

# ENVIRONMENTAL MANAGEMENT

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Paper 5014/01

Paper 1

## General comments

**Questions 1 to 4** in **Section A** appeared to be of roughly equal difficulty. Although there were wide variations in individual candidate performances within and between questions, no consistent pattern was discernible to suggest that one of the questions was significantly more or less difficult than the others. For the majority of candidates, the total mark for these questions was usually similar to the mark from one (or even both) of the questions in **Section B**.

In most Centres, candidate performance in **Section B** was similar between **Questions 5 and 6**; in a few, **Question 5** was significantly better answered. **Question 6** included the least well answered individual question on this year's paper, which was **6(a)(iii)**. Other parts of **Question 6** that were not particularly well answered by many were **(a)(iv)** and **(b)(iii)**, **(iv)** and **(v)**, for a variety of different reasons. As usual, the stronger the candidate, the less noticeable was the difference in answer quality between **Questions 1-4, 5 and 6**. For a few candidates, another reason why their answers began to fall away towards the end of **Question 6** appeared to be mis-allocation of time. There was still the tendency, noted in previous examinations, for candidates to write answers in **Section A** beyond the length expected for the low number of marks available. Whilst it was essential to compose the written answer to a question such as **5(b)(iii)** in **Section B**, in order to cover and elaborate upon a sufficiently wide range of factors, all the questions in **Section A** required short answers only. Begin with the answer from the first written word is the best advice for tackling questions in **Section A**. Filling the lines with writing does not guarantee full question coverage, particularly when the first two or three lines of each answer are filled with non-mark earning introductory statements.

Candidates need be aware of the importance of the lettered sub-sections in questions. Sometimes the same resource is being used for more than one part of the question. Usually the separate parts are examining the same, or a closely related, topic. Most candidates appeared not to look ahead to the next part of the question. If more had done this in **5(g)**, there would have been less repetition and fewer contradictory answers between the three different parts. A significant number of candidates wrote in **(g)(i)** that 'few trees' were present in the area shown on the photograph, in order to explain the high risk of soil erosion, to be followed by 'planting trees' in **(g)(ii)** for what had already been done in this area to reduce the likelihood of soil erosion. 'Tree planting' reappeared in the next part, **(g)(iii)**, which asked for 'what else' the farmer might do to prevent soil erosion. In **Question 6**, few candidates appeared to recognise that **(b)(iii)** followed on naturally from both the resource used at the start of **(b)** for world oil supply and demand, and the calculations asked for in **(b)(i)** and **(ii)**.

Candidates again forfeited marks by not paying sufficient attention to command words. This need was clear from some of the answers given to parts of **Question 6**. In **6(b)(i)** and **(ii)**, 'calculate the difference' meant that the final value, complete with sign if a minus value, was marked, and not any written information that might have been inserted. 'Describe how', used in **6(c)(ii)**, required a different type of answer from 'Describe' used on its own in the previous part, **6(c)(i)**. 'Describe' in **(c)(i)** required nothing more than descriptive statements about tundra climate and vegetation; it was a simple test of knowledge. 'Describe how' in **(c)(ii)** required some use of the basic information, towards the main question theme of wilderness. A good number of candidates found it difficult to switch from 'Describe' to 'Explain' when changing questions from **6(f)(i)** to **(f)(ii)**. They carried on describing, which led to repetition of points without further elaboration. Earlier, in **Question 5(g)(i)**, a number of candidates made no attempt to describe anything from the photograph. With this type of question, the answer was flawed. It is possible that they had looked at the photograph before writing about soil erosion, but without written description which clearly showed this, no marks could be awarded.

## Comments on individual questions

### Section A

#### Question 1

A few candidates appeared to be unfamiliar with geothermal power, apart from knowing that it is was one of the alternative sources of energy. This allowed them to gain marks in part **(c)** for renewable and clean / non-polluting, but without many more from the other parts of the question. Steam or similar was the answer required from the photograph in **(a)(i)**, and not geothermal power station, which was essentially given to candidates in the stem of the question. Wires or power lines were quite common incorrect answers in **(a)(ii)**. Instead of focusing on transfer to the power station in **(a)(iii)** and **(a)(iv)** as well, some candidates gave an advantage of the valley for locating the power station itself in **(iii)** and disadvantages of the power station in **(iv)**. The underlying problem for many candidates was a failure to use the photographic evidence, which showed far more about the pipeline transfer than power station details, such as taking up a large area on the valley floor where the good land is located, resulting in visual pollution and a likely warming up the ground surface around the hot water transfers. Depending on the level of candidate knowledge and understanding, part **(b)** was either well answered or badly answered, with few answers in between.

#### Question 2

In **(a)(i)** the four points needed to be linked with a continuous clockwise sequence of arrows. Some candidates failed to complete the cycle; a few others drew arrows from two directions in a pincer movement towards intestines. **R, P, and Q** was the order required in **(a)(ii)**; although this was the commonest answer, it was by no means universal. In **(a)(iii)**, most candidates could not go any further than very general statements about being too expensive for countries with low GDPs, and for people who are poor. These were rarely extended to include references to what could not be afforded, that would be useful for controlling typhoid such as vaccination programmes and better health service provision. Answers to **(b)** were again dominated by references to low cost, without exploring other advantages such as water availability in the village, even during power cuts, and how it provides a clean water supply. Most candidates gave answers that were either inaccurate or too narrow for the number of marks available in one or more parts of this question.

#### Question 3

Part **(a)** proved to be deceptively awkward for those who failed to home in on environment, and concentrate in particular on the final three precautions on the label. Some of the answers given to **(b)(i)** were more appropriate to a question about the environmental effects of the over-use of fertilisers rather than pesticides, since they were based on enrichment of water courses, the growth of algae and eutrophication. Only a minority of candidates focused their whole answer upon pesticide over-use, such as deaths of other useful species and interference with food chains. The full range of answer quality was evident in **(b)(ii)**. The best answers came from those who were able to refer to examples of natural predators, or to farming techniques such as inter-cropping with plants repellent to the pest. Answers were often based upon references to the development of genetically engineered crops with built-in pest resistance. Overall, there were many middle of the range answers to this question and few that were good throughout.

#### Question 4

Some candidates calculated angles in **(a)(i)**, which was not really necessary given the percentages marked on the circle. Wise candidates realised that by plotting 50% first and 10% next in a clockwise direction, the percentage markers allowed perfect accuracy. Not all completed their graphs with the key provided. The short answer of 'greater use in the developing world' was accepted in **(a)(ii)**, although the best candidates used the percentages in the table and stated that the total was only 13% in other more developed continents. Social problems were largely ignored by candidates when they answered part **(b)**. Few mentioned having to walk further to collect wood and the adverse effects of this; most referred to the consequences of forest removal for wildlife habitats, soils and the water cycle. Without a social reference, full marks could not be awarded. Answers to part **(c)** were disappointing in general, because the typical answer included re-planting and little else. Few references were seen to community forestry and sustainable management of existing timber resources.

## Section B

### Question 5

The majority of candidates contrived to get one of the three parts of **(a)** wrong. This was least likely to happen in **(a)(i)**; nevertheless, there were candidates who answered '1,000' without stating 'millions'. Most errors happened in **(a)(iii)**, for which Asia was the commonest incorrect answer. Instead of taking note of 'fastest rate of population growth' in the question, candidates were over-influenced by Asia's large total of people.

In part **(b)(i)**, most candidates chose a sensible scale and drew bars of equal width. It did not matter whether the bars were arranged by countries or by dates, as long as this was clearly indicated. While small, careless mistakes were occasionally made in the plotting, three mark responses were the norm. The only total failures were from candidates who attempted to draw line graphs. Accurately drawn graphs showed that India's total population is expected to climb above that of China by 2050. This was the answer required for the mark in **(b)(ii)**, but too many candidates stopped short of stating this, and noted only increases in both countries, or the greater increase in India. Part **(b)(iii)** was well answered by the many who included a good range of relevant points beyond the simple answer of use (or not) of birth control measures. References to examples, notably that of China under low population growth, enhanced answer quality. Relevant examples are always credited, even when not specifically requested in the question (as here). A few candidates successfully used the Demographic Transition Model as their framework for answering. Occasional totally wrong answers were given, especially about reasons for economic growth in 1 and economic decline in 2. Answers arranged as two lists of reasons rarely gained more than half marks, mainly because they suffered from lack of or limited elaboration beyond the reason heading. Typical answers were of the type 'no birth control' in 1 and 'birth control' in 2.

Marks in part **(c)** were given for both general comparative description and for the use of values. It was impossible to gain full without using values as illustrations. Some candidates limited their answers to one descriptive point from the line graph and one from the bar graphs. Often they filled all the lines without mention of a value and most gained less than half the available marks. It became clear that some, mainly weaker, candidates, did not understand what 'living on US\$1 per day' meant and assumed that there had been increases in dollar income in sub-Saharan Africa and decreases in Asia. For the many who used the correct technique of answering, namely description followed by use of equivalent values for sub-Saharan Africa and Asia, this was one of most straightforward questions on the paper.

To most candidates the type of practical task in part **(d)(i)** posed no problems; there were many full mark answers. Some began by calculating the number of degrees, but for plots of 25% and 1% this was not really necessary. For the pie graphs to be fully complete, shading in the key was needed to separate out sub-Saharan Africa from the rest of the world, consistently. It was surprising to find several examples of candidates using the type of shading given for rest of the world in the key in the one per cent segment on the graph of world total of health workers. Others ignored the instruction to fill in the key. Part **(d)(ii)** was less well answered than might have been expected. One unforeseen problem was the misinterpretation of health workers for 'healthy workers', leading to frequent comments along the lines that only one per cent of workers in sub-Saharan Africa were healthy enough to work. This made answering the question set much more difficult. The best answers came from those candidates who recognised the link between hunger and lower resistance to disease. Without adequate health services, young and old were at greatest risk.

Although weak candidates stayed too close to the information provided in the boxes in part **(e)**, the majority wrote enough to show that they understood that the diagram showed a repetitive, self-perpetuating cycle, with poverty as its root cause. Greater candidate understanding was often demonstrated by references to the need for aid, investment or help from outside in order to break the cycle. This question was intended to lead candidates into part **(f)** about types of aid. Since the question referred to 'this poverty cycle', 'Development Aid' was regarded as the best choice in **(f)(i)** and 'Food Aid' was considered to be the least useful type of aid in **(f)(ii)**. In both cases, 'Farm Aid' was regarded as the middle choice, capable of being used either positively or negatively for the question theme. Good choices made for easier justifications, and many were awarded full marks. However, it was difficult for candidates to justify the reverse choices of 'Food Aid' in **(i)** and 'Development Aid' in **(ii)**, to produce answers worth more than one mark. A wide variety of reasons were used by candidates, which were rewarded provided that they remained faithful to the poverty cycle shown in part **(e)**.

Part **(g)** elicited a full and varied range of answers from candidates. In **(g)(i)** an essential pre-requisite for the award of marks was some reference to natural features which could be seen on the photograph, such as steep slopes, bare surfaces and limited natural vegetation cover. Only then were candidates rewarded for further elaboration about the contribution of these to a higher risk of soil erosion in this area. No description from the photograph meant no marks. Fortunately only a minority of answers were general answers on soil erosion, of this type. Some descriptions were better than others, for example, 'mountainous area' suggested that the candidate had looked at the photograph, but it could have been obtained solely from the caption, and it was not as precise and useful a description as 'steep slopes'. There were many answers based upon only one observed natural feature. In **(g)(ii)** candidates who began from observation of the prominent staircase of terraces fared best. Although some struggled to find the term terraces, alternative ways of describing terrace were also accepted. Less successful were answers from candidates who suggested that tree planting had taken place, especially if they had included comments about the lack of vegetation cover in the previous part. Answers to **(g)(iii)** were inconsistent in quality and depth. Instead of referring to two of the strategies named in the syllabus (tree planting, contour ploughing, dry land farming and windbreaks), quite a number of candidates concentrated more on use of fertilisers and irrigation water. These agricultural techniques are more significant for increasing farm output than preventing soil erosion. The more successful answers tended to include references to tree planting, accompanied by one from contour ploughing or dry land farming.

**Question 5** covered familiar topics (especially population growth and soil erosion) and included questions which required the use of practical skills. Together these probably explain why a majority of candidates (and in certain Centres a very dominant majority) gained a higher mark than in **Question 6**.

### Question 6

While the most popular answer, 'sedimentary', was also the correct answer in part **(a)(i)**, plenty of candidates were attracted to the other two rock types. In addition, some circled two of them, while others missed the question out. Sedimentary rock was a common wrong answer to **(a)(ii)**. Other answers frequently seen, which were not credited, were 'fossil fuels' and 'fossil' by itself. Only a minority of candidates seemed aware that oil was made from the decomposition of plants and small creatures. Part **(a)(iii)** was answered even less well. Some left it unattempted while others showed themselves to be impossibly muddled between the characteristics of permeable and impermeable rocks. A significant proportion of candidates believed that it was the layer of sandstone rock which was trapping the oil and preventing it from moving. Under the circumstances, it was a real pleasure to read the answers of candidates who had clear understanding of the roles of sandstone in providing the storage spaces and clay in keeping the oil inside the sandstone layer. Few mentioned the importance of rock structure for forming the trap; indeed more references to anticline were noticed in the next part of the question, suggesting that candidates knew the name but could not recognise it as one common type of oil trap. Answers to part **(iv)** were either totally incorrect or effective. Few fell between these two extremes. Many candidates referred either to opencast or deep shaft mining, or to both, as if oil were a solid instead of a liquid. Fortunately there were others, who understood that drilling with pipes from the surface was the usual method. Oil is forced out to the surface by pressure or pumping. Success in part **(iv)** meant that candidates were more likely to choose acceptable answers such as fire or explosion in **(v)**, rather than unacceptable answers such as breathing problems and tunnel collapses with mining methods.

In response to the command word 'calculate' in **(b)(i)** and **(ii)**, it was the final answers that were marked (12.4 and 19.2 respectively). A few candidates wrote about the differences without doing a calculation; a small number of others made one careless error. For the final mark, the candidate needed to make clear that one of the values was negative and the other positive. Quite a large number failed to claim this mark. This question was intended to give candidates a start with their answers to part **(iii)**. Unfortunately a lot of candidates never looked at the pictograph again. If they had, they would have been able to offer answers that were more precise, by referring to the size of oil surpluses in the Middle East, matched by equally large oil deficits in the developed world. Depth and quality in part **(iv)** depended heavily on reference to an example. The Exxon Valdez disaster in Alaska was the most popular (and generally successful) choice. However, it was good to see candidates making use of local examples from Argentina and the Gulf. In part **(v)** candidates frequently referred to factors which affected the likelihood or otherwise of an effective clean-up, but without bending the content towards the main theme of the question. Thus location (land or sea, coastal or offshore), preparedness (developed or developing countries) and size of spill were regularly mentioned, but not always used in a way that took the answer above half marks.

In **(c)(i)** references to climate were more consistently accurate than were those to vegetation. Reference to coldness was the starting point for most candidates. Little precipitation, or most falling as snow, tended to claim a second mark more often than use of temperature values. Perhaps as much as half the candidature believed that tundra lands were covered by coniferous forests, in what was obviously confusion with the taiga to the south. 'No trees' is one of the defining characteristics of the tundra biome. Candidates were better at selecting and stating relevant pieces of information unaltered than actually 'describing how' they show that the area is still a wilderness when answering **(c)(ii)**.

Candidates had few problems in answering **(d)(i)**. Plenty of help was available to them in the source material provided. The economic needed to be separated out from the environmental, which not all managed to do. However, some significant losses of marks were caused by candidates allowing their pro-environmental opinions to take over too early. The wording of this part of question **(d)** did not give the option to talk about not-allowing more oil extraction in Alaska. Claiming all the marks in part **(d)(ii)** was more of a challenge. In expressing an opinion, some candidates 'sat on the fence', which usually meant that they had little to add to what they had already written in the previous part. The command word in part **(ii)** was 'explain' but too many continued to describe more than explain and restricted themselves to less than half marks. This question gave more able candidates the opportunity for demonstrating understanding of the broader issues associated with developing a highly prized world commodity in a beautiful and fragile environment. It was not the candidate's own opinion which mattered, but the quality of the explanatory comment.

Only those candidates with a firm knowledge of oil traps and oil extraction were able to maintain quality and consistency of performance throughout **Question 6**. For other candidates, the number of marks increased in each part of the question, being lowest in part **(a)** and highest in part **(d)**.

# ENVIRONMENTAL MANAGEMENT

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Paper 5014/02

Paper 2

## General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one African country, Cameroon. Many candidates understood and made good use of the source material and their written responses were sufficiently clearly expressed that the Examiners could be confident that marks awarded were deserved. 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, however there was some evidence that candidates did not always make best use of the information given at the beginning of each question.

Overall the pattern of this paper is very similar to past papers and Centres should work through past papers to help candidates see how to make the best use of the information given for each question.

## Comments on specific questions

### Question 1

- (a) There were nearly always correct answers to every section. Occasionally units were given on plotted graphs.
- (b) Candidates were not always clear as to **how** they would measure the volume of milk collected. Most of the tables presented would have been usable but again some units were not stated.
- (c) The majority of candidates appreciated the break point of 1200 metres and shaded from the bottom of the graph up to that height. In **part (ii)** the information given was used to carry out a calculation; unfortunately some candidates added 4.2 to 30 degrees rather than subtracting it.
- (d) This was a more demanding calculation and though some candidates lost their way others gave correct answers given with units. In **part (ii)** most candidates suggested that the cattle were in danger from falling into the well or contaminating the water supply with faeces. In **part (iii)** a wide range of sensible answers were given credit. However the possibility of the bullock getting tired was not given credit.

### Question 2

- (a) Candidates needed to look carefully at the diagram and the information about an experiment. There were a large number of vague answers to part **(i)**, essentially the idea is that the conditions for growth were the same, e.g. rainfall, soil type etc. If candidates suggested that it would be easier to see the difference because the plots were next to each other they gained a mark. Parts **(ii)** and **(iii)** the sampling methods are essential knowledge for this paper but unfortunately they were not well described or explained in most cases. Part **(iv)** the role of earthworms was often appreciated but the explanations would have gained more credit had the process of digestion been stated to allow the minerals to be released. The Examiners were pleased to see the roles of aeration and drainage were understood by some candidates. In part **(v)** the candidates had to do more than just describe the findings as they were asked to draw conclusions from the data given. If they made two sensible suggestions as to why there were less casts in plot B they gained two marks. In part **(vi)** a wide range of suggestions were given and most gained some credit. However there were many inappropriate references to changing seasons and the word accurate was greatly overused. Repetition of a trial may make the findings more reliable but not more accurate.

- (b) Parts (i) and (ii), the number that identified the samples that either spread black pod disease or helped control the disease should have been stated. Some candidates gave the total number for each question.
- (c) Plan A was often chosen and one or two sound reasons given for this choice.
- (d) Both parts of this question did not elicit clear answers, in part (i) candidates could often express the idea that the treatment did not seem to have reduced the fungus infestation but there were not many ideas as to how to extend the investigation that fitted the context of the question.

### Question 3

This question changed the focus to the problems associated with fishing.

- (a) Candidates were given a range of statements about a fishing village and were asked to explain why the facts stated were worrying. Many candidates took some of the statements and explained why the fishing would not be sustainable in the longer term. Surprisingly there were not many candidates who suggested the fish did not have time to reproduce or that if so many immature fish were being caught they could not be reproducing. The published mark scheme suggests a large number of creditworthy suggestions. Unfortunately some candidates arranged the statements into a paragraph but did not add any of their own ideas and so they could not gain full credit for this. In part (ii), a specific nutrient was required here, fish as a major source of protein was known by many candidates. Part (iii), sensible suggestions to do with the breeding or carrying of diseases or named diseases gained credit. Human sewage can cause the spread of disease but vague references to pollution or pollution from the fishing boats was not given full credit.
- (b) This section was well answered by most candidates, control of fishing effort seems to be very well known and the suggestions were invariably sensible and creditworthy.
- (c) The concept of sustainable food supplies was understood by most candidates and many sound answers gained two marks.
- (d) There were a significant number of candidates suggesting that the captive breeding programme would create new species which is not the correct idea. Only a minority of candidates went beyond saving the fish from extinction to suggest they could be reintroduced at a later time or that keeping them in captivity would at least hold their genetic makeup for the future (either for human use or to release back to the wild).