kazakhstan as a percentage of all the countries listed in the table.
- (iv) There were many suggested advantages of in-situ leaching as a method of mining. Most candidates were able to suggest at least one valid advantage. Statements about, 'no pollution', 'no noise', 'cheap' and 'safe' needed further detail. Some of the best answers used the candidates' knowledge of other types of mining. For instance, 'in-situ mining does not cause visual pollution like the hole of an open pit mine or the waste heaps of a shaft mine', 'it is safer because there is no dangerous underground working', 'the mining operation is cheaper because there are no shafts and tunnels to construct and fewer workers to pay', 'people living nearby will not have the noise pollution, air pollution or visual pollution caused by the explosives and heavy machinery of an open-pit mine' and 'there is little impact on the environment, forests do not have to be cleared to provide the large sites needed for a deep shaft or an open-pit mine'.

- (b) Most candidates were able to suggest at least one valid reason why the Chinese government made plans to build nuclear power stations. The most common suggestion made was about reducing dependence on coal and reducing the air pollution it causes in China. Other suggestions were about China's rapid industrial growth requiring more electricity and that China has supplies of uranium to use in the power stations or could easily import uranium from Kazakhstan.
- (c) The explanations for why people do not want to live near nuclear power stations were variable with few candidates gaining full credit. While many candidates were familiar with the effects of nuclear radiation on human health and made reference to cancer and mutations, few linked radiation clearly to uranium and the fear of leaks or accidents. A small number of candidates suggested the power stations were radioactive. There were frequent references to air and water pollution, some candidates appearing to confuse nuclear power stations with fossil fuel-fired power stations.

ENVIRONMENTAL MANAGEMENT

Paper 0680/12
Paper 1

Key messages

Read each question carefully. Attention should be paid to the command word in the question before writing a response. Questions with the command words describe, explain or suggest need more detail than those that use name or state.

Attention should also be paid to any specific detail in the question. For instance **Question 1(b)** was about hazards to people not hazards to habitats or environments.

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 the answer, for example the answer space for **Question 2(a)** had numbers and lines for stating three changes.

When questions use resources (such as diagrams, graphs, maps or tables) the resource should be studied very carefully and be referred back to before a response is written.

When the answer to a question requires a calculation, it is good practice to check whether the answer calculated seems sensible, if in doubt, repeat the calculation to check the answer. For example, in **Question 3(b)** some candidates gave high numbers as their answer even though the price of a banana was low.

General comments

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

The handwriting of some candidates was difficult to read. Candidates should try to write as neatly as possible.

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

Candidates should be reminded that the command words describe and explain have different meanings and require different kinds of answers. Many candidates did not gain any credit for **Question 6(a)(i)** because they copied information about the fruit trees being grown successfully on the mounds when the command word in the question was explain. Explain questions need to offer reasons for something and sometimes using 'because' in the answer helps. For example, the fruit trees can be grown successfully on the mounds 'because the good drainage stops the trees from being waterlogged', 'because the warm soil allows roots to grow', 'because the south facing slopes will get sunlight to ripen the fruit' and 'because the goats provide natural fertiliser for the soil'.

Comments on specific questions

Question 1

- (a) All candidates attempted to fill the gaps in the passage using the map and many gained full credit. Where errors occurred, they were mostly in the sentence about the direction of cyclone movement.
- (b) There were many very good answers describing ways in which tropical cyclones are a hazard for people living in the areas affected. All the points on the mark scheme were seen. Some candidates wrongly included ways tropical cyclones are a hazard to the environment, such as soil erosion and damage to natural vegetation and ecosystems. A small number of candidates appeared to be answering a different question about the formation of tropical cyclones.
- (c) Most candidates were able to identify a range of appropriate strategies to reduce the impact of tropical cyclones. There was good knowledge of the use of satellites in forecasting tropical storms and of evacuation to prevent deaths. Only a small number of candidates mentioned appropriate buildings, with reference to windproof tiles, water resistant windows or ground floor walls designed to allow water to wash through a building rather than destroy it. Some candidates referred to evacuation to underground shelters when cyclone shelters need to be built on stilts.

Question 2

- (a) Most candidates made good use of the data in the pie graphs to state three changes. Some candidates used as evidence the percentage of a source used in 2010 and 2014, others worked out the percentage change. A small number of candidates were less precise, stating increases or decreases with no supporting evidence. Nearly all candidates stated that in 2010, 26% of Japan's energy was from nuclear power but that this source was no longer used in 2014.
- (b) Candidates found this question more challenging. Some wrote about uranium storage and not the advantages of using uranium over coal. The most successful answers described how nuclear energy does not produce carbon dioxide so does not contribute to global warming.
- (c) Answers to this question were variable. The most successful answers explained the risk of radiation from radioactive uranium leaking from the power station if there was an accident that had damaged the reactor. This leak was then linked to potential health problems for people living nearby, such as radiation sickness and cancer. There were many incorrect references to noise and air pollution and to the disposal of nuclear waste contaminating local water supplies.
- (d) Only some candidates gained full credit for this question. The successful candidates usually suggested using renewable sources of energy and gave an example. There were very few suggestions about saving energy by switching off electrical devices or designing more efficient nuclear reactors. Some candidates suggested ways to preserve or store uranium rather than conserve supplies.

Question 3

- (a) Most candidates successfully stated that commercial farming is growing crops or rearing animals to sell for a profit.
- (b) Most candidates correctly calculated the price of the banana that goes to the plantation worker.
- (c) Most candidates successfully described the distribution of the banana plantations shown on the map, with reference to the eastern side of South America and the Tropics of Cancer and Capricorn.

- (d) This question proved challenging for many candidates and few gained full credit. There were few references to bananas requiring a tropical climate, which can be found in many developing countries, or the demand for bananas in developed countries. Responses were often about cheap labour in developing countries. Some candidates gave general descriptions of primary, secondary and tertiary industry in developing and developed countries.
- (e) Many candidates confused pesticides with fertilisers and wrote detailed accounts of how pesticides cause eutrophication. Other candidates confused pesticides with herbicides and described how pesticides could harm plants. Some stated that pesticides caused soil erosion. A small number of candidates wrote about health hazards for people when the question was about problems for the environment. The more successful answers gave a clear account of the indiscriminate effect of pesticides on other species including pollinators and the potential accumulation in food chains.

Question 4

- (a) Most candidates were able to use the graph of the demographic transition model to complete the sentences with the correct stage.
- (b) Many candidates gave good explanations of environmental problems such as deforestation, caused by urbanisation; water pollution, caused by sewage and waste put into water bodies; and air pollution caused by fossil fuels burnt in power stations for electricity or used in vehicles. Some candidates wrote about problems for people caused by rapid population growth, such as limited availability of resources, rather than impacts on the environment. Some candidates did not make very good use of the framework provided for the answer.
- (c) Most candidates were able to suggest at least two strategies for managing population growth. There were frequent references to family planning and government policies. Some candidates wrote about specific examples, such as the old one child policy in China.

Question 5

- (a) (i) Most candidates were able to complete the bar graph by plotting the two bars accurately.
- (ii) Most candidates correctly calculated the percentage of world fish catch caught by the ten countries shown in the graph.
- (iii) Most candidates were able to suggest one reason why the fish catch in China, Indonesia, Myanmar and Vietnam is increasing. The most common suggestions were population increase, increased demand for fish as food and use of modern technology on fishing boats.
- (b) (i) Many candidates were able to suggest four appropriate strategies for the sustainable harvesting of ocean fisheries. The most popular strategies were quotas or annual limits for the amount and type of fish caught, closed seasons for fishing when fish are breeding, restricted areas where no fishing is allowed so fish stocks recover, limits on nets so young fish can escape, pole and line fishing and marine reserves. A small number of candidates wrote about ways of maximising fish catch.
- (ii) Candidates found this question challenging with few gaining full credit. The better answers explained that quotas were ignored, illegal nets were used, fishing boats went into restricted areas and reserves to fish, and when small fish or protected species were accidentally caught (bycatch) they were thrown back into the sea but these were usually dead.

Question 6

- (a) (i)** This question was not well answered. Most candidates simply re-stated information from the newspaper report without explaining why fruit trees can be grown successfully on the mounds.
- (ii)** Many candidates demonstrated a poor understanding of vegetational succession. Some candidates seemed to think that the vegetation was growing or evolving into different species, rather than changing the soil structure and enabling bigger plants to grow. Relatively few candidates were able to explain that the waste from mining was colonised by a pioneer community of lichens that could survive on the mining waste because they needed few nutrients. Then explain that the waste gets worn away by the weather into minerals and the lichens die and decompose adding organic matter to the minerals to form soil. As the soil gets deeper grasses and small plants are able to grow from seeds transported by wind, birds and animals. Over time these die adding humus to the soil. The seeds of shrubs, bushes and then small trees are able to germinate. Over time the number, size and height of species increases until finally there are large trees that form the climax community.
- (iii)** Most candidates were able to explain that goats feeding on shrubs and bushes stopped the development of climax vegetation on some of the mounds because this limited growth.
- (b)** Few candidates gained maximum credit on this question because they did not explain that before a mine can be used for farming or forestry the hole left from mining operations has to be filled in. Other uses that were suggested included detailed explanations of land fill sites for domestic waste, lakes on the site of open-cast mines and turning the sites of deep mines into mining museums.

ENVIRONMENTAL MANAGEMENT

Paper 0680/13
Paper 1

Key messages

Read each question carefully. Attention should be paid to the command word in the question before writing a response. Questions with the command words describe, explain or suggest need more detail than those that use name or state.

Attention should also be paid to any specific detail in the question. For instance **Question 5(c)** was about push factors; a number of candidates wrote about pull 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 the answer, for example the answer space for **Question 3(b)** had numbers and lines for stating three impacts.

When questions use resources (such as diagrams, graphs, maps or tables) the resource should be studied very carefully and be referred back to before a response is written.

General comments

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

The handwriting of some candidates was difficult to read. Candidates should try to write as neatly as possible.

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

Comments on specific questions

Question 1

- (a) (i) Most candidates were able to match the letters on the map to the descriptions.
- (ii) Candidates found this question more challenging. Few candidates were able to describe how the plate boundaries went down the centre of the Atlantic Ocean but formed a ring around the edge of the Pacific Ocean.
- (b) Most candidates were able to suggest at least one reason why the number of deaths and injuries in earthquakes is often greater in developing countries than in developed countries. The most frequent reasons suggested were that developing countries were not likely to have buildings designed to withstand earthquakes because they were expensive, or were less likely to be prepared with evacuation plans, run-throughs, rescue teams and emergency supplies of food and water.

- (c) Most candidates were able to explain at least one way in which buildings can be designed to reduce the impact of an earthquake. There were good descriptions of foundations made of steel and rubber so buildings were flexible in an earthquake and of reinforced walls. Skyscrapers with a triangular structure like a pyramid and fire resistant building materials were also mentioned. A number of candidates included labelled diagrams in their answers, which supported their explanations and gained credit.

Question 2

- (a) (i) Only a small number of candidates were able to calculate the average annual increase in temperature shown by the graph.
- (ii) Most candidates correctly circled '1970 to 2020' as the fifty year period with the greatest increase in average annual temperature.
- (b) (i) Many candidates found this question challenging. There were some good descriptions of coal being burnt in power stations and the use of petrol and oil in vehicles releasing carbon dioxide. A number of candidates described how deforestation meant there were fewer trees to remove carbon dioxide from the atmosphere by photosynthesis. Cattle farming was usually the only suggestion for the increasing concentration of methane in the atmosphere, with very few references to garbage.
- (ii) Most candidates were able to suggest at least one strategy. The most popular strategies involved using public transport or car sharing, using renewable or nuclear energy and planting trees. There were also references to recycling and examples of strategies for conserving energy in the home and in factories.

Question 3

- (a) Many candidates completed the table by accurately matching the letters to the six causes of oil pollution. The most common error was reversing **P** (leaks from oil refineries) with **U** (leaks from oil rigs).
- (b) Most candidates were able to suggest at least one impact of oil pollution on marine and coastal ecosystems. The most common impact suggested was the death of animals, fish or birds. There were some detailed descriptions of the effects of oil on birds' feathers and the impact on marine food chains if plankton or small fish die.
- (c) Few candidates were able to describe ways to deal with oil spills in oceans. There were many vague answers about using less oil, stopping ships from carrying oil and double hulls. Some candidates listed booms, skimmers and detergents but often did not describe how they could be used to remove the oil.
- (d) Only a small number of candidates were able to explain that ships with a double hull have two layers of steel forming an inner and outer hull so if one is damaged the other stops oil from leaking into the ocean. Some candidates thought a double hull meant there were two tanks of oil.

Question 4

- (a) (i) Most candidates were able to name the Sun as the primary source of energy in the diagram of a wetland ecosystem.
- (ii) Most candidates were able to name water plants and phytoplankton as the two producers in the diagram.
- (iii) Nearly all candidates were able to complete the food chain accurately.
- (iv) Most candidates were able to explain the difference between a primary consumer and a secondary consumer.
- (b) Candidates found defining the ecosystem terms population and community more challenging. Some candidates got the definitions the wrong way round.

- (c) Few candidates gained full credit for this question. Most responses made some reference to animals, birds or fish dying and the effect on the food chain.

Question 5

- (a) (i) Nearly all candidates correctly stated 2010 as the year on the bar graph when the urban population became greater than the rural population.
- (ii) Some candidates found describing the trend challenging. The more successful answers split the time period into two sections and described the trend in each.
- (b) Few candidates were able to gain full credit by stating two ways the population of places increases.
- (c) This question proved challenging for many candidates. The question asked for push factors that would encourage people to leave a rural area. Some candidates wrote about pull factors that would encourage people to move to an urban area, others wrote a mixture of push and pull factors. More successful answers made reference to lack of schools, lack of hospitals, lack of public transport, war, poorly paid jobs and drought.
- (d) Most candidates could describe at least one environmental problem caused by the rapid growth of urban areas. There were good descriptions of air, water and land pollution and deforestation. Some answers were too general, referring to 'contamination' or 'pollution' without a clear description of the problem to the environment.

Question 6

- (a) (i) Most candidates were able to state the letters of four sustainable ways of using tropical rainforests.
- (ii) Most candidates were able to state the letters of two ways of using tropical rainforests that are not sustainable.
- (b) Most candidates were able to explain that ecotourists would not harm the environment and that ecotourism would protect a tropical rainforest. Some described how the money paid by ecotourists could be used to ensure that a tropical rainforest was protected in the future. Others described how ecotourism could provide jobs for local people in ways that would use the forest sustainably, for example in the tourist accommodation, as guides and in agroforestry to provide food.
- (c) This question proved challenging for most candidates. There were vague answers about stopping deforestation, replacing the soil and recycling paper. Some candidates seemed to be answering a question about deforestation rather than soil conservation. The best answers had good descriptions of afforestation, contour ploughing, mixed cropping and terracing.

ENVIRONMENTAL MANAGEMENT

Paper 0680/21
Paper 2

Key messages

All teachers should take special care to prepare their candidates for the extended writing questions, where six marks are available for a knowledgeable, balanced and carefully considered answer. It is vital that the candidate reads the question carefully and understands the question before answering.

General comments

Most candidates made a commendable effort in this paper. Almost all candidates finished all the questions, although some candidates did not complete the graphs or attempt the final part of each question. An important item for instruction is the drawing of line graphs, including the choice of a suitable scale to display the data. Another item for instruction is practice in the selection of comparisons, such as the tree and shrub savannas on this paper.

Comments on specific questions

Question 1

- (a) Many candidates gave five correct answers. Occasional errors occurred when stating the correct hemisphere and the annual range of temperature, where some candidates stated the maximum temperature instead of the range of temperature in error.
- (b) (i) Some candidates found it difficult to make a comparison between the two types of savanna. Good answers described the difference in height, density and variety of species in the two savanna types. Candidates would benefit from practice in such questions which require a comparison.
- (ii) Only about half the number of candidates correctly stated that it is grass that grows between the trees in tree savanna.
- (iii) Most candidates had some idea of the causes of desertification. Many explained that a combination of drought and removal of trees and vegetation leaves the soil open to erosion.
- (c) Almost all the candidates matched the terms to the definitions correctly.
- (d) (i) Most candidates identified the sea, beach and mountains as providing a good location to build a tourist resort. Climatic factors were also relevant, but candidates should be reminded that references to specific climatic factors such as temperature, sunshine or rainfall are needed to gain credit. Some candidates referred wrongly to the buildings and infrastructure that would have developed as a result of the development of the resort.
- (ii) Some candidates misinterpreted this question and did not refer in their answer to the impacts of building a resort. There was much that could have been suggested, such as destruction of the natural vegetation and its effects on wildlife and natural drainage, as well as various types of pollution caused by the construction works.

- (iii) The challenges posed in this question were familiar to candidates, but their ideas for managing them were somewhat limited. For example, the reduction of water use for swimming pools can only be done by planning controls on future developments, or enabling the use of sea water. Good answers suggested that an inexpensive means of reduction would be to make tourists aware of the problems and encouraged to save water and reduce waste. Other answers suggested the local authorities should make plans for recycling or re-use of water and waste. Many candidates showed a good knowledge of how new supplies of water can be developed such as aquifers and desalination, and also better facilities for sewage, waste and water treatment; however, these developments can only be built at a cost.
- (iv) Most candidates explained that the arrival of tourists and their activities during the holiday will burn fossil fuels, especially where traffic congestion occurs. A smaller number of candidates continued to explain tourists' high demands on electricity generation and smoke-producing activities such as barbecues. Suggestions that were not credited were the extra carbon dioxide produced by breathing and the loss of trees as a carbon sink; the effects of these would not be localised.
- (e) A number of candidates did not draw a line graph correctly. Although the axes were generally labelled correctly the choice of scale was often poor. A few candidates did not use a correct scale for the number of tourists per million on the y-axis, and others chose a scale that was too small to plot. Many did not plot the 2014 point correctly, placing it on the line that should represent 2016. A very small number of candidates drew a bar chart, not a line graph as stated in the question.
- (f) An extended response (six-mark) question marked using a level of response scheme rather than a points-based scheme. This question, by its phrase 'How far do you agree?' required an understanding of the reasons both for and against benefits to the economy and damage to the planet. There was much that candidates could recount from their earlier answers, but more able candidates went further, explaining the costs of providing and maintaining the quality of tourist facilities, and the benefits of ecotourism in making tourists more aware of their detrimental effects to the planet and how these can be improved in the future.

Question 2

- (a) (i) Most candidates understood the diagram but some were uncertain about how it worked, in particular the importance of moving the net along the sea-floor to trap the fish.
- (ii) Many candidates described the effect of trawling on coral and vegetation growing on the sea-floor. Few candidates considered that this is long-term damage, from which the ecosystem takes a long time to recover.
- (iii) Some candidates did not fully understand that overfishing is a result of catching more fish than can be replaced by natural breeding, it is not necessarily due to catching a lot of fish.
- (iv) The reasons for overfishing were well known by candidates. Most achieved maximum credit for explaining that human population increase and their increased demands, in addition to better technology such as sonar for locating shoals of fish, and freezer ships that can stay out at sea for several weeks, increase the total size of the fish catch. The lack of regulation and policing of the fishing industry, and subsidising of fuel and other costs by some countries was also relevant.
- (v) Most candidates answered this well. They had a good understanding of a marine food web.
- (b) (i) Almost all candidates read the line graph correctly.
- (ii) Most candidates understood what the graph showed and stated that the number of fish species not overfished was constant from 2005 to 2007, then rose continuously to 2014. Candidates should be encouraged to quote data from the resource for questions such as this. Better answers included reference to the small increase from 2007 to 2009 becoming steeper from 2009 to 2014.
- (c) (i) Most candidates stated the quota correctly.
- (ii) Almost all candidates read the bar chart correctly and used data from this to calculate the increase in the quota from 2011 to 2015.

- (iii) Less than half of the candidates appeared to understand that the quota was increased because plaice stocks were recovering and increasing in numbers in the sea. Some appeared to misunderstand the question, thinking that an increased quota meant that fewer fish could be caught.
 - (iv) Most candidates described ways of managing fish stocks by limiting areas and seasons of fishing to avoid reducing their replacement levels. There was little reference to enforcement of these means by legislation and policing.
- (d)
- (i) Most candidates correctly stated the year with the lowest cost of damage.
 - (ii) A few candidates appeared not to understand the meaning of the term 'three-year period', and listed the three years that had the highest number of cyclones instead of three consecutive years with the most cyclones.
 - (iii) Almost all candidates calculated the average number of cyclones correctly.
 - (iv) Many candidates referred to the strength of the winds, and that cyclones that reach land do greater damage than those that do not, especially if they move back to the sea between coasts where they can build more energy again. Other reasons that were given related to the cost of damage, which may depend on the state of development, the size of the population of the area and the preparation for such a natural disaster. Some candidates considered the shape of the land, in particular the presence of large low-lying areas by the coast. A few candidates failed to recognise that cyclones do not move far inland.
 - (v) Almost all candidates marked the correct data point with a cross on the graph.
 - (vi) Most candidates correctly used the graph or their answers to parts (i) and (ii) to show that there was no relationship between the number of cyclones and the cost of damage.
 - (vii) The causes of cyclones was a subject of which few candidates showed a sufficient knowledge. A good answer described that a warm ocean surface, of above 27°C was required, producing energy to warm the air above and causing it to rise. This creates a centre of low pressure that draws in air from all around, causing it to spin due to the rotation of the Earth. The increased energy in the atmosphere due to global warming can cause more numbers of more intense cyclones.
- (e) An extended response (six-mark) question marked using a level of response scheme rather than a points-based scheme. The question posed here gave candidates the chance to explain both the ways in which oceanic pollution can be reduced and the problems that limit their effectiveness. Many candidates listed ways in which the water is polluted such as oil leaks, plastic waste, sewage and agricultural run-off, and the means by which all of these can be prevented or controlled to a certain extent. Some candidates went further, explaining that most waters of the seas and oceans are interlinked and uncontrolled, but some countries fail to restrict effluents and solids entering the seas by their coast. Thus the problem is so big that any reduction in one area may be cancelled out by an increase in another. In addition, the rising population and the rates of development in many countries are increasing sources of pollution as fast as measures are implemented to reduce them.

ENVIRONMENTAL MANAGEMENT

Paper 0680/22
Paper 2

Key messages

Most candidates attempted all the questions; however some candidates did not read the question accurately and provided information that although correct, was not creditworthy within the context of the question. This was particular the case when the question required the application of a particular factor (such as an environmental or economic factor). Candidates sometimes missed the opportunity to explain their context fully or provide examples to support the justification being made.

Candidates were able to use appropriate technical terms, however they were not always able to define terms accurately.

Graphs were generally completed with accuracy, although candidates must ensure that they follow conventions or information already within the graph when adding their information.

The quality of responses within the extended writing (six mark) questions was generally good, candidates demonstrated skills in developing a reasoned response, and this is a skill that should be further encouraged in centres.

General comments

Centres appeared to have prepared their candidates well for this paper. Key concepts were understood and were articulated well within specific questions. Responses were sometimes weaker when candidates had to apply these concepts or give appropriate examples.

There were some examples of candidates failing to read the questions carefully, thus missing out on the requirements of the task or question. Candidates should be reminded to read the question carefully.

The quality of writing for the extended response questions was good, with few candidates responding with a simple list of bullet points. This is good practice and provides scope to meet the higher demands of some of these questions.

Comments on specific questions

Question 1

- (a) (i) Most candidates correctly identified the altitude and temperature at the tropopause. The most common error was to omit the minus symbol when stating the temperature.
- (ii) The changes in temperature at different points above the troposphere were described in a variety of valid ways. It was important that the candidates stated the changes rather than simply the temperature at different altitudes.
- (iii) Candidates were required to draw the ozone layer between the limits described. This was completed in a variety of valid ways; however, a number of candidates did not complete this question, perhaps failing to read the question carefully.
- (iv) Most candidates were able to give reasons for the importance of the ozone layer to life. Weaker responses tended to be vague with respect to the diseases caused by UV radiation.

- (v) There was significant variance in the quality of responses within this question. More able candidates typically understood the causes and sources of ozone depleting substances and in many cases also cited the chemical reaction. Weaker responses gained some credit for listing CFCs or halons with little additional detail.
- (b) (i) This question proved challenging for many candidates who identified that the Earth's surface was heated by the Sun but failed to link this to a subsequent heating of the air as a result. A number of ways of describing this process correctly were given credit.
- (ii) A number of candidates failed to read this question carefully and provided responses which linked to the development of smog rather than describing temperature inversion.
- (iii) Attempted by most candidates, responses used the information within the diagrams to support their answers, although some did not include all the details. Many candidates did not include detail of the pollutant or its source, which were creditworthy.
- (c) (i) This question required candidates to plot an additional bar on the graph. This was successfully completed by most candidates. The most common error was failure to draw a bar of the same width as the others already plotted.
- (ii) Most candidates were able to correctly interpret the scale on the graph and give the correct answer.
- (iii) Candidates were required to explain how two activities; electricity generation and agriculture, contributed to the production of greenhouse gases. Some responses showed good preparation and understanding of the question and achieved maximum credit; citing the gases concerned and their sources. Weaker responses were more vague, particularly in relation to agriculture, focussing on aspects such as pesticide use rather than methane or carbon dioxide production.
- (iv) There was a range of success in answering this question; the best responses identified the role of renewable energy sources in reducing emissions of greenhouse gases as well as the development of public transport, for example. A number of candidates focussed on the use of catalytic converters for vehicles. While these do reduce emissions of some noxious substances they do not prevent the production of carbon dioxide which is the main greenhouse gas.
- (d) (i) This question used a different approach to presenting data, namely the pH of rainfall on a map. Most candidates correctly identified the lowest pH was in the range 5.0–5.6. Credit was given to either a value within this range or stating the range itself.
- (ii) Describing the changes that occurred across the country proved challenging for most candidates, few gaining full credit. Many candidates gained some credit for identifying a general decrease in the pH of the rain, although they were more vague when describing changes across the country and its regions. Only a small number of candidates showed an incorrect understanding of the pH scale.
- (iii) A good number of responses identified that the changes in rain pH were due to an increase in industry and use of vehicles. Credit was also given to responses that described an increase in sulfur dioxide release or an increase in nitrogen oxides.
- (e) An extended response (six-mark) question allowing candidates to write about the topic more extensively. This question was marked according to the level of response provided and allowed candidates to write in depth about a limited number of aspects or develop an answer which provided a broader overview of a topic with many facets. The best responses from candidates included specific examples to support their point of view. Weaker responses tended to focus on one issue, such as the ability of countries to afford to combat pollution. The structuring of answers was generally good, with very few responses consisting of a simple list.

Question 2

- (a) (i)** Most candidates were able to use the newspaper article to correctly identify the toxins causing the death of whales.
- (ii)** This question proved challenging for a number of candidates, relatively few described the idea of accumulation. Many candidates thought that the issue was due to whales eating more toxins as they were larger animals.
- (iii)** Most candidates correctly identified a source of the pollution but some failed to describe how the pollutant eventually reached the ocean. Relatively few responses described airborne pollutants, which is a potential route.
- (b) (i)** Most candidates successfully interpreted the map and identified the correct answer.
- (ii)** This question proved more challenging for many candidates. A number of candidates correctly identified the circular motion of currents or the difference in direction of movement in the North Atlantic and South Atlantic, but did not describe all of this. While details of specific currents also received credit, relatively few responses achieved full credit.
- (iii)** Candidates showed good use of the information within the map and plausible routes for oil movement into Antarctica. A number of candidates cited the role of ship transportation, which was also creditworthy.
- (iv)** Responses showed that candidates correctly identified the source and temperature of the Benguela current, but did not always successfully use this information to describe the resultant climate on the west coast. Some candidates described the impact on fishing, which was not required by the question.
- (c) (i)** Most responses correctly stated the tidal range within Swansea Bay from the information provided.
- (ii)** Describing the generation of energy by the barrage proved more difficult for some candidates. While most identified the role of turbine rotation in the process, many did not link this to a generator or were unclear about the process of water flow which caused the turbine to turn.
- (iii)** This was completed with varying success, the most common error was to focus on the lack of carbon dioxide production, rather than the fact that the resources are not used up and the tide is dependable.
- (iv)** Most candidates correctly stated the number of homes that could be supplied by the scheme.
- (v)** Only some candidates correctly identified the issues that would be caused by allowing the rivers to flow into the barrage, most notably the risk of silt build up and the prevention of fish migration. Many candidates suggested that additional water from the rivers would mean the barrage would already be full of water and prevent it from operating, which was incorrect.
- (vi)** The environmental impact of the scheme was partially understood by candidates but few were successful in gaining maximum credit. Responses tended to focus on one aspect rather than consider a range of impacts.
- (d) (i)** Most candidates completed the graph correctly.
- (ii)** Most candidates provided a description of the trends within the stated timescale. Credit was not awarded for stating dates and figures without covering the trends that had occurred between them. Generally this question was answered well by the cohort.
- (iii)** Many candidates correctly identified the impact that previous overfishing had had on fish stocks preventing large quantities being caught.
- (iv)** While expressed in a variety of ways, candidates showed a good general understanding of the term ecosystem. Candidates were not required to link their answer specifically to the Atlantic Ocean.

- (e) An extended response (six-mark) question marked using a level of response scheme rather than a points-based scheme. As with the other extended response question, candidates generally structured their answers well, rather than producing a list or bullet points which would limit the potential credit achieved.

The phrasing of the question required candidates to form an opinion and provide evidence to justify this. The best candidates were able to do this and provided a good comparison of the impact of the range of pollutants in the question. Weaker responses lacked supporting evidence to back up their statements and in many cases only focussed on the impact of plastics, scarcely covering raw sewage and heavy metals.

ENVIRONMENTAL MANAGEMENT

Paper 0680/23
Paper 2

Key messages

Most candidates attempted all the questions; however some candidates did not read the question accurately and provided information that although correct, was not creditworthy within the context of the question. This was particular the case when the question required the application of a particular factor (such as an environmental or economic factor). Candidates sometimes missed the opportunity to explain their context fully or provide examples to support the justification being made.

Candidates were able to use appropriate technical terms, however they were not always able to define terms accurately.

Graphs were generally completed with accuracy, although candidates must ensure that they follow conventions or information already within the graph when adding their information.

The quality of responses within the extended writing (six mark) questions was mixed. Some candidates demonstrated skills in developing a reasoned response, and this is a skill that should be further encouraged in centres.

General comments

Many candidates demonstrated good preparation for the paper and had good knowledge of key topics and concepts; however, some candidates found it challenging to apply their knowledge to the specific situations in the questions.

Some candidates did not complete information on graphs when instructed to, thus missing the opportunity to achieve full credit. There are examples of this happening at all ability levels, suggesting the instruction was missed; candidates should be reminded to read the question carefully.

Comments on specific questions

Question 1

- (a) (i) This question required candidates to demonstrate their understanding of the water cycle by completing the diagram using words provided. Most candidates were able to demonstrate the correct interpretation of the diagram and place the words in the correct spaces.
- (ii) It was clear that many candidates were well prepared to demonstrate their knowledge of terms in the water cycle. However, some candidates tried to formulate a definition based purely on the word and not within its context to the water cycle.
- (b) (i) Using graphical information, most candidates correctly identified the highest rainfall and the day and time it occurred. The most common error was to omit the day.
- (ii) This question proved to be more challenging; fewer candidates were successful in interpreting the river data to identify maximum flow and the day and time.
- (iii) Candidates found it challenging to provide a good explanation for the delay between the point of maximum rainfall and peak river flow. Many failed to identify that the rain may fall some distance away from the river so will take time before it reaches it.

- (iv) While candidates appeared to be prepared for a question related to flooding, some did not contextualise their answers to the economic factors within this question scenario. Many responses were very general and failed to link to the economic aspects.
 - (v) Most commonly candidates identified the need for river defences such as banks or barriers, fewer candidates identified the opportunity to dredge the river to increase its capacity.
 - (vi) While most candidates demonstrated knowledge that malaria is a water-bred disease and spread by mosquitos, few were able to provide sufficient detail of the process to achieve full credit.
- (c)
- (i) Most responses showed an accurate reading of the diagram and gave the correct answer.
 - (ii) Using the same diagram, candidates generally found it more challenging to identify the ranges within a desert.
 - (iii) This question required candidates to describe the climate of a tundra. This could be achieved by using the data in the diagram and their own knowledge. While most candidates were able to identify some features, responses often lacked detail or failed to use the data provided to achieve full credit.
 - (iv) Describing the vegetation within the tundra proved to be more challenging for many candidates. The most common error was to describe coniferous forest and the ways conifers are adapted to snowy conditions rather than a landscape containing low growing plants and sparse vegetation.
 - (v) Only a small number of candidates achieved full credit for this question, most strategies described were lacking in detail or were repetitive of points already made.
- (d)
- (i) Candidates needed to plot the correct divisions and also provide a key. A number of candidates failed to provide and use a key to link to their finished pie graph.
 - (ii) This question was well answered by candidates.
- (e) A six mark question allowing candidates to write about the topic more extensively. This question was marked using a level of response scheme rather than a points-based scheme. While it was clear that many candidates understood the need to develop a strategy to ensure the appropriate use of water resources, few were able to articulate their answers in a developed way. The stronger responses sometimes included references to international or regional treaties and also the way water use may be managed using pricing strategies.

Question 2

- (a)
- (i) Almost all the candidates correctly identified the renewable energy source that increased the most during the specified period.
 - (ii) Most candidates were able to use the information within the graph to complete the required calculation.
 - (iii) This question proved to be more challenging, many candidates referred to the 'bad effects' of fossil fuels without providing any detail as to what they were. More able candidates often referenced the impact of government subsidies or the developments in renewable technologies.
 - (iv) Candidates generally showed a lack of understanding of the reasons why levels of geothermal energy generation are low, commonly describing the limitations being expense of its efficiency rather than the geographical restrictions that impact its use.
- (b)
- (i) Candidates needed to plot two bars on the graph. While the shading of the bar was ignored within the mark scheme, it was expected that the width of the bars would be of a corresponding size to those already plotted within the graph.
 - (ii) Candidates were generally able to use the graph to reach the correct answer.

- (iii) Candidates were credited for a wide range of potential reasons; these ranged from the cost of sourcing materials, the availability of other sources and safety concerns, to international issues which may impact supply and use of the technology.
 - (iv) This question was attempted by most candidates. The most common error was giving reasons that were not environmental.
- (c) (i) This question required candidates to identify the greatest producer, represented by the size of a circle over the country. The map was understood by most candidates who correctly identified Australia.
- (ii) Describing the distribution of the producing countries proved to be more challenging. The most common error was to suppose that the locations were on the coasts of countries, whereas the circles merely identified the size of production within that country.
 - (iii) The description of extraction of a mineral (bauxite) from an open-pit mine proved to be challenging. A relatively low number of candidates achieved full credit. Many confused this type of mining with other forms of mining.
 - (iv) This question was poorly answered by many candidates, only a few achieved full credit. Expected answers included the use of water sprays to reduce the level of dust generated, or restricting the hours of operation to reduce the impact of noise. Neither of these answers was seen regularly within scripts. A number of weaker responses described the generation of gas without any context, detail or any method of mitigation.
- (d) (i) Almost all the candidates were able to rank the data from the table in the correct order.
- (ii) Most candidates were able to correctly calculate the percentage of world production occurring in China.
 - (iii) Most candidates correctly identified the number of countries.
- (e) (i) Linked to the table in part (d), candidates had to analyse additional written information to formulate their answer. A good number of candidates were able to identify a country which met the criteria.
- (ii) This question proved marginally more difficult for many candidates. Correct responses needed to name all three countries to be awarded the credit.
 - (iii) The environmental impact of the use of coal was well understood by most candidates. Stronger responses demonstrated a depth of knowledge and covered a range of issues.
- (f) An extended response (six-mark) question marked using a level of response scheme rather than a points-based scheme. It was expected that responses would state the degree to which they agreed with the statement made.

While most candidates identified the benefits of recycling, the stronger responses concluded that recycling alone will not solve the problems faced and still uses energy, for example in transportation, as well as covering the impact of increased global demand. Weaker responses tended to focus on one aspect (such as atmospheric pollution) and lost potential credit with the lack of supportive evidence for their point of view.

ENVIRONMENTAL MANAGEMENT

Paper 0680/03
Coursework

General comments

The coursework was generally completed well, allowing candidates to demonstrate their enthusiasm about their own local environment.

Some interesting environmental topics were carried out, allowing candidates to investigate issues within their environments.

Comments on specific questions

Domain A

Candidates generally gained good credit in Domain A; covering the environmental issues they had chosen well.

Domain B

In Domain B candidates were able to gain credit for a variety of investigative skills and used a wide range of techniques to present the data.

Domain C

Domain C is still 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. A thorough review of possible choices available for sustainable development should be the main focus of Domain C, and all interested parties should be canvassed as to their opinions so that a thorough assessment can be carried out of the factors behind their value positions. A management plan can then be devised with a consideration of constraints and advantages.

ENVIRONMENTAL MANAGEMENT

Paper 0680/41
Paper 4

Key messages

- The source material and the question must be read carefully.
- Data from either graphs or tables should be used to help describe trends or patterns.
- 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 state of the United States of America. Many candidates understood and made good use of the source material and their written responses were clearly expressed.

The mathematical and graphical questions did pose 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 answers were in the acceptable range. These candidates clearly used a ruler to measure the distance and used the scale provided on the map.
- (b) (i) Most candidates correctly calculated the total estimated population of the four islands for 2020.
- (ii) Many candidates did not follow the instruction to give the answer to one decimal place.
- (iii) Nearly all candidates arranged the islands in the correct order.
- (c) (i) Most candidates gained some credit for the table. All the headings were needed for maximum credit to be awarded.
- (ii) Most responses gained some credit for this part question.
- (iii) Most candidates were able to explain why catching female fish would reduce the marlin population.
- (iv) Most answers described an appropriate order of events and so gained maximum credit. Only a small number of candidates did not use the information given to help produce clear answers to this question.
- (v) Many candidates gave detailed accounts of measures to control fishing activity. On this occasion the information given stated that this sport fishing used a rod and line; comments about nets were not given credit.
- (d) (i) Candidates regularly made all the suggestions shown on the mark scheme as to why site 20 was the least damaged dive site.
- (ii) The term biodiversity was only clearly defined by a small number of candidates. A suitable comment about the number of different species in an area was expected.

- (iii) Most candidates had a clear understanding of this question and gave good answers. A very small number of candidates incorrectly suggested toxic fish could be fed to animals.
- (iv) Many answers revealed a good understanding of the strategies for environmental management of the peacock grouper. All of the points on the mark scheme were suggested by candidates who made good use of the information provided.

Question 2

- (a) (i) Most candidates completed the table correctly.
- (ii) Most candidates presented a bar graph that gained some credit. However, the y-axis was frequently not given a complete label. In some cases, candidates selected the wrong data to plot.
- (iii) Many candidates gave answers that lacked the precision needed to gain all of the credit available. Stated conclusions should always relate specifically to the data being commented on.
- (b) (i) Most candidates calculated the percentage increase in wind speed correctly.
- (ii) Many candidates suggested two sensible reasons why an increase in average wind speed would have reduced the birds' ability to breed.
- (iii) Candidates did not find it easy to clearly suggest a reason for the increase in average wind speed.
- (c) (i) Most candidates suggested reasons why more bottle tops were found than plastic bottles. However, very few candidates suggested that the tops were made of a different plastic that may have taken longer to break down.
- (ii) Only a small number of candidates stated that this was a systematic method of sampling.
- (iii) This was a demanding calculation. However, many candidates were able to use the information provided and gain full credit.
- (iv) Most candidates found it difficult to clearly state the correct direction the wind was blowing. This meant that most candidates could not relate wind direction to the distribution of plastic on the beaches.
- (v) Candidates usually suggested more people visited one beach and left more litter.
- (vi) Candidates usually identified at least one suitable method of plastic disposal.
- (d) Many candidates gave quite good accounts of how microplastics would accumulate along a food chain. Almost all responses could be awarded some credit for this question.
- (e) Most candidates gave good reasons as to why the problem of plastic waste would be difficult to reduce by 2030. A small number of candidates gave very vague generic answers that could not be credited.

ENVIRONMENTAL MANAGEMENT

Paper 0680/42
Paper 4

Key messages

- The source material and the question must be read carefully.
- Data from either graphs or tables should be used to help describe trends or patterns.
- 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 state of the United States of America. Many candidates understood and made good use of the source material and their written responses were clearly expressed.

The mathematical and graphical questions did pose 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 answers were in the acceptable range. These candidates clearly used a ruler to measure the distance and used the scale provided on the map.
- (b) (i) Most candidates correctly calculated the total population of the four islands.
(ii) Many candidates did not follow the instruction to give the answer to one decimal place.
- (c) (i) About half the candidates gave the correct temperature range. Others wrote down the first step towards the answer, the highest temperature and lowest temperature, but did not do the calculation. Others worked out the average temperature.
(ii) Most candidates correctly named the driest and wettest months.
- (d) Very few candidates made full use of the information in the table in their suggestions. Very few mentioned low rainfall. Statements about temperature were often imprecise. The most successful use of the information from the table was often with reference to humidity.
- (e) All the points listed in the mark scheme were seen. Deforestation was frequently suggested, usually linked with habitat destruction and sometimes with loss of biodiversity. Many answers included references to litter.
- (f) (i) Some candidates only circled one area when the question asked for two so could not gain credit.
(ii) Candidates usually made reference to sites in the chosen area being close to Honolulu.
(iii) There were frequent references to the various ways coral could be damaged by divers, water pollution and to plastic being discarded.

- (g) (i)** There were many good answers explaining the various ways the fish collector licence would lead to the reduction in fish numbers. There were frequent references to overfishing, the depletion of fish stocks, fewer fish available to breed and the extinction of some species.
- (ii)** Many answers revealed a good understanding of the strategies for the sustainable harvesting of ocean fisheries, with references to conservation laws, quotas, net size, mesh size, breeding areas and seasons. There were fewer references to marine reserves. Increasing the cost of the fish collector licence or ensuring the fish collectors had some education or training were popular strategies.
- (h) (i)** A number of candidates missed the significance of asking the same question.
- (ii)** Few candidates were able to explain clearly that asking more boat captains on more days made plan two better than plan one.
- (iii)** The most common mistake was not including the fish in any heading of the table.

Question 2

- (a) (i)** Many candidates followed the instructions and gained full credit. A small number of candidates did not do this or did not attempt to answer the question.
- (ii)** Few candidates could identify the type of sampling method being used.
- (iii)** Many candidates identified the distance and direction of the anomalous result correctly.
- (iv)** Some candidates wrote about the data on the sample lines instead of describing the pattern. Those who described the pattern often omitted to mention that it was true for all four sample lines.
- (v)** Although many candidates wrote about comparing the samples of sand, only a small number of candidates mentioned the concept of a control.
- (b) (i)** Some candidates did not answer the question, instead they wrote about the diagram's value as a technique for displaying data. Others did not understand that wind direction is reported by the direction the wind is blowing from. Those who showed they understood wind direction usually gained full credit.
- (ii)** Most candidates knew that lead is toxic. Many wrote about how a small amount of lead could kill the chick because it is very young. Few used the word bioaccumulation in their explanation.
- (iii)** There were some good reasons suggested for why there are no plans to remove the source of lead contamination from Midway Island. These included the cost, the fact that no people lived there, that it was a long way from Hawaii and it would be difficult to remove the lead without disturbing the nesting albatrosses. A small number of candidates mistakenly referred to plants in their answers to this question.
- (c) (i)** Nearly all candidates presented a line graph that was plotted correctly. There were some graphs with no axis labels, some with incomplete axis labels and some that plotted the wrong data.
- (ii)** Most candidates were able to describe how the average leaf area decreased with increasing mass of lead nitrate.
- (iii)** A few candidates incorrectly described each pot in the experiment having different conditions. The details provided for instruction 5 were often the most successful and those for instruction 4 the least successful.
- (iv)** There were some confused ideas for experiments to find out more about the effect of lead on plant growth. The better suggestions referred to using other plants and other concentrations of lead nitrate and/or measuring mass, height, number of leaves or crop produced.
- (d)** Most suggestions for why many countries have laws to control the release of lead from fuels into the atmosphere made reference to lead either being toxic or causing death or brain damage. There were some incorrect statements suggesting lead could cause climate change and acid rain.

ENVIRONMENTAL MANAGEMENT

Paper 0680/43
Paper 4

Key messages

- The source material and the question must be read carefully.
- Data from either graphs or tables should be used to help describe trends or patterns.
- 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, Zimbabwe. Many candidates understood and made good use of the source material and their written responses were clearly expressed.

The mathematical and graphical questions did pose 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) Most candidates calculated the percentage of people employed in mining correctly.
- (ii) Most candidates correctly stated four years.
- (iii) Many candidates read the graph carefully and stated four correct values.
- (iv) Most candidates gave one good reason why companies wanted to invest in platinum mining.
- (b) (i) Only a small number of candidates correctly stated the type of rock that formed the great dyke.
- (ii) Most candidates gave at least one correct detail as to how an intrusion was formed. Only a small number of candidates gained maximum credit.
- (c) (i) The patterns shown by the data in the table were clearly described by nearly all candidates.
- (ii) Most candidates correctly calculated the range of copper concentration, although some wrongly calculated the average value instead.
- (iii) Many candidates recognised that the water was too acidic for living organisms and that some of the chemicals were toxic. Only a small number of candidates made further suggestions as outlined in the mark scheme.
- (iv) A good number of candidates described a dilution and concentration effect, related to the climate data, correctly.
- (d) (i) Candidates who answered this question usually gained high levels of credit. However, some responses just provided numerical answers instead of describing the pattern of results as the question asked.

- (ii) Candidates that compared the first and the second survey were able to gain credit here.
 - (iii) Candidates gave a variety of valid reasons as to why the results of the two surveys would be different.
 - (iv) Candidates were usually able to gain some credit for describing more surveys.
 - (v) Only a small number of candidates were able to gain credit for explaining how growing plants can reduce the spread of chemical pollutants.
- (e) (i) Most candidates gave a sensible way of encouraging investment.
- (ii) Many candidates gave two good advantages to the country of the development plans. More thorough responses gained maximum credit.

Question 2

- (a) (i) Most candidates identified two costs incurred by small scale miners.
- (ii) Most candidates identified one risk to miners of this type of work.
- (b) (i) Candidates frequently had difficulty in using the information given to correctly describe the direction of the wind.
- (ii) Nearly all the candidates correctly plotted the data as a graph. In a small number of cases the y-axis was not fully labelled.
- (iii) Candidates nearly always described the trend shown by the graph correctly.
- (iv) Most candidates gave one sensible suggestion as to how to improve the survey. More detailed responses gained full credit.
- (v) Only a small number of candidates made the link between leaves being covered in dust and reduced photosynthesis. Those who made this link usually gave detailed answers gaining maximum credit.
- (c) (i) Nearly all candidates identified one reason why farmers did not want mining to occur on their land. Many candidates went on to give one or two further reasons as outlined in the mark scheme.
- (ii) Only a small number of candidates gave convincing reasons as to why a licence for a large scale mine might take a year to be granted. There were very few suggestions about the need for an environmental impact assessment.
- (iii) Candidates found it difficult to explain why mining is not a sustainable activity. Only a small number of candidates clearly stated that materials extracted from mines are a finite resource.