

ENVIRONMENTAL MANAGEMENT

Paper 5014/11

Paper 11

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 performed equally well on **Section A** (the four 10 mark questions) and **Question 5** and **Question 6** in **Section B**. There was no clear pattern in terms of performance on the **Section A** questions. 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 or other resources. Both questions requiring the completing or drawing of graphs, **Question 5b(i)** and **Question 6b(i)**, scored highly, as did **Question 4(a)** and **Question 6e(ii)**, which were based on using information from the graphs. All parts of **Question 2(a)**, based on a map resource, scored highly. Some knowledge questions also proved easy, notably **Question 5b(ii)** and **Question 5c(i)**. The weakest answers came from a range of questions, but were generally those requiring some interpretation or application. The difficult questions were **5b(iv)**, **5c(iii)**, **5d(ii)**, **6a(ii)**, **6b(iv)**, **6f(i)** and **6f(ii)**. Details of what was expected and how these questions could have been better answered are in the next section.

Comments on Specific Questions

Section A

Question 1

- (a) (i) Generally poorly answered. Careful study of the soil profiles should have enabled candidates to answer part (i) correctly.
- (ii) Candidates did not score well here and some seemed to be guessing at the answers.
- (b) Of the four parts, candidates struggled most with (iii), air, which is needed for respiration of soil fauna. Part (iv) was best answered.
- (c) Most candidates worked out that the deeper soil would allow roots to grow.

Question 2

- (a) (i) Nearly all correctly answered this question.
- (ii) The only problem here was when candidates did not realise that the Pacific was split between the left and right edges of the map and only counted in one of the areas.
- (iii) Most gave one of several possible answers, usually that all were distant from the Chagos Islands or all were coastal nations.

- (b) Candidates rarely gave enough information for maximum marks, but most discussed the overfishing.
- (c) The disadvantages for people scored more highly than the benefits for the environment. It was expected that candidates would make the connection between the ban and the chance for fish stocks to recover.

Question 3

- (a) (i) Most stated it was a wind vane.
 - (ii) Candidates either correctly stated 'south' or incorrectly stated 'north'.
 - (iii) A and C were mostly answered correctly, but few knew that the shaft was to raise the arrow high above anything that might interfere with the wind.
 - (iv) A number of candidates ignored the photograph and wrote about location of weather instruments in a Stevenson screen. The question states '...this weather instrument' so it should have been clear what was required.
 - (v) Few candidates could state that there were no obstructions to the wind.
- (b) (i) Candidates either did not attempt the question or completed the wind rose correctly. It is not known whether candidates did not know what to do or missed the question as there was no answer line. Candidates should be reminded to read with care.
 - (ii) Most candidates got the idea of wind breaks, but few provided further detail about the orientation of the wind break.

Question 4

- (a) (i) Most correctly stated the percentage from the graph.
 - (ii) This question proved comparatively easy, with plenty of descriptive points that could be credited.
 - (iii) Nearly all identified the answer.
- (b) Both parts caused problems for many candidates. The best realised that normal tilling was being replaced by no till so that there would be no fuel costs for tractors. Even good candidates rarely realised that the no till method would reduce evaporation from the soil compared to tilled soil.
- (c) Despite the lack of understanding shown in (b)(ii), quite a few candidates could explain why keeping some of the soil covered could reduce soil erosion. The most frequent answers concerned the fact that wind and flowing water would be less likely to remove soil particles. However, few went beyond that to explain how it helps retain moisture and why that is important.
- (d) Terracing and contour ploughing were the most common correct responses.

Section B

Question 5

- (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 such as 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 6

- (a) (i) Whilst some candidates stated that the tundra was located at 60°N, most correctly stated it was mainly north of 60°N. Other marks were obtained for identifying that it was in the northern hemisphere of North America, Europe and Asia, that it stretched along coasts and came further south in the east of North 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 answers also discussed safety measures that oil companies could take to minimise environmental damage.

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Paper 5014/12

Paper 12

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 **6b(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 perform best on the first four questions. On the two longer questions, candidates tended to score slightly better on **Question 6** than on **Question 5**. 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)**, **2b**, **3b**, **4a(i)**, **4a(ii)**, **4a(iii)**, **5d(i)**, **6a(i)**, **6a(ii)** and **6b(i)**. Most of these involved using the data within the questions. The weakest answers were to **Questions 4b(iii)**, **5a(iii)**, **5c(ii)**, **5e(iv)** and **5e(vii)**.

Comments on Specific Questions

Section A

Question 1

- (a) (i) The magma reservoir was known by nearly all, but the crater label was frequently placed on the vent and the oceanic crust sometimes put in the ocean or on the continental plate.
- (ii) Whilst the majority answered correctly, many thought it was the mantle.
- (iii) A small majority of candidates answered correctly that it was a convergent or destructive plate boundary.
- (iv) Many candidates could explain about subduction, friction and melting. Some confused the type of plate boundary.
- (b) There were many hazards that could have been included in the answers, such as lava flows, pyroclastic flows, volcanic bombs, earthquakes, etc. Some candidates wrote about houses and farmland being destroyed without mentioning the actual volcanic hazard(s) that caused this.

Question 2

- (a) (i) Candidates frequently interpreted the diagrams well, noting the weakening of the trade winds, the change in the current direction and how this warm water prevented the upwelling of the cold water.
- (ii) The best candidates realised that the increased rainfall would lead to increased growth of plants, so more food for herbivores. These would increase in numbers and provide food for carnivores. The presence of dead fish and iguanas washed up on the shore was also credited as a food source for the land animals. Weaker candidates often got no further than water availability, while others incorrectly wrote about the cooler cloudy weather making life better for animals.
- (b) This question was well answered with most candidates understanding that the nutrient supply at the base of the food chain would decrease greatly and cause decreases in numbers higher up the chain.

Question 3

- (a) (i) Candidates who did not realise the graph was cumulative struggled. Instead of adding another 40 000 on the top of the Bangladesh column, they added it at the bottom.
- (ii) The misunderstanding of the nature of the graph caused some candidates to perform poorly. Other candidates noted correctly that there were more deaths after 1950 than before, but few added the detail for the second mark that this was not the case for India where more deaths occurred before 1950.
- (b) This question was well answered with strong winds and heavy rain (floods) being given by most candidates.
- (c) Many candidates knew that low-lying areas close to the sea would suffer most from cyclones. They were less certain about human and economic factors. Better candidates discussed differing population densities and differences between developed and developing countries in terms of warnings/evacuation and shelters.

Question 4

- (a) (i) This question was answered well by most candidates.
- (ii) The correct choice was given by the overwhelming majority of candidates.
- (iii) 2001 or 2002 were correctly given by most candidates.
- (b) (i) Many candidates were able to identify higher yields. Some struggled to find a second reason such as increased income, less money spent on pesticides or the environmental advantages of not using pesticides.
- (ii) This question was well answered with most realising that it would have health benefits.
- (iii) This was less well answered than the previous two parts. Good answers covered human fears about health or allergies as well as biological concerns about competition with natural plants, cross breeding to produce super weeds, etc.

Section B

Question 5

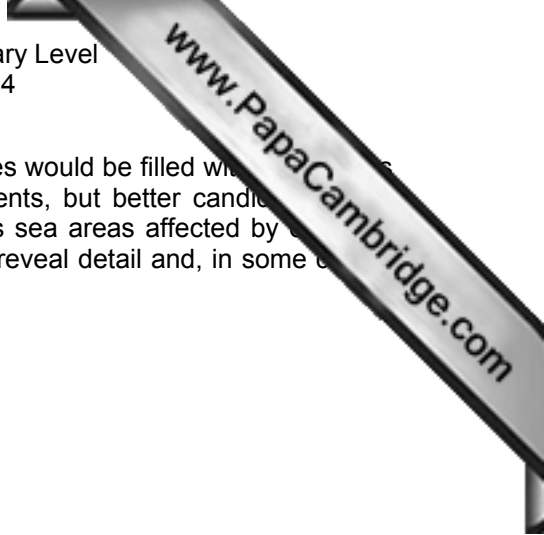
- (a) (i) Most candidates achieved at least one mark, usually by indicating the areas were close to the equator or within the tropics. A number of candidates just stated they were on the equator or at 0° which could not be credited as they are not only located on that line of latitude.
- (ii) As for 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. Some 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 from 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 6

- (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, which was not possible to gain full credit on the restoration of such environments, but better candidates extended their answers to other damaged environments such as sea areas affected by sea level rise. Such answers were more than just a list and were developed to reveal detail and, in some cases, a clear explanation.



ENVIRONMENTAL MANAGEMENT

Paper 5014/21
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. The 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

Paper 5014/22
Alternative to Coursework

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.