ENVIRONMENTAL MANAGEMENT

Paper 5014/01

Paper 1

General comments

There was little noticeable difference in final mark outcomes between totals of the four short questions in ***Section A*** and each of the two long questions in ***Section B***. Some outstanding scripts were seen from candidates with a broad and thorough knowledge and understanding of the natural environment, human activities and strategies for management, which allowed them to maintain the flow of full, high quality answers throughout. A few candidates, fortunately fewer in numbers than in some previous years, penalised their overall examination performance by not finishing all parts of **Question 6**. Their scripts displayed the results of a mis-allocation of time. Overlong answers, well beyond mark availability for the short answer questions in ***Section A***, were later followed by empty spaces and unfinished sentences in some of the longer questions towards the end of ***Section B***. There was some evidence this year that more candidates than previously were answering questions in order of preference rather than paper order. This showed good examination technique for a paper in which candidates are expected to need all the time allocated to it.

Within ***Section A***, a clear pattern of marks emerged – highest marks from **Question 1** (generously supplied with useful source information in the stem of the question), high marks for **Question 2** (examining a familiar topic), significantly lower marks for **Question 3** (about lead and its effects, which appeared to be less well known) and equally low marks for **Question 4** (answers not well directed towards the questions set). Within ***Section B***, the overall standard of answers from most candidates to **Questions 5** and **6** was very similar. If they were not, as many candidates scored better on **Question 5** as did for **Question 6**. For some, part **(a)** in **Question 5** proved to be more difficult than parts **(b)-(f)**. Overall, however, the vast majority of candidates exhibited considerable familiarity with the topic of fishing. The final part, **(g)(ii)**, was the least well answered part of **Question 5**. Many candidates failed to focus on the question set, spending time describing how the strategies named in **(g)(i)** would work, and seemed to assume that they were all easy to implement. The most troublesome part of **Question 6** appeared to be **(c)(i)**. Only a minority of candidates showed much knowledge and understanding of extensive pastoral farming. Likewise 'plant new varieties of crops' often failed to trigger references either to high-yielding varieties or GM crops. Consistently more successful were the answers for large dams and trickle drip irrigation.

Huge variations were noticed in the speed with which candidates began to answer the actual question set. Often the main mark-earning parts of answers were concentrated in the lower half, often within the last two lines. Too many candidates began by repeating the question, instead of answering it. The use of a booklet with spaces below each question for answering renders repetition unnecessary. Many candidates obviously felt that they had fully answered a question once all the lines left for it had been filled. Wise candidates, displaying good examination technique, looked at the number of marks available, and tried to include a wider range of points and more detailed elaboration or exemplification in answers worth four or five marks. In both **Questions 5** and **6** the two longer final parts appeared to be less well answered than usual. The final part of **Question 6** suffered particularly badly from this. Many eight- and nine-line answers essentially referred to nothing more than stating that developed countries were richer and people better educated, and that developing countries were poorer and people were less well-educated. Education anyway was not particularly relevant to this answer. When answering the four mark question in **5(f)(ii)**, many candidates were satisfied after they had referred to just one of the El Nino years, having named the year and stated the amount of catch. Instead they should have continued the search for other evidence from the graphs to support their answer.

Comments on individual questions

Section A

Question 1

The most frequent reasons for candidates achieving below half marks in part **(a)** were use of a social advantage instead of disadvantage, or attempted use of a disadvantage which was more environmental than social. Even when a social disadvantage was correctly identified, candidates used explanations which were more economic than social. Choosing and explaining the two economic advantages were undertaken more effectively and with far more consistency. Five- and six-mark answers were common. There was a much greater range in the quality of answers to part **(b)**. The weakest type of answer typically began with planting trees, and included reclaiming land for farming, but contained few if any references to methods of achieving them.

Question 2

- known of the three processes in **(a)(i)**. A systematic approach to answering, beginning with evaporation of sea-water and ending with surface or groundwater using the slope to flow back into the sea, yielded the most sure reward in **(a)(ii)**. Marks in this part seemed to be lost more by carelessness in completing the explanation than by lack of understanding. Candidates found **(b)** the least easy part to answer. Many candidates suggested and stuck with only one reason; even with good elaboration, it was not normally enough for more than two marks, and one mark answers were frequent. Overuse by people, supported by references to increasing population and greater frequency of droughts, were the reasons used in many of the three-mark answers.

Question 3

To gain full marks in part **(a)(i)** candidates needed to recognise one of the times of sharp decline, the fluctuations, and the later time of more gentle (but also more persistent) decline. Able candidates found this easy, and made appropriate references to years and emissions. The weakest candidates typically filled all the answer lines, yet used only one of these descriptive elements. For many less able candidates, this part yielded their only marks for the whole question. **Part (a)(ii)** was the least well answered part. Few answers were focused on trends, despite this being a direct continuation from the previous part. Even good candidates spent too much time trying to give reasons for high emissions instead of seeking reasons for emissions decline. Only a few candidates showed that they knew that road traffic was responsible for high levels of emissions, before the now quite widespread adoption of unleaded fuels. Only a tiny minority broadened their answers to include references to substitutes for lead in industry, such as plastic and copper. References to fewer vehicles appeared more regularly in answers to **(a)(iii)**. Answers to part **(b)** tended to be either a success or a disaster. Many candidates appeared able only to conceive of pollution and dangers to health as coming from the air; global warming, ozone depletion and human health problems from poor air quality were referred to more often than was lead poisoning, and its adverse effects on human and animal health.

Question 4

As in last year's examination, some candidates did not state what could be seen on the photograph. Part **(a)(i)** needed to be answered in terms of photograph-based evidence; apart from mention of trees, little direct connection existed between photograph and answer from many candidates. Many candidatesdid not mention trees, woodland or forest in **(a)(ii)**. Grasses, bushes and small shrubs were suggested more often. Part of the reason must have been limited understanding of vegetation succession. Something a little more precise than what many candidates were able to offer was required in **(a)(iii)**, such as 'eat the new shoots' or 'pull out young plants by their roots'. Candidates who began with the role of mosses and lichens answered part **(b)** really well. The majority gained one or more marks from references to increased humus, nutrients and fertility. Other candidates, who either began with advantages of trees for soils or referred to farming techniques for improving soils such as crop rotation, failed to demonstrate any understanding of succession. Most answers to part **(c)** covered only a restricted range of reasons, which were inadequate for full marks. Most frequently given were loss of habitats and biodiversity.

Section B

Question 5

Answers to part **5(a)(i)** were often no more than a list of places, for which some credit was given, provided that it was based on continents or countries and not just names of oceans. Better answers came from candidates who were able to detect features of the overall pattern, such as all but one of the main fishing areas being located north of the Equator. Most candidates found answering **(a)(ii)** a little easier, most frequently suggesting near to coasts, around islands and on continental shelves as similarities. Northern versus southern hemisphere, even if not as briefly stated as this, was the most frequently suggested difference.

In part **(b)** there were wide variations in candidate performance. Strong candidates packed their answers with real content, particularly for ocean currents and continental shelves. The one disappointment was the general absence of references to named ocean currents. It soon became clear to Examiners that some weaker candidates added more after having answered part **(e)**, but often the additions were of little worth, because they concentrated on warm ocean currents. ;This only served to emphasise how limited was their understanding. Most answers to **(c)(i)** were accurate, although many fewer marks would have been awarded if Examiners had insisted on the inclusion of the unit (millions). Candidates should be reminded of the need to state units when working from graphs. In part **(c)(ii)**, some candidates viewed overfishing as synonymous with a lot of fishing. Either they finished their answers having mentioned the rise to the peak in 1987, or having dealt only with the increase during the whole period between 1970 and 2000 (usually worth no marks). Recognising the decrease from the late 1980s was an important requisite for full mark answers on this section.

Part **(d)(i)** discriminated well between weak candidates, who added little to what was already given to them in the labels on the spider diagram, and able candidates, who could include an example of high technology for locating shoals of fish, and appreciated that larger sized fishing boats and refrigerated factory ships could explore the oceans more widely, staying out at sea and fishing for much longer periods. All the causes were equally capable of generating full mark answers in part **(d)(ii)**. Choice was less important than candidate knowledge and understanding.

With only a moderate amount of understanding, the answers needed for all three parts of **(e)** could be obtained from the two diagrams. However, some candidates failed to realise that in order to establish clear differences in parts **(i)** and **(ii)** their answer needed to be two-sided or comparative. Another common failing was to refer to the differing opportunities for fishing, only to find that they needed to repeat their answers in part **(iii)**. Others interpreted well what the diagrams showed. In some answers it was easy to detect good understanding of El Nino based upon knowledge.

In part **(f)(i)** a few candidates took 1982 and 1983 to be one year and included 1994 as a replacement for one of them. By referring to the El Nino years of 1982 and 1990 in part **(ii)** it was possible for candidates to argue that El Nino events had no or limited effects upon fish catches in Peru, but answers which only followed this route could gain no more than half of the available marks. The evidence for reduced catches was too overwhelming, particularly in the 1990s. The most convincing answers were those in which candidates directly compared catch sizes in El Nino years with those in surrounding years. However, in part **(iii)** the evidence for overfishing was not as definite. Some candidates successfully argued that continually rising catches during the 1990s, except in El Nino years, at significantly higher levels than those in the 1980s, were a sign that overfishing had not occurred. Others noted the large drop in 1994 compared with surrounding years, and argued equally well that this suggested overfishing had occurred. In this question, the strength of supporting evidence mattered more than the opinion taken about overfishing. The least satisfactory answers were those in which candidate opinion was not made clear.

The weakest answers to part **(g)(i)** came from candidates who merely reversed the causes of overfishing from the spider diagram in part **(d)**. These answers were largely worthless, since they were not usually accompanied by any positive strategies for sustainable harvesting of ocean fisheries. Candidates had plenty of strategies to choose from, there being six or seven of them named in the syllabus. Quotas, closed seasons and restricted areas for fishing were the ones most frequently used. In order to gain the final mark, candidates needed to write more than just ‘strategies’ in the centre of their spider diagram. They had to make clear what the strategies were for. Diagrams always need to be free-standing to be effective. Most of the answers given to part **(g)(ii)** failed to reach the expected standard. Here it was difficult to justify ‘easy to implement’ as the answer, yet many candidates tried to do this. However, they tended to skirt around the real question by spending most of the time describing how implementation of the strategies would reduce overfishing. Those candidates who focused their responses upon the difficulties involved in carrying out the

strategies, by reference to fishermen's needs for income and food, international problems of effective policy implementation and the difficulties of monitoring, seemed to have little trouble giving answers worth full or almost full marks. Unfortunately, such answers were the exception.

Question 6

Successful answers to part **(a)(i)** often began with 'in an open area' or similar. Least successful were those that were totally negative, such as 'not in a city', or those which tried to describe the many types of weather (mountain, coast, etc.) that could be recorded here. 'For protection' alone was not a strong enough answer in **(a)(ii)** unless animals or people were mentioned. Thermometers of any type gave an acceptable answer to part **(a)(iii)**. Some candidates answered 'temperature' without naming the weather instrument. Others gave the name of the white box. Barometer was quite a common answer as well. Although, inevitably, there were candidates who confused anemometer with wind vane in **(a)(iv)**, there were many well-drawn and labelled diagrams. Unfortunately, a few candidates drew an excellent diagram of an anemometer, but without name or labels, and could be given very limited reward for their efforts.

Occasionally candidates missed out part **(b)(i)** which was a careless error. Virtually every candidate who attempted the question correctly picked out the highest and lowest temperatures of 34 °C and 16 °C. Despite the guidance in Station B column, many did not attempt to work out the annual range for Station A, (18 °C), and left the box empty. 'Dry season' was a poor answer to summarise precipitation during the year. Something stronger, such as 'dry all year', was needed. 'Summer' or 'May/June to September' were considered to be superior answers to 'March-September' in **(b)(ii)**. One of the most common answers was 'August', but one month by itself does not make a season. While most candidates correctly selected 'Desert' climate for Station A in **(b)(iii)**, as many, if not more, chose 'Equatorial' climate for Station B. This confirmed the problems that many candidates have with understanding climates. The choice of desert for Station A was easy to explain in part **(b)(iv)** because of the absence of rain, but many of the attempts to explain Savanna for Station B were unconvincing, relying only upon lifting wet and dry season from the table. Much better were responses which either ruled out Equatorial because of the lack of rainfall all year, or used a more complete picture of summer rains and winter dryness with not too much variation in the high temperatures to justify their choice of Savanna climate.

Most candidates were only able to gain half the available marks for part **(c)(i)**. It was clear that less was known about extensive livestock farming than the other three. Few recognised this type of farming as a traditional activity in places too dry for cultivation and little mention was made of the natural adaptation of certain animals such as camels to dry environments. The better answers about new varieties of crops were the ones which were adapted by the candidates to the question theme – that the seeds, whether high yielding or genetically modified, had been developed to grow in dry environments. Plenty of not very relevant references to high yielding varieties of rice were seen. 'New varieties' in the question triggered off many barely relevant references to crop rotation, how it works and its advantages. Consistently the best answers were seen for the third option of large dams, even if weaker candidates relied heavily upon 'expensive' for the disadvantage without further elaboration. There were some good answers for trickle drip irrigation, although in some there was over-concentration on underground water supplies at the expense of the irrigation method. Able candidates, with the support of knowledge and understanding, were the only ones to state advantages and disadvantages with precision in this question. In part **(c)(ii)** option **3** was the most popular choice. With relevant comments about amount of water and distance into the future that water supplies were likely to last, many candidates claimed marks. More candidates using option **4** gained full marks than for any of the other options, especially when they concentrated on explaining the advantages of trickle drip over other types of irrigation, and not upon underground water supplies.

Naming a desert, such as the Sahara or a desert region such as the Middle East, was considered insufficient in **(d)(i)**. The most obvious answer was the Sahel or one of the countries within it. Naming appropriate areas within the candidate's home country was also rewarded. However, it was clear in this part, as well as in the next two parts, that many candidates regarded a desert, and an area suffering desertification turning it into a desert, as the same. Physical causes given in part **(d)(ii)** were sometimes no different from the description of a desert climate. There was an absence of reference to drier periods that are longer and more severe than normally expected (i.e. drought). While in general this part was high scoring, because most candidates were clearly familiar with the human causes such as deforestation, overgrazing and over-cultivation, some candidates used the whole answer to explain the difference between physical and human factors without any mention of actual causes of desertification. Total human or total physical answers were equally acceptable in **(d)(iii)** and explanation that matched the view expressed was what mattered. Those who answered along the lines that human causes accelerate natural causes to extend desertification to new areas gave many of the best answers, especially when it was linked to increased population pressure.

There were wide variations in the quality of answer given to part **(e)(i)**. Lack of rain and wind under high pressure conditions to remove the pollutants from the air earned full marks for many. However, from time to time references to inversion of temperature and favourable conditions for the formation of photochemical smog were successfully included in answers. Weakest of all were the totally irrelevant answers about ozone hole formation and carbon dioxide concentrations leading to global warming. In **(e)(ii)** candidates who chose a vertical scale of 10 squares for 50 days were the ones most certain to draw a fully accurate graph, because all the plotted points fell on graph lines, whereas those who began with 0 at the bottom and 210 at the top made one or more mistakes unless very careful, because only two of the plots were exactly on a graph line. There was an almost equal candidate preference for bar and line graphs. There were a few total disasters, caused by candidates using an unequal scale and simply writing in the values from the table to plot at every 5 or 10 grid squares. Over-simple answers, such as 'Decrease' or 'It is declining', failed to gain the mark in **(e)(iii)**. Without reference to days or atmospheric pollution, the trend was not meaningfully described. The result was the careless loss of a mark. The final part, **(e)(iv)**, suffered from too many vague answers, caused by candidate over-reliance upon weak generalisations lacking further support and development. Use of more knowledge of strategies, more money for implementation, more law enforcement and better education in developed than in developing countries generated low marks. Inclusion of actual strategies such as catalytic converters, cleaner fuels and improved public transit systems began to strengthen answers greatly.

ENVIRONMENTAL MANAGEMENT

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 one African country, South Africa. 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.

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) The majority of candidates could calculate the loss as 90%, however the second part of this question proved to be a little more demanding, with a wide range of answers other than 2009.

(b) Candidates often suggested that the rhinos could not defend themselves, a sensible suggestion worthy of credit, however it was also frequently suggested that the rhinos could not kill their prey without a horn. This was not given credit as rhinos are herbivores.

(c) The majority of candidates suggested sensible questions with well laid out responses. The Examiners do expect to see at least one of the questions with three or four response alternatives (as shown in the question). In **part (ii)** only a minority of candidates gave more than one creditworthy suggestion. There are several acceptable ways of taking a fair sample but unfortunately it was often suggested that all the villagers or only one person from each village should be interviewed.

(d) Both parts of this question were frequently well answered. In **(i)** the idea that once the local people had ownership of the animals they would prevent over-exploitation was appreciated and expressed in a variety of ways. In **(ii)** the tables were mostly given with sensible headings.

(e) In **(i)** the local people clearly gained income and some candidates went on to give specific uses to which the money could be put or suggested that poverty could be alleviated. Vague references to improving the standard of living were not given credit. In **(ii)**, most candidates correctly said that the rhinos survive, but many did not mention they would then be able to breed and thus avoid extinction.

Question 2

(a) Candidates needed to look carefully at the data and most gained both marks for **(i)** and **(ii)**. In **(iii)** there were many completely correct graphs. Future candidates should be reminded that time should be plotted on the *x*-axis (horizontal).

In **(iv)** only a trend that both increase was required to gain the mark. Some candidates gave answers which were too detailed. Detailed descriptions were not required.

In **(v)** a wide range of answers were presented, a minority of which gave the correct answer of 20%.

In **(vi)** a wide range of factors were given but water was often cited, despite the whole point of the trial being to find out if different quantities of water made a difference.

In **(viii)** there were some good suggestions as to how to keep the planting the same. The pod counting proved to be a difficult question to answer as it would not be possible to count all the pods. This meant the candidates needed to suggest a workable method of sampling the pods. In the last part only a minority of candidates referred to measuring the weight or mass of the harvest. This type of question has been asked in the past so the concept of measuring a crop is not thought to be difficult for candidates.

(b) This question was aimed at candidates presenting a sustainable plan for a farm using some of the information given but adding their own knowledge of environmental management to their plan. In the past these questions have often involved crop rotation, which in this case was inappropriate. This example was specifically set in a dry climatic region without obvious access to significant supplies of water. The Examiners were disappointed to see that often candidates wrote about crop rotation and irrigation without regard for the context given. Very few candidates appreciated that peas are leguminous and fix atmospheric nitrogen thus removing the need for costly fertilisers.

Question 3

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

(a) Many candidates correctly stated that cyanide was toxic or poisonous. Lung damage was suggested as a risk, but not as frequently as expected.

(b) Most candidates expressed the idea that more profit could be made.

(c) The chemical ponds needed to be covered to prevent overflowing during rainfall or animals having contact with the chemicals. Many candidates became worried about evaporation (which would only have lead to loss of water and not the chemicals), which did not gain credit. In **(ii)** there were many good and detailed answers involving infiltration and underground flow leading to pollution of drinking water supplies and/or the river.

(d) This section considered the impact of development. In **(i)** a wide range of sensible suggestions around employment and increased income were given. In **(ii)** a range of adverse effects were suggested including loss of farmland and specific ideas about types of pollution. Answers just stating pollution without further detail did not gain credit.

In **(iii)** the location away from the village was often correctly stated, as was the risk of contamination of the river in **(iv)**.

(e) Nearly all candidates improved the layout by moving it further away from the village. A number of other ideas were incorporated and if these were discussed in **(ii)** they gained credit. One mark was given for the drawing, and three explanations compatible with their plan gained the remaining marks.

(f) Biological monitoring was required to gain credit here. Some candidates referred to taking pH readings. These might remain the same even if the water quality deteriorates. The candidates often suggested monitoring the fish numbers/species, either before and after the mine started work, or upstream and downstream of the mine to check for differences. This gained maximum marks.