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FOREWORD

This booklet contains reports written by Examiners on the work of candidates in certain papers. **Its contents are primarily for the information of the subject teachers concerned**.

UNIVERSITY of CAMBRIDGE
International Examinations

ENVIRONMENTAL MANAGEMENT

GCE Ordinary Level

Paper 5014/01

Paper 1

General comments

This session all the candidates appeared able to complete the paper in the allocated time; indeed, good candidates typically managed to supply full answers throughout, with some extended answers beyond the lines left for answering. A higher proportion of marks were often lost in the shorter questions in ***Section A*** worth just one or two marks than in the longer questions worth four or more marks in ***Sections A*** and ***B***. The skills based questions, based upon direct use of the graphs, were some of the least well answered questions on this paper, which was unusual. Candidates had been well prepared for the syllabus content covered in the questions.

Question 1 examined energy topics with which the majority of candidates were fully familiar and they scored high marks. At the other extreme, a small number of candidates, who tended to offer only one factor or one reason when two or three marks were available for the questions, scored low marks. Total scores in the middle of the range were largely absent. Likewise, most candidates showed good familiarity with the main question themes of over-fishing and conservation in **Question 2**. The most likely place for marks to be lost was in part **(a)** as a result of inadequate or careless use of the graphs. A similar trend was apparent in **Question 3**; the shorter one and two mark answers were less well answered than the longest question in the final part. This question generated the lowest average mark, partly due to lower levels of knowledge and understanding for savanna climate, vegetation and farming practices than for energy and fishing. **Question 4** was consistently well answered with fewer opportunities for candidate confusion between the greenhouse effect and ozone hole to reduce answer quality.

For most candidates, performance in **Question 5** was slightly better than in **Question 6**. One weakness which pervaded some answers to **Question 6** was poor direction towards question focus and main command words, notably ‘state’, ‘describe’ and ‘explain’. Some candidates attempted to explain instead of ‘state’ in **Question 6 (a)(ii)** and to state instead of ‘explain’ in **Question 6 (a)(iii)**; likewise some explained instead of described in **Question 6 (d)(i)** and **(ii)**, or else gave entire answers based on negatives (i.e. what could not be seen in Sketch **A**). Better descriptions of the housing in Sketch **A** were often seen in answers to Sketch **B** in **6 (e)(i)**, where they could not be credited. As a result, there were occasions when understanding of topic content did not lead to any addition to the mark total.

For some candidates, it proved to be difficult to maintain standards of performance across all the questions. Although some truly excellent scripts were seen, with the spaces left for answering full of relevant detail and comment throughout, most scripts included one or more sections which were low scoring. These occurred in all questions. What is important for gaining a high total mark in a question paper like this, composed entirely of structured questions, is that the candidate reads every question with great care. Candidates should be advised to keep checking that their answers match the question. Marks, once lost, cannot be retrieved.

Comments on specific questions

Question 1

'Rotation' was the best answer to **(a)(i)**, and for a few this proved to be the most testing part of this question. 'Electricity' was a better answer in **(a)(ii)** than 'energy'. Good candidates gave full answers to both parts of **(b)**. Provided that candidates obeyed the command word by describing rather than explaining, locations in terms of coastal and offshore rather than inland, in the north west and down the east coast rather than along the English Channel coast in the south, were often full enough to claim all three marks in **(b)(i)**. The best answers in **(b)(ii)** came from candidates who put forward and explained at least two different lines of argument. Part **(c)** was equally well answered by the majority of candidates; many good answers were continued beyond the lines and these candidates clearly could have written a lot more.

Question 2

Lack of care in answering **(a)(i)** resulted in some answers falling outside the acceptable limits of 76-86 million tonnes. In **(a)(ii)** some candidates referred to one graph only, usually total weight of fish caught, which meant that they were unable to establish a valid comparison. Some of the same candidates did not appreciate fully that graph **B** showed less fish to feed the population in **(a)(iii)**, and that this was an indication of non-sustainability. Full answers to both parts of **(b)**, in which good knowledge and understanding of the measures and issues were demonstrated, meant that the majority of candidates finished this question on a high note.

Question 3

In **(a)(i)** it was not unusual for the bar to be drawn to show 220 mm instead of 210 mm. Some described quite fully in **(a)(ii)** without showing a clear recognition of the existence of both dry and wet seasons. Some candidates suggested that the wet season began in March instead of May! Similarly in answers to **(b)(i)**, it was more common for information about the vegetation to be given for one season rather than for both. Some of the adaptations of trees suggested in **(b)(ii)** were not for drought. Despite the occasional over-narrow answer to part **(c)** due to concentration on just one reason, or upon soil erosion in general without emphasising causes relevant to nomadic pastoralists, this part was answered with consistently greater fluency than were the shorter questions which preceded it.

Question 4

Neither 'atmosphere' nor 'respiration' were automatic correct answers to parts **(a)(i)** and **(a)(ii)**. Provided that 'human activity' from the stem of the question was not overlooked by candidates, answers to **(a)(iii)** were full and reliable. There was a wide choice of possible strategies for **(b)(i)** and few candidates found it difficult to find two that they could describe. Answers to **(b)(ii)** were concentrated on references to developing countries, although one or two candidates used the USA as an example from among the developed countries with some success. Inadequate answers were rare.

Question 5

The majority of candidates exhibited familiarity with a divided bar graph in **(a)(i)**, although some were too generous with the size of the area devoted to 'others', which needed to cover less than one square. At the other extreme, a few did not know where to begin and tried to insert separate bar graphs within the frame. Only about half the candidates correctly chose 'water vapour' in **(a)(ii)**. In **(a)(iii)** repeated failures to name the solid chosen reduced the number of successful answers. Greatest understanding in **(a)(iv)** was shown by candidates who explained carbon dioxide by reference to photosynthesis and water vapour in terms of the water cycle. Answers, in which carbon dioxide was referred to only in terms of greenhouse effect and global warming, were too narrow and worth no more than one mark.

The answer to **(b)(i)** was 9000 metres. Those who answered 'above the stratosphere' in **(b)(ii)** exposed a lack of knowledge and understanding about the position of the ozone layer. Part **(b)(iii)** was well answered in general. The role of ozone for protecting living organisms against the worst effects of the sun's ultra-violet rays was well appreciated. Successful answers continued into **(c)(i)** and **(c)(ii)**, except from those candidates who regarded depletion of the ozone layer as the main cause of global warming. The highest quality answers came from candidates who knew that the ozone hole was discovered in Antarctica, where no permanent settlement exists, which triggered references to the fact that the causes of the pollution responsible for depleting the ozone layer had to come from elsewhere in the world.

The graph in part **(d)** was not completed by all with the accuracy typically associated with a vertical bar graph. Perhaps candidates were discomforted by the size of the values to be plotted, which led to some errors in completion. A few gave careless answers to **(e)(i)** by writing down nitrogen and/or sulphur alone. Although some tried to answer **(e)(ii)** without linking emissions to health problems, most gave answers that were sufficiently all-embracing to be worth both marks. Carbon dioxide was the best and most popular choice in **(e)(iii)**. Sometimes explanation was over-dominated by references to greenhouse effect, which was considered to be an inferior response compared with absorption by plants or respiration from humans.

In part **(f)**, most candidates recognised the significance of differences in scale. The choice of carbon monoxide in **(i)** produced the most consistently successful answers, because these could be justified either by amount of traffic or second largest amount emitted. Explanations for greenhouse effect and global warming from carbon dioxide, and for acid rain from sulphur dioxide and oxides of nitrogen, that were more world-wide were equally successful in **(f)(iii)** for the effects.

Candidate understanding was essential for delivering successful answers to part **(g)(i)**. It was pleasing to discover that able candidates could identify the inversion of temperature, as well as understand its significance for trapping the pollutants in the atmosphere below. Fewer, however, were able to appreciate the effects of the strong sunlight in promoting the chemical reaction to create photochemical smog. Full marks related to pollutants trapped between the two mountain ranges, shelter from the main wind direction and sinking air preventing the upward escape of surface pollutants were more readily gained by candidates with understanding. A wide variety of positive suggestions were accepted in **(g)(ii)** that covered transport, industry, and energy consumption in general. Negative suggestions, such as reducing the use of cars, industries and fossil fuels, were not accepted, because they were not strategies. To part **(g)(iii)**, two or three mark answers were the most common, typically for reference to the large concentration of cars and industries in cities and to their importance, which made it difficult to reduce their numbers. After this, only the best candidates explored a broader range of points, such as non-stop growth of cities, people's love of the car, weak controls and problems of enforcement, in order to gain access to the highest mark level.

Question 6

In part **(a)(i)**, 'Africa' was usually the first mark; candidates who kept an eye on the number of marks available referred to other locations as well, such as 'the Middle East', 'South-west Asia', or included more detailed references to the distribution within Africa. In part **(a)(ii)** one mark was easily achieved for appreciating the general difference in fertility rates between the two sides of the line, but only a minority worked for the second mark by quoting supporting values and locations. Part **(a)(iii)** examined a well-known topic. The weakest answers came from candidates who merely reversed what they said for developing and developed. Fortunately, the majority varied the content and the language used for developed and developing, and referred to supporting examples. China was the most widely quoted example of a country with a population policy. It was good to see the frequent use of local examples which enhanced answer quality.

Few candidates claimed all the five marks available in part **(b)**. There was too much of a tendency to compare between developed and developing in **(b)(i)**, while insufficient use was made of values to support description from the graph. In the better answers, however, candidates did note the differences in rate of growth, with a marked slow down from about 1990 onwards. This hastened the award of the second mark. Some candidates overused the word 'change' without clearly establishing an increase. In **(b)(ii)**, attention to detail was needed and answers such as 'about the same' or 'almost equal' did not fully fit the question theme of 'major change'. One mark answers to **(b)(iii)** dominated; although the value of the expected total in 2025 was widely quoted, the failure to quote another comparative value meant that effective elaboration for the large increase was not given.

Among those candidates who recognised that difference in income was the economic reason needed in part **(c)(i)** were some who failed to state that income was higher in urban areas. Few attempted to state the size of the difference (E£1100), which is what had been hoped for originally. Social reasons sometimes made an irrelevant appearance. Part **(c)(ii)** was one of the least well answered questions on the whole paper. A significant percentage of candidates failed to base their answers on 'evidence from the table', as demanded by the question. Few, if any, used the values to state the size of the differences between urban and rural areas; instead values (if referred to) were merely repeated. The best answers came from those who tried to explain differences by reference to water-based diseases and their effects on health, particularly that of infants.

Failure to follow the command word 'describe', rather than lack of understanding, was the main cause of mark losses in **(d)(i)** and **(ii)**. Some candidates made no attempt to describe what could be seen; instead they concentrated on writing about what not present as regards building materials and services. A list of building materials used in sketch **A** seemed to be given just as frequently under **(e)(i)**, where it could not be credited. Answers to **(d)(iii)** were typically more relevant, although some again lost the question focus in **(iv)** due to insufficient attention to 'around the edge of a big city'. Environmental effects of urban sprawl, distance from services and work, and land pollution from the use of the area for disposing of waste from the entire city, were the three relevant problems referred to most.

To gain both marks in part **(e)(i)** candidates needed to mention both building materials and services, and most did. Part **(e)(ii)** was answered well by candidates who referred to increased income from finding formal work and to improvements made by city authorities or governments, especially for the provision of services. More references could have been made to real examples. On the other hand, answers which began with such as 'To improve the services', 'To prevent the spread of disease' or 'To improve the appearance of the city for tourists', showed that question needs had been misinterpreted.

Answers to part **(f)** did not yield consistently high marks. Only limited real knowledge of either irrigation or new seeds was presented in the typical answer. In **(f)(i)** the name of a place was required, not just 'rural area', with a named country representing the minimum level of acceptance. This proved to be too high a demand for some. Specific information about the area named in **(i)** was generously rewarded in **(f)(ii)**, but it was not always seen. References to why irrigation was needed and techniques of irrigation were not as frequent as had been expected. It was disappointing that candidates did not make more use of examples from their own countries. Part **(f)(iii)** was a different type of question. The answer 'Yes' was surprisingly popular; in some cases it was really well supported by precise references to ways for helping farmers to improve output and quality of life. The answer 'No' was justified best when both push and pull factors were included. This question elicited the full range of responses, although with a majority of two mark answers for both 'Yes' and 'No', indicating a lack of development to the extent needed in a five mark question.

Paper 5014/02

Alternative to Coursework

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of an African country, Rwanda. The majority of candidates made use of the source material and were able to display their knowledge of environmental management. The mathematical and graphical questions were attempted by nearly all the candidates and there was no evidence of candidates being unable to complete the paper in the time available.

Comments on specific questions

Question 1

Some climate data for two farms was presented and candidates were asked to identify the months with rainfall greater than 100 mm and the driest month for each farm. Most candidates inspected the table of data carefully and selected completely or partially correct answers. In part **(c)** the graph was nearly always orientated in the correct manner and there were fewer mistakes in setting out the scales than in past years. A majority of candidates produced clear line graphs with a key.

Part **(d)** required a percentage calculation, unfortunately many candidates could not select the correct figures from the table to complete the calculation, correct working gained one mark even if no answer was presented. Three plans were presented and candidates were asked to draw a table to record the data for plan C. Nearly all candidates drew a table; the best examples had space for the data and clearly headed rows and columns. Some candidates attempted to produce a table from all the plans and there were even a few attempts to produce a graph.

Candidates seemed to find part **(d)(iii)** rather difficult and those that did correctly suggest plan **(a)** often failed to give a convincing reason for their choice. Similarly in part **(e)**, data was presented and it was anticipated that candidates would recommend that at least half a hectare of sorghum was needed to be grown and that weeding was essential, however, most candidates gave a range of general suggestions that were unrelated to the information given in the table, such as use an alternative source of energy. These suggestions rarely gained any credit.

Part **(f)** described an experiment in words and diagrams and presented data gathered by candidates from the experiment. The Examiners were a little disappointed to find that some candidates could not study the table and select the correct answer for waterlogged conditions. However, in part **(ii)** there was an appreciation of the need either for accuracy or the need to calculate an average value. Many candidates gave clear suggestions and reasons for growing selected crops on farm **A** and **B**. In part **(iv)** only a minority of candidates expressed their answers clearly and suggested sensible factors that must be kept the same if the experiment is to be repeated.

Question 2

A diagram of a crop rotation was presented with Field 5 being much smaller than the others. Candidates were asked which field the farmer should make bigger and the Examiners were surprised to see a wide range of answers, especially as the scale of the diagram was clearly given. Only a very small number of candidates suggested that a larger Field 5 would make crop rotation easier. In part **(b)**, candidates completed the diagram in such a way as to show understanding of the concept of rotation even if each row was not always correct. In part **(c)**, completing the table proved difficult for many candidates though they often successfully explained the differences between the two groups. Most candidates found it difficult to suggest ways of collecting data accurately.

In part **(d)** most candidates appreciated that the soil profiles were in two groups but in some cases they thought B, C and F were in the open rather than under the trees. Part **(ii)** only required answers relating leaf fall to deeper topsoil and erosion to shallow topsoil, unfortunately many candidates only described the properties of top or sub-soil.

Question 3

This question asked candidates to make judgements about different crop plantings. Most candidates realised they were being asked to suggest why each idea might make things worse for the farmer and a wide range of valid answers were given. The planting of GM maize elicited many inappropriate suggestions about the health risks to humans of eating GM food rather than focusing on the cost or the possible special requirements of a GM crop.

Part **(b)** was often carefully answered and 4 or 5 marks awarded. Any reference to the use of a particular method, needed to be qualified so that the practice would have been sustainable.

Question 4

This questions some of the effects of mining wastes and why people become miners. The counting of particles in part **(a)** was often correctly completed though many candidates attempted this without making any marks on the diagram. Striking through each particle seemed to be the most reliable method of finding the correct answer. Some candidates seemed to be confused by the terms nearest and furthest but sometimes they could go on to give a correct reason. In part **(iii)**, the risks to humans and plants were well known by most candidates. The Examiners were particularly pleased to see many references to reduced photosynthesis and reduced growth rather than the plant dies.

In part **(b)(i)**, nearly all candidates understood the need for tax revenue or export leading to foreign exchange.

In part **(b)(ii)**, candidates were asked to prepare a questionnaire to find out why people became miners.

The layout with more than two possible answers to each question was often excellent and gained credit. However, some of the questions were aimed at finding out about conditions in the mine rather than finding out about peoples' previous employment and how much money they now earn compared to their past employment.

Future candidates taking this examination should be encouraged to read each section of the question paper and study diagrams carefully before writing their answers.