ENVIRONMENTAL MANAGEMENT

Paper 5014/11
Paper 11

Key messages

- For an examination paper of this length it is essential for candidates to plan their use of time carefully.

- Answers to the 10 mark questions in **Section A** need to be short and precise. The number of marks for the question should be used as the guide for the amount of description or the number of reasons needed.

- More candidates than previously had spent time underlining key question words and this was time well spent. For example, candidates who underlined 'land based ecosystem' in **5(a)(iii)** and 'your chosen alternative energy source' in **6(d)(iii)** were more likely to give answers which directly met the question need.

- Candidates are encouraged to pay attention to the number of marks given for the question. There were many examples of one comment being given to two mark questions, such as **4(a)(iii)**, **5(d)(i)**, **6(c)(iii)** and **6(c)(iv)**.

- Candidates are advised not begin answering by repeating what is in the question. Sometimes this filled the first two or three lines of the answer, especially when background information was included as well.

General comments

In **Section A**, candidates found **Questions 1** and **2** slightly more challenging. Within **Section B**, candidates were more likely to gain the first mark for the question, even if answers were not developed enough to earn the other marks. Only the occasional individual questions proved to be more challenging, such as **5(a)(iii)**, for which general food chain knowledge and understanding needed to be applied to a specific example. Candidates appeared to be particularly comfortable with the questions on alternative energy sources in **6(d)**.

Those candidates who made sure that they answered all of the questions, who kept an eye throughout on question wording and the number of marks available, who attempted to elaborate and refer to an example whenever possible, were the ones who came out with the highest marks. They used their knowledge and understanding in the most effective way to achieve a consistency that, in some cases, was most impressive.

Comments on specific questions

Section A

Question 1

(a)   Candidates typically began by referring to the great overall increase in aluminium production. Full credit was awarded if candidates carefully described other changes within the period from 1900 to 2009 from the graph. Use of values was credited when they were related to a significant change.

(b) (i) and (ii)
        Very light in weight was the most common property used.

(c)   HEP was the answer expected, but this was not always given.

(d) (i)   Recycling was the way included most in answers, followed by more efficient use. Other ways, such as using technology to develop or discover substitutes were referred to less frequently.

(ii) The easiest way to show candidate understanding of this question was to write down an example, such as pH decreasing from 5 to 4.

Question 2

(a) (i) The two bars needed to be correct for both length and width, but not all responses were.

(ii) Almost all candidates gave an answer between 10 200 and 10 300 in 1995 to gain credit.

(iii) The characteristic most commonly stated was affecting large numbers of people.

(b) (i) Typhoid, dysentry and diarrhoea were the valid water-borne diseases. Malaria. was the most common wrong answer.

(ii) The most able candidates were in possession of a clear knowledge of the different types of water-related diseases.

(c) Many candidates began their answers by making the general point of lower income. What determined whether the remaining two marks were claimed was the extent to which they developed their answers.

Question 3

(a) Some candidates found it easier to describe the anemometer than to state its name. Many gained credit for their description by referring to the rotating cups, on top of a long pole, which were linked to a counter showing the number of rotations.

(b)(i) Descriptions of the wind power output graph were shorter than expected. The constant maximum output between 30 and 60 metres per second, and no output over 60 metres per second, were rarely mentioned.

(ii) More candidates gained credit for explaining that the wind needed to be strong enough to turn the blades to begin power output, than for explaining why the machines are shut down during high wind speeds above 60 metres per second.

(iii) Only a few recognised that standby cost was the cost of using another power source during times when wind power is not working.

Question 4

(a) (i) Most candidates correctly placed nitrogen, ammonia and nitrite from top to bottom in the three boxes on the diagram.

(ii) Leaching, causing a loss to groundwater was referred to more frequently than fertiliser loss in surface run-off.

(iii) Decomposition was widely recognised as the process linking dead organisms to ammonia in the diagram. In many answers partial credit was awarded as candidates failed to describe the process more fully by referring to decomposers.

(b) (i) The answer nitrogen-fixing bacteria was expected.

(ii) Most candidates appreciated that use of legumes was a more environmentally friendly way of fertilising soils, at the same time as they provided income as a useful crop for animal fodder or human food.

Section B

Question 5

This was generally well answered. Good familiarity with the topics examined was shown by virtually all candidates. Credit was lost by candidates who failed to develop their answers in line with the number of marks available.

(a) (i) Light from the sun, precipitation, decomposed, carbon dioxide, soil, roots and nutrients and permeable rocks were the expected answers in the boxes (moving from left to right and top to bottom). Some alternatives were also allowed, such as decay for decompose and oxygen instead of carbon dioxide.

(ii) Most candidates answered this question well, especially when they began with 'plants make their own food' (or similar) and explained briefly how they did this.

(iii) This proved to be more challenging, not because of lack of understanding of the concept of food chain, but because the candidate needed to give a food chain specific to a chosen land based ecosystem. The majority of accurately completed food chains were given for the savanna lands of Africa; grass, zebra, lion and vulture was a common example used. Next in effectiveness were tropical rainforest examples. Much less effective were general food chains, unrelated to a named ecosystem, of the grass, rabbit and fox variety. There were a few examples of water based food chains which were not credited.

(iv) The majority of candidates were precise and knew about the 90% reduction between each level in the food chain.

(b) (i) A good number of candidates struggled to give both soils and animals. One of them was often replaced by water, or by an even more direct element of climate such as temperature or rainfall.

(ii) Biotic and abiotic were accurately separated by candidates who had named soils and animals.

(c) (i) Keeping the bars of equal width proved to be a greater challenge than correctly plotting the rainfall totals on the graph for many candidates.

(ii) Describing the features of the vegetation shown on the cross section allowed candidates to gain partial credit. Additional information based on knowledge of the natural vegetation was given most for hot desert, where the space for answering was widest.

(iii) Most candidates agreed that rainfall variations were more responsible for vegetation changes in the tropics than temperature. This was explicitly stated in the best answers. It was followed by statements relating reductions in vegetation height and density from the coast moving inland to decreases in annual rainfall. Some also commented on why temperature changes were less significant, along the lines that temperatures above 20°C provide sufficient heat for plant growth. In weaker answers, the importance of rainfall for plant growth was described, but without any reference to this example. A few candidates chose temperature as being more important. The choice was justified by high tropical temperatures causing high rates of evaporation, most significant in hot deserts. This choice did not allow for further development.

(d) (i) Most candidates were awarded partial credit for noting that people are capable of destroying (or badly disrupting) ecosystems. However, many responses lacked further elaboration.

(ii) Most divided bar graphs were accurately completed. The most common error was showing the tundra as four per cent instead of two, making the bar the equivalent of two squares in width.

(iii) The best answers came from candidates who realised that differences in percentage losses between ecosystems were a reflection of how easy or not it was for people to make a living. Candidates gained less credit by the size of the differences between ecosystems rather than suggesting reasons for them.

(e) (i) and (ii)

The choice of sustainable forest management strategy was critical to the success or otherwise of the answer to this question. Of the strategies named in the syllabus, reforestation and selective logging (i.e. sustainable harvesting of hardwoods) were far and away the most popular choices. Both allowed good opportunities for further description in the first part of the question, and giving reasons to explain their limited use in the second part. Full credit was awarded to candidates who considered the likely level of detail needed for a four mark question. Others chose replanting, but then stopped after giving only one outline reason, such as more costly or takes more time.

Question 6

Within **Question 6**, part **(d)** was the best answered part.

(a) (i)   Some candidates stopped the bars too short and did not draw them the same width as the ones already given.

    (ii)   Many candidates distinguished between the top three world regions (developed) and the rest (developing) by appropriate shading of the key

    (iii)   Most candidates chose the label 'developing' and explained on the basis of lower carbon dioxide emissions per person. A few chose 'developed' and explained on the basis of the presence of oil-rich countries within the Middle East. The level of explanation was key to gaining full credit.

    (iv)   The majority of responses were between 18,100 and 18,300 kilograms.

    (v)   Almost all candidates began to give the answer needed, often citing the greater numbers of fossil fuel burning industries and cars in the USA compared with Ethiopia. More able candidates also stated information for Ethiopia, about its lower level of economic development and greater rural population and the likely lower fossil use in a country where farming remains the dominant activity.

(b) (i)   Sulfur dioxide was stated by some candidates, but its main importance is as a cause of acid rain.

    (ii)   This was well answered by most candidates. Some responses confused the greenhouse effect with the hole in the ozone layer. It was well known that greenhouse gases allow short-wave light radiation from the sun in and trap some of the long-wave heat radiation from going out, however this was not always stated in a precise way.

    (iii)   Many candidates correctly separated out physical evidence and effects from causes and attempts to reduce the effects.

    (iv)   Some candidates relied too heavily on using the statements in the box and added little in the way of comment to explain variations in concern between countries. Some successfully developed their answers around examples of countries likely to be most affected, notably Bangladesh and the Netherlands, and gave reasons about why they have more to worry about than large countries like the USA and Russia. Less able candidates gave responses which referred either to low lying countries at risk of flooding, but without naming examples, or to poor countries heavily reliant on farming, which are the ones most likely to be most affected by changes in weather and climate.

(c) (i)   The best four sectors to shade on the pie graph were energy supply, manufacturing industry, transport, and heating and lighting buildings. One or more of these were frequently omitted, sometimes replaced by one that was non-applicable, such as forest clearance

    (ii)   Many candidates did not realise that the pie graph was already marked at ten per cent intervals, to help them and to avoid the need for calculations.

    (iii)   Forest clearances was the most popular choice. Candidates who described more fully, or looked for a second way in which greenhouses gases were emitted, were more likely to gain full credit.

    (iv)   Most candidates gained credit for reference to the dominant size of the total percentage in the graph. Few responses provided a supporting comment about their widespread, every day or essential uses.

(d) (i) Virtually all candidates included the common characteristic of these alternative sources that they will not run out, usually by stating that they are 'renewable'. Fewer candidates included the second, that they are all natural sources.

(ii) Most candidates gave two reasons, such as more expensive and limited availability; non-established usage or unreliable efficiency were also quite commonly included as one of the reasons.

(iii) Many good responses were given especially from candidates who referred to examples. This was done either by naming a dam for hydro-electric, or by naming countries with suitable natural conditions, such as Iceland for geothermal. A good level of knowledge about harnessing the energy source chosen was shown. A few candidates answered in relation to wind power; this did not gain credit as it was not one of those named in the diagram.

(iv) Responses needed to be specific for the source described in **(d)(iii)** and not just about alternative sources in general. For the resource that had been chosen, it did not matter whether the candidate's view was optimistic or pessimistic; it was the appropriateness of their explanation that determined the mark. Some of the best responses in this part were related to solar power, especially from candidates who were aware that the price of solar panels is falling fast. It was easy to relate this to the universal availability of solar energy.

(v) This question was the opportunity for candidates to refer to alternative energy sources as a whole. The typical response included references to the finite nature of fossil fuels and the growing pressure on governments to limit emissions to reduce climate change and global warming. Those candidates who went further and included another element, such as research and development likely to lead to new technology and cheaper alternative sources of energy often gained full credit.

ENVIRONMENTAL MANAGEMENT

Paper 5014/12
Paper 12

Key messages

- For an examination paper of this length it is essential for candidates to plan their use of time carefully.

- Answers to the 10 mark questions in **Section A** need to be short and precise. The number of marks for the question should be used as the guide for the amount of description or the number of reasons needed.

- More candidates than previous sessions had spent time underlining key question words and this was time well spent. For example, candidates who identified the command word 'Describe' by underlining in **5(b)(i)** were more likely to concentrate only on stating what the three estimates showed.

- Candidates are encouraged to pay attention to the number of marks given for the question.

- Candidates are advised not begin answering by repeating what is in the question. Sometimes this filled the first two or three lines of the answer, especially when background information was included as well.

General comments

Most candidates attempted answers to every question. However, there were a few instances of candidates not completing all the later parts of **Question 6**. Careful planning of use of examination time is essential, especially by more able candidates with good understanding and plentiful knowledge.

Candidates seemed to find little difference in level of difficulty between the **Questions 1-3** in **Section A**. However, the average mark for **Question 4** was generally lower. In **Question 6(b)** it became clear that national parks were better known than biosphere reserves.

Within **Section B**, candidates were more comfortable describing from the graphs, such as the world population graphs in **5(a)(ii)** and **5(b)(i)**, than with suggesting reasons as in **5(b)(ii)** and **5(c)(ii)** and **(iii)**. The three parts of **6(c)** proved to be more challenging than parts **(a)**, **(b)** and **(d)**. Often candidates took insufficient account of that part of the question 'for the people referred to in box P' in **6(c)(i)**, which led to answers of a more general nature about the economic costs of dam building for a country. Environmental problems in **6(c)(ii)** were often directed towards the farmland abandoned, without recognising that it was all under water, instead of the increase in farming on the higher slopes and its consequences. In **6(c)(iii)** the loss of dam usefulness was viewed by many in terms of replacement by other energy or water sources, instead of siltation leading to reduced water holding capacity. In **6(e)(i)**, some candidates were well into the question before they clearly recognised that referring to squatter settlements (or slums / shanty towns) was the key to answering.

Those candidates who made sure that they answered all of the questions, who kept an eye throughout on question wording and the number of marks available, who attempted to elaborate and refer to an example whenever possible, were the ones who came out with the highest marks. They used their knowledge and understanding in the most effective way to achieve a consistency that, in some cases, was most impressive.

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Comments on specific questions

Section A

Question 1

(a) (i)   The majority of responses were focused on description and almost always had sufficient coverage for full credit.

(ii)   Most candidates based their responses on different physical conditions, especially differences in climate, between the two regions. Those who also referred to the large deposits of oil and natural gas in the Middle East were the ones most likely to suggest sufficient reasons for full credit.

(b) (i)   The environmental impacts of using oil and gas were well known. More able candidates were able provide more precise responses, relating the gas emitted to a named impact (e.g. sulfur dioxide for acid rain) instead of relying on more general terms such as air pollution.

(ii)   Good responses often started with mention of the finite nature of oil and natural gas deposits, which led naturally into the economic consequences for countries and industries dependent on them.

Question 2

(a) (i)   The correct responses of 6% and 18% were commonly seen.

(ii)   Most candidates read the graphs accurately.

(iii)   Candidates needed to recognise that the gap between urban and rural areas for improved sanitation was widening with time in order to gain full credit. Some did this by words alone, others quoted percentages in support. Responses which gave percentage values from the graph, without comment often gained partial credit.

(b) (i) and (ii)
Candidates were more likely to gain credit for giving reasons for rural areas than for squatter settlements. The remoteness of rural areas was referred to in a variety of ways; physical, economic and political. Whereas for squatter settlements, many candidates over-concentrated on edge of town location, at the expense of wider references to more likely reasons, such as the scale of the problem, its ever increasing size and settlements' changing locations.

(c)   The greatest variations in response quality were seen in this question. Strong answers were based around people drinking contaminated water, which showed that candidates knew cholera was a water-borne disease. Other responses were more likely to continue with the theme of sanitation from the graph, without making clear how people catch cholera and less credit was available for these. References to pools of stagnant water were often a sign that the transmission of cholera was being confused with water-bred diseases such as malaria.

Question 3

(a) (i),(ii) and (iii)
The content needed for the three parts of **(a)** was widely known. The siting needs of a rain gauge for stability, in places without shelter from the rain or the chance of excess water falling in, formed the basis for the majority of responses.

(b) (i)   The majority of candidates correctly plotted the graph.

(ii)   Many candidates isolated the two years (2000 and 2010) in which rainfall was above average and noted the below average rainfall (by varying amounts) in the other nine. A few did not relate annual values to average rainfall.

(iii) The most common error was to ignore the question focus on livestock farmers. These responses were more likely to be based on the need for irrigation to grow crops, instead of mention of poorer pastures leading to animal losses and falling incomes. Many candidates paid insufficient attention to the many drier than average years and the problems they caused for livestock farmers. The wet years might well have been beneficial in topping up water stores instead of a problem.

Question 4

(a) (i) Many candidates gave the correct responses.

(ii) The more able candidates gave the correct response.

(iii) Burning fossil fuels for link 5 was almost always included in candidates' responses and fossilisation for link 4 was usually referred to, although not always named.

(b) Good responses were given by candidates who made clear the purpose of world biosphere reserves and recognised that they were not quite the same as national parks. Maintaining biodiversity, preserving genes for the future, allowing scientific research and providing education and training are stronger aims behind the creation of biosphere reserves. Candidates who were more familiar with national parks, typically gained partial credit, often for habitat conservation and eco-tourism (but not just tourism itself).

Section B

Question 5

This was well answered, as candidates showed that they were familiar with the topics examined. Credit was lost when candidates' responses were not directly focused on what was being.

(a) (i) A common incorrect response was 1700, from candidates who did not look at the scale carefully enough; the great majority gave the correct answer 1800.

(ii) Almost all candidates noted the differences in speed of growth before 1900 compared with that after the turn of the century. Use of supporting values enabled candidates to obtain full credit. Some candidates incorrectly quoted population totals at different dates, directly from the graph, without any accompanying description of population growth.

(b) (i) Full credit was obtained by candidates who noted what the total population was expected to be in 2010. Some candidates gave full description without mention of population totals and these gained partial credit. Some responses contained brief description, without references to totals or dates. These also gained only partial credit.

(ii) Some candidates gave general responses about the problems of making population predictions; others chose one theme throughout (such as birth control) and tried to apply it individually to each of the three estimates. Both had varying degrees of success. In general, the most productive approach was to take each one separately and refer to a mixture of reasons, especially availability of birth control measures, pressure on the Earth's resources and new technology.

(iii) Full credit was awarded to candidates who explained more broadly, or referred to an example.

(c) (i) Most candidates correctly identified 40 years.

(ii) Candidates who selected one reason only for differences in life expectancy were more likely to obtain full credit. The most common response was medical; however wealth and clean water were also accepted.

(iii) Many responses were a continuation of what was included in **(ii)** and these tended to lack any references to reasons that could explain the really low life expectancies, such as wars and particular diseases like HIV/AIDS. Afghanistan, South Africa and Sub-Saharan Africa named in the life expectancy graph were included as a trigger for these. Full credit was obtained by candidates who were focused more tightly on one reason in **(ii)**, such as medical, and referred to at least two totally different reasons in **(iii)**, such as wars, natural disasters or clean water supplies.

(d) (i) Candidates who used comparative terms such as broader base for Nigeria and taller pyramid for Japan were likely to gain full credit. The overall shape for Nigeria (more of a pure pyramid) was easier to describe than the more irregular, upright shape for Japan. A common incorrect approach was to answering by comparing percentages.

(ii) Occasionally whole bars or parts of bars for the under 15s and/or above 65s were left unshaded on the pyramids. However, the vast majority of candidates gained credit.

(iii) This question was answered equally well by candidates who focused on the 15-64 age group as the working population and independent, and by those who concentrated on the other two groups as dependent non-workers. The relatively few unsuccessful responses were given by those who stayed with the pyramids and did no more than compare relative sizes of these age groups between Nigeria and Japan.

(iv) A common incorrect response was 22%,.

(v) Virtually every candidate followed the question instruction to look for both advantages and disadvantages. The most successful responses gave a range and a reasonable balanced between the two.

(vi) Candidates who chose disadvantages seemed to find it easier to develop their answers towards full credit, particularly if they made reference to pressure on resources.

(e) (i) Candidates needed to include the idea of an increasing percentage or large numbers of old people in a country. Many of the attempts were too static to gain credit and not entirely correct such as 'more old people than young people' or 'it refers to people aged 65 and older'.

(ii) The main errors were from candidates who attempted to plot the three age groups by starting all of them from the base of the country's bar, so that they were superimposed and unreadable.

(iii) The award of full credit depended on the amount of detail given by candidates. Mention of pensions, medical provision or care homes, with comment about the elderly retired costing money as the tax base is reduced, was the most direct route to three marks.

(iv) Many candidates found this question difficult. The poor choice of UK could lead to only partial credit, based on the UK's smaller percentage of working population in 2010. The choice of Japan, tended to refer only to the working population becoming more elderly in future. Full credit was gained by those who incorporated references to fertility data as well. A lot of candidates failed to use all the population information available in the table.

Question 6

Within **Question 6**, candidates showed that they were much more comfortable with the questions that formed parts **(a)**, **(b)** and **(d)**. These were consistently better answered than those in parts **(c)** and **(e)**.

(a) (i) Most candidates gained partial credit for correctly naming the water cycle processes in the boxes. Percolation in **F**, groundwater flow in **G** and surface run-off in **H** were more likely to be incorrect than condensation in **D**, precipitation in **E**, transpiration in **J** and evaporation in K.

(ii) There was generally good understanding about the water table and its importance for clean well water supplies, as well as for irrigation in dry areas..

(iii) The majority of candidates correctly gave rainfall or precipitation.

(iv) Many responses know that the mountain location was important, but candidates struggled to state exactly how. Precise statements, such as steep sided mountain valley, steep slopes around it for fast run-off and higher precipitation in mountain areas, were the common ones.

(b) (i) Some candidates used an example of a dam in their own country; others relied upon one of the world's well known large dams, notably Aswan High Dam in Egypt, or Three Gorges Dam in China, or Hoover Dam in the USA. Nearly everyone who gave a name, also attempted to state a location.

(ii) Some candidates took note of 'for people living in the area around it' part of the question. Two of the most common answers of electricity supply and irrigation, were of little relevance to people living around the edges of the reservoir.

(iii) Virtually all candidates recognised that electricity was made at **M** on the diagram.

(iv) Most candidates realised that the water was being used for irrigation, even if only a limited number described the network of channels or canals shown.

(c) (i) Candidates needed to take note of 'for the people referred to in box **P**' in the question. This stopped them from concentrating their responses on the high costs of dam building for developing countries. Those who focused their answers on local people from the beginning typically gained more credit. Most candidates also included both social and economic problems. The issues were well known, when the correct route to answering was followed.

(ii) Successful responses focused on farming on higher slopes being the trigger for references about the greater likelihood of soil erosion on steep slopes, leading to increased run-off, and leaching of minerals into the reservoir. With this approach, full credit was common. Less able candidates did not establish the correct context, as all their comment was directed towards what would happen to the abandoned farmland, without any realisation that it would all be under water.

(iii) Better responses focused on sediment accumulation, leading to reduced water capacity. Some candidates missed the point of the question by referring to a greater preference for other energy sources, or by suggesting reasons why water supplies to the dam might be reduced.

(d) (i) The best responses were from candidates who clearly kept the environmental problems separate from the economic ones. This meant that the environmental was covered in adequate detail so that the overall answer was well balanced between the two and not over-dominated by economic problems.

(ii) Many candidates correctly made reference to population decrease.

(iii) Push factors needed to dominate in candidates' responses. These also needed to include a comment about their relative strength in order to claim full credit. This was sometimes achieved by reference to likely pull factors of urban areas.

(iv) Some candidates continued their answers from the previous part, referring to deteriorating soils or falling water supplies, and typically gained partial credit. Full credit was awarded if candidates then commented on the likely limited sustainability of the new activities (catching crabs and collecting firewood). A few also correctly expressed the view that the present resources may now be adequate to support the remaining population after so many had already left and gained full credit.

(e) (i) Some candidates did not realise that the key to answering this part was to refer to squatter settlements. This led to general responses which relied heavily on terms such as congestion, lack of electricity and sanitation and tended to gain partial credit. Candidates who began by mentioning slums, and referring to building materials, lay out, inferior locations or poor services were more likely to be awarded full credit. The most common award of credit was for reference to easy spread of disease, which was included in a variety of different contexts.

(ii) Some excellent responses were given by candidates with a clear knowledge of an example of a scheme for improving slum housing in a developing world city. The most popular choices were Karachi, Mumbai, Chennai and Cairo. Other candidates referred to community self-help schemes or slum clearance into apartments in a more general way and gained partial credit. A few candidates incorrectly named developed world cities such as New York and Tokyo.

ENVIRONMENTAL MANAGEMENT

Paper 5014/21

Alternative to

Coursework

Key messages

Centres are encouraged to work through past papers to help candidates improve on their exam technique and make the best use of the information given for each question.

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one country, Peru. Many candidates understood and made good use of the source material and their written responses were sufficiently clearly expressed. The mathematical and graphical questions did pose some difficulties for a minority of candidates.

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

Comments on specific questions

Question 1

(a) The advantages of improved trade links were well understood. Most candidates wrote about increase in foreign currency and some developed their ideas about jobs and standard of living

(b)(i) Most candidates suggested valid ways in which the ecosystem would be altered by the introduction of a new species of fish. Eating the carache fish and competition between species were the most common ideas. However, some discussed the impact of fishing and ignored the idea of ecosystems.

(ii) The most common answers were 'to compare' and 'accuracy'.

(iii) This was correctly answered by most candidates, although some incorrectly said it was to keep it fresh for eating.

(iv) This graph plotting exercise revealed a common mistake of omitting the labelling of the axis. The plotting of data was correctly carried out.

(v) Candidates found reading correct values from a graph. A large number of errors were seen, many candidates incorrectly wrote 320 and 120.

(vi) Most candidates attempted to describe the relationship between mercury and fish length. However, few were awarded full credit. There were frequent suggestions that mercury helps fish grow and some got it the wrong way round, saying that smaller fish have higher mercury concentration.

(c) Many candidates gained credit by quoting figures, but few wrote about the pattern of decreasing downstream.

(d)(i) Most candidates realised that if the scientist bought frogs it would simply add to the problem of declining frog numbers.

(ii) There were some suggestions that were too vague to gain credit and some candidates were clearly not describing sampling in a market.

(iii) Most candidates produced a sensible table and gained maximum credit.

(e) (i) There were more combinations given as answers than should have been the case.

(ii) Nearly all candidates presented correct answers.

(iii) Many different answers were presented. The difficulty seemed to be that they could not focus on one figure as the anomaly, or they tried to describe the quadrat. Another mistake was quoting number 6.

(iv) The most frequent answer was that adults were caught for sale, the alternative was that they had just reproduced.

(v) A great many clearly stated answers were seen.

(vi) Many candidates re-visited the market idea, rather than extending any field survey. Only a minority of candidates made valid suggestions.

(f) (i) Most candidates made sensible suggestions about breeding in captivity.

(ii) Candidates made sensible suggestions about conservation of endangered species.

Question 2

(a) (i) Nearly all candidates correctly stated the percentage of other types of waste.

(ii) Those who chose organic waste found it difficult to discuss how it was recycled. The best responses chose tins or plastic and discussed the idea of it melting.

(iii) Many candidates stated less pollution as an environmental advantage. The idea of using less resource to manufacture a product was also given in many cases.

(b) (i) If newspaper was chosen as the least profitable material, candidates frequently went onto gain full credit. Some candidates found it hard to identify the profitability of the different materials.

(ii) Many picked up on the idea of profitability for iron and plastic waste, but rarely developed their answer further.

(c) (i) Many wrote rather lengthy answers, usually they gained credit, but a minority of answers remained too vague.

(ii) The candidates that understood tally charts gave the correct response. A significant minority gave the wrong answer of 51, by adding up the answers.

(d) (i) Some candidates correctly tallied the number of waste collectors.

(ii) There were a wide range of computations, only some of which provided the correct answers. There are always calculations in this examination to test data handling skills.

(e) (i) Most candidates appreciated that there would be less waste around the city.

(ii) Some answers discussed taxing or charging local inhabitants, rather than selling the waste collected.

(iii) There were many answers about improving health that gained credit. Although some candidates mentioned tourism, this was often not developed enough.

(iv) Nearly all candidates commented on the idea of lack of profit and loss of jobs.

(v) Very few candidates mentioned limiting the number of visitors and only noted the idea of ecotourism. There was much discussion about sport fishing, boats, and piped water supply.

ENVIRONMENTAL MANAGEMENT

> **Paper 5014/22**
>
> **Alternative to**
>
> **Coursework**

Key messages

Centres are encouraged to work through past papers to help candidates improve on their exam technique and make the best use of the information given for each question.

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one country, Pakistan. Many candidates understood and made good use of the source material and their written responses were sufficiently clearly expressed. The mathematical and graphical questions did pose some difficulties for a minority of candidates.

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

Comments on specific questions

Question 1

(a) (i)   The problems of frequent power cuts were well described by nearly all candidates.

(ii) and **(iii)**

Most candidates found the process of identifying the largest and smallest decrease demanding and gave incorrect answers. The reasons given to support their selection were often too vague to gain credit. Overall this question proved very difficult for candidates.

(b) (i)   Nearly all candidates gave good reasons for the increase in the price of milk. All the expected answers were seen regularly.

   (ii)   The table was nearly always completed correctly.

   (iii)   Most candidates gave sensible reasons to explain why some farmers could not start the 50 animal project.

   (iv)   Most candidates plotted very clear graphs. Only a small number failed to provide any form of key to distinguish the cow and buffalo plot. Some axes were not clearly labelled.

   (v)   The changes in milk output were correctly described by nearly all candidates.

   (vi)   This question was meant to be more demanding, only a small number of candidates suggested the idea that there had been improvement in milk output by cross breeding.

(c) (i)   The uses of the land shown in the photograph were generally well described and the majority attempted to describe three different uses.

   (ii)   Many candidates found it difficult to put themselves in the position of the urban dairy farmer. There were surprisingly few candidates who mentioned the advantage of being close to a large market for their milk or being able to supply very fresh milk.

   (iii)   There were many excellent descriptions of the risks during heavy rains. All the expected marking points were seen regularly.

(iv) The majority of candidates suggested why dung was used as a fuel.

(v) Nearly all the candidates understood that dung can be used as a fertiliser or a fuel, but not both.

(d)(i) Many candidates did not seem to appreciate the risks to the people carrying out the cooking inside buildings. Instead there were inappropriate suggestions about global warming and acid rain.

(ii) There was a wide range of answers, many clearly demonstrating an understanding of sustainable activities. Answers that relied on the bullet points given in the question, without any further ideas of their own, did not gain credit.

Question 2

(a)(i) Nearly all candidates correctly suggested at least one advantage of building new power stations.

(ii) Most candidates inspected the table of data and correctly identified a sequence of villages in the table.

(iii) Many candidates had a clear understanding of the causes of poor growth in children.

(iv) This question required careful consideration of the data presented. Most candidates correctly suggested there was no link between these diseases and the coal mine. Supporting reasons, that used the data, were given by a good number of candidates.

(v) Some candidates suggested the need for blood samples, with was not necessary. All the expected answers were seen regularly.

(b)(i) Candidates often suggested the quantity of coal dust must be kept the same. Some answers were repetitions of the method points described, these were not correct.

(ii) There were a large number of well constructed answers to correctly describe what the experimenter found out.

(iii) There was a wide range of sensible suggestions as to what else could have been measured.

(iv) Most candidates clearly understood that the coal dust would reduce the absorption of light and therefore the rate of photosynthesis.

(c)(i) Most candidates correctly suggested coal dust reduces the number of tree species.

(ii) Few candidates gained credit for this question. Although some correctly realised the explanation hinged around wind directions.

(d) There were many thoughtful responses that gained maximum credit. Most candidates did explain different points of view to provide a balanced response.