ENVIRONMENTAL MANAGEMENT

> **Paper 0680/11**
> **Paper 11**

Key Messages

Candidates should:

- Read each question more than once, looking especially at the command word(s) used such as state, describe, explain and suggest.

- Look at the marks allocated to each question and write responses accordingly.

General Comments

Most candidates attempted the majority of questions. Candidates scored well on questions **1a(ii)**, **1b**, **3a(i)** and **4a**. Questions **3a(iii)**, **2a(ii)** and **5b** were the questions candidates found most challenging my candidates. Overall, **Question 6** was the hardest on the paper.

Comments on Specific Questions

Question 1

(a) (i) Most were able to gain credit for the idea that ecosystems contain living and non-living components, although some talked about living and non-living organisms. Only the best candidates received full credit by going on to discuss that these components interact with each other.

(ii) This question was quite well answered. The most common problem was the nature of the energy type produced from respiration in plants and animals.

(b) This relatively easy interpretation of a diagram was well done by the majority of candidates.

Question 2

(a) (i) Many were unable to get beyond a simple description of the diagram, which did not really help to explain how cyclones are formed. Many candidates received credit for the statement that the sea temperature needs to be high. Better candidates were able to go further and discuss the rising of hot air and the generation of a pressure gradient.

(ii) The instruction to describe two different types of damage was ignored by many who went on to list generic damage.

(iii) Most candidates were able to offer at least one measure taken, most commonly the provision of shelters.

(b) Most candidates offered the generation of electricity, as a use of wind power. Few were able to suggest a second use, such as pumping of water.

Question 3

(a) (i) This question was well answered. The most common mistake was to mix up water and oxygen between the two processes. This was followed closely by candidates who simply listed all the alternatives twice, which could not be credited.

    (ii)   A minority of candidates produced very good answers to this challenging question. These stated oxygen would be absent and linked this to air spaces being filled with water. A few candidates knew that oxygen is virtually insoluble in water.

    (iii)   Most candidates focused on irrigation, and did not receive credit. Their argument being that waterlogging is caused by farming practices rather than considering it might be a feature of some locations, due to factors such as soil type, which needs to be mitigated.

(b)(i)   The majority of candidates were able to use the graph to arrive at the correct answer.

    (ii)   Matching soil type to their drainage properties was within the capability of most candidates.

Question 4

(a)   A very large majority of candidates were able to come up with at least two, and very often three, resources from the sea.

(b)(i)   Some candidates found this question challenging. In the main, this question was well answered with a good knowledge of the effects of both oil and raw sewage shown.

    (ii)   Candidates were less secure in their knowledge of how oil spills and raw sewage emissions can be dealt with. However a pleasing minority were very knowledgeable, especially concerning methods of dealing with oil spills.

Question 5

(a)(i)   The vast majority were able to identify both types of plate boundary.

    (ii)   Although this was a very challenging question, it was pleasing to see a good number able to produce accurate and quite detailed diagrams of the events at a convergent plate boundary. The weakest simply drew S. America with arrows, virtually copying what they had been given above.

(b)   A good proportion of candidates were able to get credit by suggesting the possibilities of geothermal energy and tourism, but most could not get beyond this.

Question 6

(a)(i)   A minority gave very good answers, discussing the effects of reduced vegetation cover on soils and going on to point out how this would leave it exposed to wind and rain. Many were not able to get much beyond the idea of animals trampling the ground and somehow wearing it away.

    (ii)   A good number gained partial credit for some discussion of evaporation of water leaving salt on the surface. Fewer gave any indication where this salt had come from.

(b)   Most candidates were unable to suggest much beyond banning logging, but the better ones discussed afforestation and various techniques such as strip or selective logging and agro-forestry, all terms on the syllabus.

ENVIRONMENTAL MANAGEMENT

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Key Messages

Candidates should:

- Read each question more than once, looking especially at the command word(s) used such as state, describe, explain and suggest.

- Look at the marks allocated to each question and write responses accordingly.

General Comments

Most candidates attempted the majority of questions. The questions candidates performed well on were **5b(i)**, **5b(ii) and 6a(i)**. Questions **1b(i)**, **2a(ii)** and **6b(i)** were found the most challenging by candidates.

Comments on Specific Questions

Question 1

(a) (i)   Most candidates were able to answer this question and gained at least some credit. Some descriptions muddled populations and communities. A minority of candidates wrote about human populations and local communities in towns and cities.

(ii)   The best answers gained full credit by sketching an S (sigmoid) graph. Many gained partial credit for a J-shaped or an inverted J-shaped curve. A simple rising straight line was not credited.

(b) (i)   Many candidates were unable to name the model as the Demographic Transition Model.

(ii)   A number of candidates wrote very detailed descriptions of the changes in human birth rate and death rate over time but did not explain them. This meant they could only be awarded partial credit.

Question 2

(a) (i)   Most candidates gained at least some credit for identifying CFCs as a gas not produced by a natural process and many also gained credit for nitrogen as a gas not affected by human activity.

(ii)   There were many answers that seemed to copy the features in the 'no temperature inversion' diagram. The best answers had clear bands of cool, warm and cold air with fumes/smoke trapped. Some candidates wrote temperatures on the diagram to show that they knew how the temperatures changed in an inversion.

(iii)   Many answers described clearly how the trapped pollutants might affect health. Most however failed to explain that people could be too ill to go to work. There were some good answers about the increased costs to hospitals of health care and the loss of revenue from tourism.

(b) (i)   The answers to this question were very variable. The best were competent explanations of the formation of acid rain with reference to the burning of fossil fuels in factories, power stations and vehicles and to volcanoes erupting, leading to the production of sulfur dioxide and nitrogen oxides. These answers went on to describe how these gases dissolved in water in the atmosphere to

produce rain with a low pH of around 4 or the formation of correctly named acids such as sulfuric and nitric.

(ii)   A number of candidates wrote about the effects of acid rain on ecosystems, agriculture, human health and buildings instead of answering the question. There were some well thought out answers about the lack of national boundaries in the atmosphere and the power of wind to move airborne pollutants.

Question 3

(a) (i)   Few answers gained full credit but most candidates were able to identify the process as plate movement (or continental drift). Some answers then went on to describe different types of plate movement instead of explaining how the plates moved apart with reference to convection currents and magma rising from the mantle.

   (ii)   Many candidates identified the plate boundary, correctly, as constructive or divergent.

(b) (i)   Most candidates explained that fewer people are injured or killed in volcanic eruptions because they can be predicted, whereas earthquakes cannot. Other explanations that gained credit were that volcanoes are often found in remote mountain regions, with sparse populations, and that lava can be very slow moving giving people time to get out of the way and so save their lives.

   (ii)   Most candidates were able to gain the majority of the credit for describing ways in which governments might reduce the death toll during an earthquake. Considerable detail was often provided about how buildings could be modified to resist earthquakes. There were detailed answers about education, earthquake drills and training and the importance of supplies of food and water.

Question 4

(a) (i)   Successful answers identified the pattern of dry deserts around the Tropics of Cancer and Capricorn and at the North and South Poles. Some candidates wrote a list of places.

   (ii)   Most candidates were able to gain partial credit for explaining how countries with low rainfall could obtain supplies of water. Desalination and accessing groundwater supplies were the most popular answers. A number of candidates did not appear to understand the question and wrote lengthy answers about conserving water or getting water by rain harvesting, which could not be credited.

(b) (i)   This question was challenging and few candidates gained full credit. Some of the working shown indicated that candidates had the right idea about how to go about answering the question, but then became confused. Some appeared to think that the target had been achieved before 2000, because over half the world's population had access to safe water. Others, having calculated that between 2000 and 2012 access to safe water had increased by 1% per year, went on to state that by 2015 92% of the world's population would have access to safe water.

   (ii)   Many candidates identified typhoid and cholera as being transmitted by drinking contaminated water but were unable to explain that this was because they were caused by water-borne bacteria.

Question 5

(a) (i)   Most candidates gained at least some credit for explaining how deforestation in the mountains of Tibet and Nepal leads to flooding in Bangladesh. There were competent answers about reduced interception of rainfall, soil erosion, increased run-off and sedimentation in the rivers.

   (ii)   Most candidates, again, gained at least partial credit for describing how flooding could be reduced by planting trees. There were also detailed answers on how the building of dams, reservoirs and embankments could reduce flooding and how terracing on the mountains could reduce soil erosion.

(b) (i)   Most candidates stated that wood was a forest resource. Burning was a popular use, followed closely by making furniture.

   (ii)   Most candidates knew that forests help to maintain the balance of carbon dioxide and oxygen in the atmosphere, and that photosynthesis was involved.

Question 6

(a) (i)   Most candidates correctly matched B (Manaus) to equatorial, A (Hebron) to tundra and C (In Salah) to hot desert.

(ii)   Most candidates gained the majority of available credit for describing and explaining two ways plants growing in hot deserts are adapted to the climate, with some showing extensive knowledge by writing about more than two ways. Answers showed a good understanding of the functions of long deep roots, thick fleshy stems, reduced leaves and spines.

(b) (i)   Few candidates gained full credit for explaining why few people live in area A, the tundra. Although some candidates described how the climate was too cold for people to grow crops, few mentioned the cost of heating homes.

(ii)   Few candidates gained full credit for explaining how lack of water and high temperatures make farming difficult in deserts.

ENVIRONMENTAL MANAGEMENT

> Paper 0680/13
> Paper 13

Key Messages

Candidates should:

- Read each question more than once, looking especially at the command word(s) used such as state, describe, explain and suggest.

- Look at the marks allocated to each question and write responses accordingly.

- Make sure all questions are attempted, especially graphs (these appear to get missed by some candidates as they do not have response lines).

General Comments

Most candidates attempted the majority of questions showing they had time to complete the paper. The questions candidates performed well on were **1a(i)**, **1a(ii)**, **2a(ii)**. Questions **3a(ii)**, **6b(iii)** and **1a(iii)** were the most difficult for them. More details are given in the next section.

Comments on Specific Questions

Question 1

(a) (i) Most candidates were able to draw three arrows to show the direction of energy flow between the Sun and the lion.

(ii) Most candidates were able to complete the table correctly naming the grasses as producer and the gazelle and lion as consumers. Some candidates included community as a niche for the gazelle or the lion.

(iii) Few candidates were able to explain that the gazelle lost energy in life processes.

(b) (i) Many candidates named Africa as the country where the Waza National Park is located, when the answer was Cameroon. This confusion of country with continent has occurred previously.

(ii) Most candidates were able to describe animals that a visitor would see in the Waza National Park. Many used the information provided, but they were not so successful at naming plants. The better answers described grasses, such as elephant grass, and trees such as bush willow, baobab and acacia.

(iii) There were a wide range of answers to this question. Many candidates wrote about the money tourism would bring, developing their answers with reference to different types of jobs, services for tourists and accommodation. Others described how money would improve the local economy and how the infrastructure, such as roads, and services would be improved. Some answers included that local people would also appreciate the biodiversity of their local area and the opportunity for research and education.

Question 2

(a) (i) Many candidates achieved full credit for completing the bars for Brazil and the United States. A minority made no attempt at this question.

(ii) Many candidates identified China as the country producing the greatest amount of iron ore.

(iii) Many candidates had difficulty in working out the percentage of iron ore produced by Australia. Where the space for working was used, it often indicated this was because they did not know how to calculate a percentage.

(iv) Some candidates had difficulty in explaining that the known iron ore reserves in Australia were estimated to last about seventy years in 2011, and this meant that the iron ore would be used up by 2081.

(b) (i) Most candidates gained at least some credit for describing the impact of an opencast mine on a rural environment. Impacts included different types of pollution (visual, atmospheric, noise and water), loss of habitat and traffic problems on local roads.

(ii) Most of the successful answers were about the job opportunities an open cast mine could provide. Some candidates wrote about an open cast mine being less dangerous for workers, others about mining more iron ore.

Question 3

(a) (i) Answers to this question were often confused, but most candidates were able write about at least one feature of the Stevenson Screen that ensured that a thermometer would correctly measure air temperature. The most popular answers mentioned the white paint reflecting the heat of the Sun and the slatted sides allowing air in. Some candidates wrote about how the Stevenson Screen was sited above the ground and away from buildings that could put it in shadow.

(ii) Candidates found this question difficult. Many wrote about temperature instead of specifying the highest and lowest temperatures. A number of candidates knew that there were thermometers in the Stevenson Screen that were used to measure humidity.

(iii) About half of the candidates knew that a barometer measures the pressure of the air.

(b) Most candidates found describing two strategies for reducing acid rain difficult. Many wrote detailed answers about conserving energy with reference to using public transport, walking and cycling. There were also some good answers about the use of scrubbers in factories to reduce emissions of sulfur dioxide and fitting catalytic converters to cars to reduce nitrogen oxides.

Question 4

(a) (i) Most candidates did not realise that the area shaded A showed population increase and the area shaded B showed population decrease.

(ii) Candidates were more successful matching the five population pyramids with the five stages of the Demographic Transition Model.

(iii) Suggesting two limitations of the Demographic Transition Model proved more challenging. Although this is clearly on the syllabus, many candidates were unable to provide a creditable answer.

(b) There were some excellent answers describing how family planning, the education of women and government policies were strategies for managing population growth. China's 'One-Child Policy' was often included as an example of government policy.

Question 5

(a) (i)   Most candidates were able to gain partial credit or better for supplying the words missing from the diagram.

    (ii)   This question was more challenging and few candidates gained full credit. There was, however, some understanding that, if the trees were cut down and removed, there would be less interception at W, and that runoff at Z would increase.

(b)   Candidates were able to gain at least some credit for suggesting three ways water in rivers and lakes can be polluted. Detailed examples were provided of pollution caused by farming, urbanisation, mining, factories and transport.

Question 6

(a) (i)   Some candidates were unable to name August, September and October as the three months shown on the graph as when the river Nile used to flood. Some appeared to be looking at the peaks on both graphs, others at the wrong graph.

    (ii)   Some candidates did not realise that when the River Nile flooded silt/mud was deposited by the flood water and this fertilised the land. A number of answers stated that fertilisers were needed because crops were not getting enough water.

(b) (i)   Most candidates knew that hydro-electric power is generated from fast flowing water.

    (ii)   Most candidates gained at least some credit for explaining why electricity generated from fast flowing water is a renewable and sustainable energy resource.

    (iii)   Few candidates gained full credit for suggesting the environmental problems of building large dams in developing countries. There were, however, some thoughtful answers. These included how dams could be ugly, habitats could be lost, crop land could be flooded, fish could be made unavailable to eat and people could get water-based diseases. Noise made during the construction of a dam and reservoir was also credited.

ENVIRONMENTAL MANAGEMENT

Key messages

- It is essential that candidates read the questions carefully. There were several questions on this paper where the answers were not related to the question set. Some candidates underlined key words which helped them focus on what was required.

- There were several instances of candidates stating something is affected without saying in what way it was affected. For example, in **1a(iii)**, a number of candidates stated that the birth rate affects the rate of natural increase. Others stated that the level of education affected the birth rate. In neither case did they state how the natural increase or the birth rate was affected.

General comments

Candidates scored equally well on both **Question 1** and **Question 2**. Nearly all the candidates attempted all the questions and completed the paper. Candidates found some questions quite easy. These were frequently, but not always, questions based on graphs. Both questions requiring the completing or drawing of graphs, **Question 1b(i)** and **Question 2b(i)**, scored highly, as did **Question 2e(ii)**, which was based on a calculation from a graph. Some knowledge questions also proved easy, notably **Question 1b(ii)** and **Question 1c(i)**. The weakest answers came from a range of questions, but were generally those requiring some interpretation or application. The difficult questions were **1b(iv)**, **1c(iii)**, **1d(ii)**, **2a(ii)**, **2b(iv) 2f(i)** and **2f(ii)**. Details of what was expected and how these questions could have been better answered are in the next section.

Comments on Specific Questions

Question 1

(a) (i) Comparatively few candidates achieved full credit. This was mainly because they were unable to distinguish developed from developing and so the ratio was incorrect. There was a clue in the next question which suggested that most mega-cities were in developing countries.

(ii) A few candidates wrote that most were in developed countries, indicating that they had not read all parts of the question. Many could identify that there were far more mega-cities and that Asia had seen the biggest increase. A variety of other statements were equally valid.

(iii) This proved to be a challenging question. There were two main problems. First was that many candidates interpreted natural increase as birth rate, not realising that it is also dependent on the death rate. Second was that candidates did not say why natural increase was higher in developing countries than in developed. Many wrote, often rather vaguely, about general reasons for a high birth rate or large natural increase without answering the question set.

(iv) This was another comparative question where many candidates struggled. Answers usually stated reasons why rural to urban migration was quite rapid in developing countries, but never stated why it was lower in developed countries.

(b) (i) This question was well answered. Some candidates lost marks due to inaccuracy in completing the graph.

(ii) Some candidates correctly identified the pull factors. G could be either, both or ignored.

(iii)   Many candidates quoted a public service, such as health facilities. These could not be credited as public services were included as a pull factor in the earlier parts of **(b)**.

(iv)   If candidates had thought there were more push than pull factors in part **(b)(ii)**, they had difficulty answering this.   The simple answer was that pull factors are more important.   Ratios or percentages could have been quoted to gain extra credit, or they could have added that push factors are also important to some people.

(c)(i)   This question was well answered with clean water, sanitation and health care being the most frequent responses.

(ii)   Many candidates were able to gain credit here, for example relating the supply of clean water to better health. To access more credit they needed to develop their answer, for example explaining how clean water will lead to better health or why dirty/contaminated water will cause illness.

(iii)   The first part of this question, about the features of the houses, was much better answered than the second part about location. Most candidates knew that the houses were small with maybe just one room and often made of cheap or free materials such as bits of wood, corrugated iron, etc. They also knew they were close together and lacked basic facilities. Far fewer could write about likely locations. These settlements will develop where they can find space. This is usually on the edge of cities or areas not wanted for other land uses. The areas close to rivers, the steep unstable valley slopes, along railway lines or close to polluting factories are all good examples.

(iv)   Answers needed to be possible for the people, most likely working together, to achieve.   So installing piped water or electricity did not obtain credit. Some good answers were seen about collective action to improve the area, such as designating areas for rubbish and installing simple long-drop toilets away from houses and water supplies. Many had little to say beyond 'get a job' or 'get an education'.

(v)   Answers here often lacked depth. There are many examples of city schemes, often involving self-help schemes where the authorities supply basic services and people build their own houses on land that cannot be taken away from them. Providing security of tenure, so people improve their own plot, and providing basic services could be used to gain full credit.

(d)(i)   This was reasonably well answered, but some candidates gave irrelevant answers such as deforestation for loss of agricultural land. Others repeated the 'houses packed together' example that was given for congestion.

(ii)   As was the case for the other two developing/developed comparative questions in part **(a)**, candidates frequently wrote vague answers about why there were some problems in developing cities. The best answers used the headings from part **(d)(i)** and provided detailed answers. For example, congestion is worse in developing cities as road systems are often old and not designed for the sudden increase in car ownership. Whereas in developed cities the authorities have built modern road systems or invested in high quality public transport to get people out of their cars. Problems other than those listed in part **(d)(i)** were also credited.

Question 2

(a)(i)   Whilst some candidates stated that the tundra was located at 60 °N, most correctly stated that it was mainly north of 60 °N. Other marks were obtained for identifying that it was in the north of N. America, Europe and Asia, that it stretched along coasts and came further south in the east of N. America and Asia, etc. It is this attention to detail that earns credit. Vague statements could be awarded little if any credit.

(ii)   Few answered this correctly by stating there were no continents at a similar latitude in the southern hemisphere. Many thought the southern hemisphere to be hotter than the northern hemisphere. Closer observation of the map would have given a good hint.

(b)(i)   The graph was accurately drawn by most.   Temperature graphs should be line graphs, but Examiners also credited bar graphs if correctly drawn.

(ii)   Annual temperature range is the difference between the minimum and maximum temperatures, 29 °C in this case. Quite a few candidates spent time calculating the average temperature.

(iii)   The best answers pointed out that temperatures were below freezing for 9 months and that even in summer the maximum was just 5 °C. They also noted the low rainfall, with a maximum of 13 mm, and that the annual rainfall was much less than the 250 mm used to classify a desert.

(iv)   Good answers added notes to the effect that at high latitudes the Sun's rays had to heat a much larger area than those at the equator. The very best also stated that the longer journey through the Earth's atmosphere causes scattering or reflection of the rays.

(c) (i)   Most noted the low vegetation of grass, flowers and shrubs and the rocky nature of the ground.

(ii)   Weaker answers referred only to the climate and did not go on to explain why low temperatures and precipitation made farming impossible. The better answers made the connection and also used the photograph to explain how the rocky nature of the ground did not allow ploughing or even digging.

(d) (i)   Plants was the correct answer though Examiners also accepted grass. It is a food web so photosynthesis was an incorrect answer.

(ii)   To get full credit a marine food chain had to be given. Some candidates tried to do a land-based food chain, which scored partial credit.

(iii)   There were a number of irrelevant answers as candidates did not read the question carefully. Detailed answers about why fish stocks decline could not be given any credit. The best answers were those that looked at the impact not just on seals and hence polar bears, but also on zooplankton and phytoplankton. It was an overstatement to say that all the seals and polar bears would die: fish stocks had declined rather than been reduced to zero.

(e) (i)   Few candidates achieved full credit. There are many places on Earth where oil exploration and extraction takes place in the sea, so candidates needed to refer to the extreme cold (sea ice, problems for workers and machinery) and its remoteness. These factors would lead to high wages and transport costs as well.

(ii)   Most correctly calculated the answer.

(iii)   Whilst many noted the big increase in the price of oil for partial credit, few went on to say that this meant they could cover the extra costs involved in searching for oil off the coast of Greenland.

(f) (i)   Nearly all correctly stated that Greenlanders welcomed the possibility of an oil industry. The best answers went on to explain in terms of independence, improved infrastructure, well paid jobs, etc.

(ii)   The question was about developing an oil industry in Greenland, so answers needed to focus on environmental issues there, rather than the enhanced greenhouse effect and global warming. Possible oil spills were mentioned, but rarely did candidates go on to say what effect such spills would have on the ecosystem. The cold environment would also mean damage from spills takes longer for nature to repair. Very few used the statement in the stem that 'The Arctic is one of the world's last remaining wilderness areas'.

(iii)   Answers to this question were often very vague. Good answers struck a balance between the need for more wealth in Greenland and the arguments against exploitation. The occasional answer discussed safety measures that oil companies could take to minimise environmental damage.

ENVIRONMENTAL MANAGEMENT

Paper 0680/22
Paper 22

Key messages

- It is essential that candidates read the questions carefully. There were several questions on this paper where the answers were not related to the question set. Some candidates underlined key words which helped them focus on what was required.

- When plotting graphs or using data from graphs, candidates need to ensure they are accurate.

- Some questions do not have answer lines, for example where a graph needs completing. There are still candidates who miss such questions completely. It is therefore essential that candidates read all parts of questions to avoid missing out on marks.

- There were several instances of candidates stating something is affected without saying in what way it was affected. For example, in **2b(ii)** stating that the high pressure affects the movement of air, does not say how that movement is affected, i.e. prevents the air rising.

General comments

Candidates tended to score slightly better on **Question 2** than on **Question 1**. All candidates seemed to have sufficient time to answer all the questions, though the comparatively low credit awarded on the final question may have been caused by some candidates rushing to finish and not reading the question carefully enough.

All questions discriminated well. The questions where candidates scored particularly highly were **1a(i)**, **1c(i)**, **1d(i)**, **2a(i)**, **2a(ii)** and **2b(i)**. All of these involved using the data within the questions. The weakest answers were to questions **1a(iii)**, **1c(ii)** and **1e(iii)**.

Comments on Specific Questions

Question 1

(a) (i) Most candidates achieved at least one mark, usually by indicating the areas were close to the equator or within the tropics. A number of candidates just stated they were on the equator or at $0°$ which could not be credited as they are not only located on that line of latitude.

(ii) As for part **(i)** most candidates obtained at least one mark for identifying the zone around $60°$N. Just saying they were on $60°$N (which many thought was the Arctic Circle) was not accurate enough for credit to be awarded.

(iii) Many candidates simply repeated what they had stated in the previous two questions. Better candidates indicated specific differences in extent or compared tropical with temperate.

(b) Many candidates scored highly on this question. Better candidates were able to identify the necessary characteristics, particularly in number of layers, shape and leaves. Weaker candidates knew the layers and knew something about the leaves. Few candidates were able to name an example of a tree in the taiga forest such as pine, spruce or larch. Coniferous and fir are generic terms and were not credited.

(c) (i) The majority gave a correct figure of $26°$C. Some calculated an average temperature or gave the range as $2°$C.

(ii) Candidates found this question difficult. Quite a few candidates did not try to explain the differences in vegetation. Instead they gave vague descriptions of the climate with occasional attempts to explain why the climates were different. Very few candidates referred back to the table in part **(b)**. The best answers were those based on the table, particularly explaining the differences in shape of the trees or the leaves.

(iii) Many candidates wrote about why the trees grew more quickly in the tropical rainforest rather than thinking about the reasons why they were cleared. Clearance has mainly been for agriculture, so candidates could gain full credit for thoroughly explaining why the climate of the tropical rainforest was better for farming than that of the taiga. Some candidates did not seem to understand that the percentages indicated the proportion of trees cleared.

(d)(i) There were plenty of points that candidates could make to describe the initial slow increase in deforestation, the rapid rise to 2004 and then the steep decline. Many noticed the slight increase in 2008. Some candidates lost marks for inaccurate quotes of figures or not using units.

(ii) Quite a few candidates wrote about why environmentalists were concerned in 2004 but did not develop their answers to the later dates. Others wrote answers that did not answer the question, instead describing the impacts of deforestation. This was an example of where candidates needed to read the question carefully and think about the extent to which environmentalists should be worried.

(e)(i) Many candidates correctly identified national parks and nature reserves.

(ii) The better answers stated how these areas gave protection through banning of logging, etc. A number of candidates simply rephrased the question saying that the trees were protected.

(iii) The buffer zone runs the whole width of the biosphere reserve along its southern edge. Many descriptions were incomplete stating, for example, that it was between the lake and the nature reserve. More precision was required for credit to be awarded. More candidates received credit for suggesting the purpose of the buffer zone.

(iv) The best answers focused on what sustainable harvesting meant, its impact on the forest and how Fair Trade helps in such conservation. A lot of candidates made no reference to Fair Trade and some wrote about clearing more forest for subsistence farming.

(v) Many candidates understood that tourism could provide jobs as tour guides, in tourist facilities or in maintenance of the area. Other frequent answers involved making and selling local crafts. Fewer went on to look at how the infrastructure and income form tourists would benefit them in terms of healthcare, education, etc.

(vi) Many candidates scored at least one mark. The best answers dealt with the large size of the areas, the lack of money to pay for protection, corruption/bribery and the needs of the poor to make a living from the forests.

(vii) Many candidates did not note the phrase 'To what extent' in this question and so did not receive full credit. Good answers looked at reasons why they might and might not be successful. Weaker candidates might be advised to focus on one view, for example that the pressure on land by the poor would threaten their success. This could then be developed for more credit. However, to obtain full credit there needed to be consideration of both sides and some sort of judgement.

Question 2

(a)(i) Most candidates did well on this question.

(ii) The vast majority of candidates answered this correctly.

(iii) Many candidates identified that such pollution could cause illness, with examples and that this might cause them to miss work. Better candidates went on to look at the possible impact on tourism, medical costs and costs to industry of being required to reduce emissions. A large number of candidates did not notice the word 'city' and wrote about acid rain damaging crops or fish stocks, which could not be credited.

(iv) Better answers dealt with costs, lack of motivation and people/industry needing energy and that these fuels were the cheapest and easily available. Weaker candidates could only provide one reason or, in some cases, wrote about why pollution should be reduced.

(b)(i) To gain maximum credit candidates needed to have carefully labelled axes and four accurate plots. A number of candidates did not label the axis 'particulates / arbitrary units'. Some candidates would have obtained much more credit if they had plotted accurately. Frequently the plots of 121 and 21 were well above those figures, sometimes as high as 125 and 25.

(ii) Most candidates understood that a steep sided valley would block the movement of air and hence pollution. The major difficulty was in explaining that high pressure stopped the rising and mixing of air. The best answers covered all three aspects very well.

(iii) Candidates new about reducing air pollution. The best answers described rather than listed strategies. The weakest wrote a simple list which lacked description and, in most cases did not give a strategy. For example, 'use public transport' is commendable, but it is not a strategy and does not describe its use. Better to have stated that 'local government should improve / subsidise public transport so as to reduce the use of cars'. A list of strategies or what could be interpreted as strategies could achieve the majority of the credit. Better candidates described a number of such strategies and showed good knowledge of the use of scrubbers on chimneys and how catalytic converters work. It should be noted that CFCs are not a pollution issue in cities and that their manufacture virtually ceased after 1995.

(iv) Cost, a lack of alternatives, difficulty of ensuring compliance with laws and people having a basic need for energy were the main responses given. Some candidates did not note the wording about reducing air pollution. Large populations and people driving cars are factors in air pollution but not reasons why it is difficult to reduce air pollution.

(c)(i) This question was about reducing the risk of a leak. Quite a lot of candidates wrongly gave the answer that it should have been built 80 km away from the city. This would reduce the impact, but not the risk. Most candidates identified that better maintenance and safety systems would have reduced the risk of an accident occurring.

(ii) Many candidates correctly identified factors from the article to explain the difference. Some candidates went further, discussing that it was likely that evacuation and medical procedures would have been much better in the developed country of the USA.

(d)(i) To obtain full credit candidates needed to describe **and** explain. Many candidates wrote a list of effects but with no explanation. Good explanations used the information about the toxic waste on site being washed into the ground, so the drinking water becomes contaminated and poor health results.

(ii) A good way to answer this question was to develop the answers given in part **(i)**. For example that the toxic waste will probably still be contaminating the water, that birth defects are with a person for life, etc. Some good answers developed the idea of biomagnification, especially with respect to mercury. Other answers reflected on the comparative poverty of the people and likely lack of medical care for long term illnesses.

(e) This was an example of a question where candidates needed to read care. The question was about **restoration** of damaged environments, but many wrote answers that were lists of controlling pollution rather than clearing-up afterwards. Those who answered the question often concentrated on restoration of opencast mines. Many of these thought the holes would be filled with soil. It was possible to gain full credit on the restoration of such environments, but better candidates often extended their answers to other damaged environments such as sea areas affected by oil spills. Such answers were more than just a list and were developed to reveal detail and, in some cases, explanation.

ENVIRONMENTAL MANAGEMENT

Key messages

- It is essential that candidates read the questions carefully. There were several questions on this paper where the answers were not related to the question set. Some candidates underlined key words which helped them focus on what was required.

- When plotting graphs or using data from graphs, candidates need to ensure they are accurate.

- When a question asks for reasons or an explanation, candidates need to develop their answers. Often there are several marks available and a simple one line explanation is unlikely to contain sufficient reasons to gain full credit.

General comments

There was little difference in the performance of candidates on the two questions and all candidates had sufficient time to complete the paper. The better answers addressed the question set and showed the candidates had aimed to provide as much detail as possible where required. Weaker answers had some or all of the following characteristics:

- Descriptions and explanations were brief.

- They were vague and imprecise, for example in **1d(ii)** simply saying 'people are worried about it' with no indication as to why they were worried.

- They did not answer the question set. For example, in **2f(ii)** some candidates wrote about the process of mining or ranching with no mention of how these activities could be more sustainable and less damaging.

All questions discriminated well. The questions where candidates scored particularly highly were **1b(i)**, **1f(i)** and **2c(i)**. All of these involved using the data within the questions. The weakest answers were to questions **1b(ii)**, **1c(ii)**, **1f(iii)**, **1g**, **2c(ii) and 2e(ii)**. Details follow in the next section of this report.

Comments on Specific Questions

Question 1

(a) (i) Most candidates achieved at least partial credit, usually by stating it had increased. Better answers stated by how much and also identified variations in the rate of increase or the decrease in 2008/9. A few wrote about oil consumption rather than total world energy consumption.

(ii) The figures were quite straightforward, 4000 out of 12 000, which is one third or 33.3%, but many candidates were unable to calculate this.

(b) (i) This was an easy question. A few candidates showed a lack of accuracy and lost credit by showing SO_2 at 2% rather than at 1%.

(ii) The better answers explained the impact of both gases and why they needed to be reduced. Some candidates confused the two gases.

(c) (i) Most candidates were able to say that the estimates were not very accurate. Only the better candidates went on to add detail about how different the two sets of estimates were.

(ii) This proved to be one of the most difficult questions on the paper. Very few realised that new discoveries had been made in the intervening years as exploration had been undertaken in more remote and challenging locations. The other major factor is that technology has now improved to extract more from the known gas and oil fields. Weaker candidates thought demand for oil had decreased due to alternative energy supplies, in spite of the graph on page 2 showing oil consumption had increased.

(iii) Most knew that oil and gas was being used far faster than they were being formed and that the formation of these fossil fuels took millions of years. The better candidates stated that fossil fuels were finite.

(d) (i) Some candidates did not read the question carefully enough and wrote about the advantages of fossil fuels and renewables compared to nuclear power. Much information could be gained from the graphic and the best candidates used this information well to gain credit.

(ii) Comparatively few candidates could give examples of nuclear accidents such as Fukushima, Chernobyl or Three Mile Island. Answers were often vague or lacked explanation of the risks of nuclear power.

(e) (i) This should have been a straightforward question for most candidates as the stem informed them that a power station was damaged in an earthquake. Few discussed the implications of a major leak or knew that Japan was on a plate boundary and prone to earthquakes.

(ii) A number of candidates were able to list and develop points. Weaker candidates often focused on just one alternative. Those who wrote about wind or solar energy frequently ignored the disadvantages of a lack of power when conditions are calm and it is dark.

(f) (i) Candidates did well on this question, which required accuracy in reading from the graph.

(ii) Candidates were less able to extrapolate an accurate answer for part **(ii)**.

(iii) Weaker candidates struggled to come up with an answer to this question. If the raw materials will run out soon, then solar panels are not sustainable. Solar energy is sustainable only if alternative technology using different raw materials can be developed as the Sun will last for billions of years: it was rare for a candidate to realise this.

(g) The best answers identified the two renewable and one non-renewable sources and compared them in terms of costs. They then discussed other factors such as the possible lack of reliability of onshore wind. Solar power was though by such candidates to be too expensive, though a few noted that the cost of solar had decreased and that as fossil fuels became rarer and the price increased, solar would be viable in terms of cost. Weaker candidates did not distinguish between renewable and non-renewable sources and so made little progress.

(h) Most candidates could identify that electricity is vital for development and to improve the standard of living.

Question 2

(a) (i) A large number of candidates did not make the estimate correctly.

(ii) It was expected that most would identify the statement as partly true or true if the hot desert was an anomaly. However, only the better candidates noted this general decrease in NPP. The best answers used data from the graph or explained in terms of climate to get further credit, possibly using information from the following page.

(b) (i) Good candidates understood the link between temperature and precipitation and the amount of biomass, and quoted examples from the tropical rainforest. Weaker candidates sometimes made the connection but did not go on to explain why high precipitation and temperatures result in large biomass.

(ii) Nearly all identified precipitation, but explanations were frequently confused. It was rare for candidates to note that temperatures in all three were high enough for rapid growth all year.

(iii) Most identified temperature as the main factor. Better candidates could explain their choice in terms of short growing season or frozen ground.

(c) (i) This was one of the easier questions on the paper as candidates could use the diagram and their own knowledge. The main feature missing from some answers was that nutrients from the decomposition are released into the soil.

(ii) Even the better candidates found it difficult to explain why nutrient losses were small. Nutrients can be lost by soil erosion or leaching, so answers needed to explain why neither would occur to any great extent. Candidates are usually knowledgeable on the subject of soil erosion, so it seems that they did not make the link in this case. Leaching is less well known, but is minimal here as tree roots take up nutrients in water before they are washed from the soil into the bedrock.

(d) (i) Many seemed unfamiliar with the syllabus term hunter-gatherer.

(ii) Good candidates made use of the material provided as a basis for their explanations. Some weaker answers suggested that they did not read the information provided and so could not answer the question set.

(e) (i) Answers to this question were much better than those to **(c)(ii)**, with most candidates being able to offer some explanation. Weaker answers tended to consist of simple statements such as 'wind blows the bare soil away'. Some added ideas such as 'no plants to hold the soil in place'. The best answers developed these basic themes in terms of the wind drying the soil and there being no vegetation to block the wind or intercept rainfall.

(ii) The loss of nutrients was not explained as well as soil erosion in part **(i)**. The diagram provided a hint in terms of the arrows showing downward movement in the soil. This was ignored by the majority of candidates who seemed unaware of the leaching process.

(f) (i) It was not necessary to explain why each of the economic activities were unsustainable. Credit was given for general points applicable to some of the activities and to points that were specific to a particular economic use. The best answers combined these approaches using specific uses to illustrate the general points about minerals and timber being used up. Agriculture and HEP were more difficult to explain, but there were some good attempts in terms of soil fragility and the silting up of reservoirs.

(ii) There were a considerable number of irrelevant answers to this question. In such cases it seems that the candidates did not understand the term 'sustainable' and so they wrote about the development and processes involved in forestry or tourism. Some good answers were seen. Ecotourism seems well known by some candidates. Selective logging or planting two trees to replace each one cut down were also well explained.

ENVIRONMENTAL MANAGEMENT

Paper 0680/03

Coursework

Key Messages

- There were some interesting environmental topics investigated this series. These again showed the value to candidates of the opportunity to see sustainable issues in real life and in the context of their local areas.

- There were some projects that did not include a sufficient range of techniques to be able to formulate a sustainable management plan. The advice is always to start thinking about this at the start and then tailor the research to arrive at this final conclusion.

Comments on assessment criteria

Domain A

Domain A remains the strongest section. The majority of work showed that candidates were applying their knowledge from the course to their research in a competent fashion and this set them up admirably for the theory examinations.

Domain B

A wide range of techniques were used by most candidates, including some excellent first-hand practical work. Unfortunately this was not the case for all and some work contained insufficient detail to score well in either this domain or in **Domain C**.

Domain C

As often found previously, this was the weakest domain for many candidates. This was often the result of a lack of forward planning. It would help candidates to read the descriptors for this domain and ask themselves if they have fully considered the ultimate reason for their research, i.e. to produce a sustainable development plan.

ENVIRONMENTAL MANAGEMENT

| Paper 0680/41 |
| Alternative to Coursework |

Key messages

- This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of three countries, Ethiopia, Kenya and South Sudan. Many candidates understood and made good use of the source material and their written responses were sufficiently clearly expressed for credit to be awarded. Questions involving calculations and graphs did pose some difficulties for a minority of candidates.

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

- Centres might like to consider working through past papers with candidates to allow them the experience of using and selecting information from a given question.

Comments on specific questions

Question 1

(a) (i)   Most candidates calculated the population densities correctly.

(ii)   Many candidates recognised that the fertility rate was likely to be the most important factor in determining future population increase and correctly identified the country.

(iii)   Most candidates suggested at least one good reason for the delay. All the points on the mark scheme were seen regularly and the best answers easily gained full credit.

(iv)   Most candidates gave some reasons why the standard of living would increase. However, usually only partial credit could be awarded. Further details of economic development seemed to be difficult to recall or express for a majority of candidates.

(v)   Most candidates appreciated that there would be more trade between counties. The significance of countries being linked to a sea port was only considered by a small number of candidates.

(vi)   Many candidates suggested at least one way in which environmental damage could be reduced.

(b) (i)   Most candidates presented arguments suggesting the port development would go ahead, all the points on the mark scheme were regularly suggested. The candidates who argued that the development should not go ahead also made some valid points.

(ii)   The advantages of exploiting the new coal deposit were well understood by most candidates. However, a minority suggested the only use of coal would be to fuel the trains rather than export it or use it for electricity generation.

Question 2

(a)   Nearly all candidates gave credit-worthy answers that described the damage to human health that could be caused by wire burning.

(b) (i)   Candidates often find the selection of a sequence of events quite demanding. On this occasion there were a large number of correct answers.

(ii) Completing the table for medium and light duty wire was attempted by all candidates. Most used a method that found the percentage of plastic correctly. The number of metres of wire needed to give 1 kg of copper proved to be more demanding.

(iii) Most candidates correctly selected heavy duty wire. Giving reasons such as it giving the most copper or being worth the most money.

(c) (i) Most candidates gave a valid reason as to why this sampling method was not going to provide a representative sample.

(ii) Most candidates gave sensible reasons as to why this sampling method was an improvement on method A.

(iii) Nearly all candidates selected an additional feature of this sampling method that made it the best method to use.

(d) (i) Most candidates presented two questions. Most of the questions were clearly related to health. Some of the questions were very similar to the questions presented in the table, which limited the credit that could be awarded. Candidates scoring maximum credit often referred to medical conditions not given in the table.

(ii) Nearly all candidates selected Q and gave a valid reason.

(iii) Only a minority of candidates clearly stated the wind direction and the consequence of transporting more air pollution to location Q. In some cases candidates made suggestions about water movements, this did not answer the question.

(e) Many candidates identified that Q and R were close to a water channel but only some went on to mention contaminated water or the breeding of mosquitoes.

(f) (i) Some of the advantages and disadvantages of using wire stripping machines were correctly given by most candidates. All the points on the mark scheme were seen regularly.

(ii) Most candidates only focused on the need for people to make a living burning wire.

Question 3

(a) (i) The graph plotting was demanding in this paper. However, there were a good number of fully-labelled graphs with a key that gained maximum credit.

(ii) The pattern of results was well described by most candidates. Many candidates referred to the drop at the end of the plot. Suitable numerical values were used to support answers.

(iii) Only a minority of candidates clearly identified the point on the graph that gave a maximum yield of roots. Unfortunately some candidates only made statements about the maximum height of plants.

(iv) Few candidates appreciated that cowpeas were a leguminous plant capable of fixing nitrogen.

(v) This question about sustainable farming proved to be difficult for many candidates. Only a small number referred to the high cost of fertiliser and therefore the risk of losing money at harvest. There were some good references to fertilisers causing long-term damage to soils.

(b) (i) The table was completed successfully by nearly all the candidates.

(ii) Nearly all the candidates gave a reason why planting with cowpeas was a good idea. Most failed to give a second point that was worthy of credit.

ENVIRONMENTAL MANAGEMENT

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Paper 0680/42

Alternative to Coursework

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Key messages

- This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of India. Many candidates understood and made good use of the source material and their written responses were sufficiently clearly expressed for credit to be awarded. Questions involving calculations and graphs did pose some difficulties for a minority of candidates.

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

- Centres might like to consider working through past papers with candidates to allow them the experience of using and selecting information from a given question.

Comments on specific questions

Question 1

(a) (i) Most candidates made sensible suggestions about the problems caused by urban migration. There were a small number of suggestions about rural people not adapting to their new life. This did not gain credit unless further details were given.

(ii) Many candidates did well on this question with both axes fully-labelled in many cases.

(iii) and **(iv)** Many candidates correctly identified the smallest and largest increase. The largest increase seemed a little easier for candidates to identify.

(v) Most candidates gave sensible reasons to account for the increase in the MSP. Inflation and increase in demand were the most common answers.

(vi) Despite performing well in part **(v)**, many candidates found it harder to suggest the advantages to the government of setting an MSP.

(b) This question proved to be demanding for many candidates. A small number suggested that only the softer tissues would breakdown.

(c) (i) Many candidates suggested fact four as the main cause of costs or reduced profit.

(ii) Most candidates selected fact one, two or three and stated a valid reason to support their choice.

(d) (i) Descriptions of eutrophication given in the question did not elicit the required description of the processes involved for some candidates. The candidates that did make the link usually received full credit.

(ii) Most candidates made sensible suggestions as to how to improve the sampling regime. All the points on the mark scheme were regularly suggested.

(iii) The overwhelming majority of candidates realised that the water quality returned to normal.

(e) (i) Most candidates suggested the process was quicker, however they had already been told this. A minority of candidates realised that the process would happen faster if the temperature was higher.

(ii) Most candidates answered correctly.

(f) (i) A good number of sensible safety suggestions were offered, even though it was not expected that any of the candidates would have carried out the experiment.

(ii) Most calculations were correct.

(iii) Most candidates suggested the old method was better as the fibres were a little stronger. Other candidates suggested the advantage of the new method was that it would produce fibres more quickly. Both answers gained credit.

(iv) Only a minority of candidates described the natural variation in the fibres as the cause of variation in the data.

(v) It was quite rare for candidates to suggest using weights of smaller values.

(g) Candidates nearly all made at least two points either in favour or against keeping the JPMA. All the points on the mark scheme were seen.

Question 2

(a) (i) Nearly all candidates presented a table with headings. In some cases it was not clear that there were enough rows to record all the data.

(ii) The correct pattern was described by a majority of candidates.

(iii) Some suggestions as to how the *Derris* plant had reached the mangroves were not clear enough to gain credit.

(iv) Many candidates described how the new plant may alter the balance within the mangrove ecosystem. A small number of candidates stated that the new plant would become extinct, rather unlikely for an invasive species.

(v) Most candidates gave one sensible suggestion to support plan A.

(vi) Most candidates could see that plans B and C might be counterproductive and described ways this might be so.

(b) Nearly all candidates gave at least one valid reason why most of the money from ecotourism did not reach local people.

(c) (i) Nearly all candidates gave sensible suggestions to control an outbreak of cholera.

(ii) Most of the questions presented were clearly related to health. Further credit was available for a more detailed question.

(iii) The number of villages that should have been sampled was highly variable. A significant minority of candidates wanted to sample all of them; this would not have been a sample.

(iv) Many candidates did identify sensible ways of sampling a village. All the points on the mark scheme were seen regularly.

(d) This was a demanding question. There were some good suggestions about how to be better prepared for future cyclones.

ENVIRONMENTAL MANAGEMENT

Paper 0680/43

Alternative to Coursework

General comments

- This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of Colombia. Many candidates understood and made good use of the source material and their written responses were sufficiently clearly expressed for credit to be awarded. Questions involving calculations and graphs did pose some difficulties for a minority of candidates.

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

- Centres might like to consider working through past papers with candidates to allow them the experience of using and selecting information from a given question.

Comments on specific questions

Question 1

(a) Most candidates gave good accounts of the long term damage caused by flooding.

(b)(i) and **(ii)** Most of the calculations were correctly completed.

(iii) Only a small number of candidates appreciated that without pollination or fertilisation the flowers would not develop coffee beans.

(iv) Most candidates gave sensible reason for the change in conditions. Only a small number made the link between higher temperatures and increased evaporation.

(v) There were many good descriptions to explain how to use a rain gauge. All the points on the mark scheme were seen.

(vi) Most candidates gained maximum credit for their tables.

(c)(i) Most candidates realised the risk of the crop not always being profitable. Few recognised that plan one was still a monoculture, or discussed the risks of monoculture.

(ii) and **(iii)** The candidates made many good suggestions as to why these plans would help the farmers. All the points on the mark scheme were regularly suggested.

(d)(i) Most candidates made sensible suggestions as to how to improve the sampling regime. All points on the mark scheme were regularly suggested.

(ii) Nearly every candidate attempted this question. Some answers could not be credited as they lacked relevance.

(iii) Most candidates suggested a useful question related to the farming being undertaken.

(iv) Most candidates correctly selected B and then went on either use figures to support this selection or to describe the advantages of B.

Question 2

(a) (i) and **(ii)** Most candidates correctly selected figures from the graph and completed the calculation successfully.

(b) (i) There were many good suggestions as to why more mining licences were given.

(ii) Some of the descriptions of open pit mining lacked the detail required for full credit. Some descriptions were ambiguous and could have been confused with shaft mining.

(iii) The damage caused by mining was very well described by a majority of candidates.

(iv) Most candidates could give at least one advantage of open pit mining.

(c) (i) Nearly all candidates realised that moving the local people to make way for a large new mine would create many problems. The descriptions of the problems were very variable across candidates.

(ii) Most candidates realised that the extra restrictions would lead to extra costs and closure in the medium to long term.

(d) (i) The risks to health of mining were well described.

(ii) The correct value was selected by nearly all candidates.

(iii) The graph was correctly plotted and labelled by a majority of candidates.

(iv) The pattern shown by the graph was often not fully described. Many candidates did not recognise that the lack of an increase after 41 years of age.

(v) The possible reasons for collecting a larger sample were not very well described by many candidates.

(e) (i) The trends for the number of plants and number of species were usually well described.

(ii) Candidates often found it difficult to come to a clear conclusion about the data collected.

(iii) The significance of a sloping site was not appreciated by many candidates as a likely explanation for the differences between up and downslope vegetation.

(iv) Only a small number of candidates realised that horizontal vegetation surveys of the same site could be the next step in the investigation.