CONTENTS

ENVIRONMENTAL MANAGEMENT

General comments

This year's paper did not seem to be significantly harder or easier than previous years. It was very heartening for the Examiners to see, therefore, a definite improvement in the performance of candidates, the majority of whom now seem well prepared and knowledgeable. Some still suffer from the fact that they are not working in their first language. This can lead to misinterpretation of what is required or difficulty in expressing their ideas in a form that is mark worthy. Some examples of this are given below. The Examiners are striving all the time to make the wording such that the questions are accessible to all, and can always learn from the difficulties that actual candidates have.

Comments on specific questions

Question 1

Most of this question was well done by most candidates.

(a)(i) Most recognised the type of plate boundary but the spelling of the correct answer was often wrong.

(ii) There was a surprising number who were unable to place X in the correct place; probably about half the entry got this right.

(iii) Most of the candidates were able to discuss plate movement and very often it was in the right direction. There was less success in going on to describe that this movement would lead to friction and melting.

(b)(i) Most candidates were able to discuss the necessity of making measurements on the volcano to learn things about it. Many were also able to go on and discuss the value of this information in warning people and/or evacuating people from the area.

(ii) Many discussed the presence of fertile soil in the area together with mineral wealth. Other common and acceptable answers given discussed tourism opportunities and geothermal energy.

(c) The word 'relief' in this question caused many candidates a problem and a minority talked about the help to be given after the eruption. In hindsight, it would have been better to just refer to the help to be given.

Question 2

(a)(i) This question usually yielded at least one, and very often two, marks for candidates. However, it was clear that quite a significant minority were not entirely sure what was going on and a good number went on to discuss steam generation at some stage in the process.

(ii) Many candidates were successfully able to come up with two suggestions here, including the cost of a large dam or the highly technical workforce needed. Most got at least one.

(b) This question was well done by nearly all with renewability, cheapness (to run) and lack of air pollution being the best answers.

(c) A wide range of possible answers was given here and many were credited. These ranged from the possibility of flooding, habitat loss to problems downstream of the dam.

Question 3

(a)   This question was quite well answered, but there was a lot of confusion between what happened to fertilisers and pesticides on the one hand and animal waste on the other. Some attempted to gain credit by discussing pollution from the tractor or acid rain.

(b)   The key word 'biological' was quite often ignored here. Candidates received just one mark for vague reference to death of animals/humans or all the marks up to the maximum and beyond for a detailed discussion of the steps in eutrophication. The most common, and not surprising, error was to ascribe oxygen depletion to the algae. A common mistake was to refer to the environment under discussion as 'marine' rather 'aquatic'.

(c)   The most common answers here, which gained credit, were ones discussing the lack of technical know-how, money, the lack of sanitation and the large populations farming by rivers.

Question 4

(a)(i)   It was very rare for the correct term, temperature inversion, to be used here, despite the fact that it is on the syllabus.

(ii)   A figure in the range allowed was very often given.

(iii)   Generally, the only candidates who were able to score here were those who realised the limitations imposed on air movement by the relief of the valley and that wind movement might be reduced. Very little sensible attempt was made to explain the inversion effects on smog build up.

(b)   This question was quite well done. Many were able to talk about catalytic converters (although less could spell it!) and go on a make some sensible suggestions as to what they do. Using unleaded petrol and relying on public transport, bikes, etc. were also commonly quoted. Attempts to discuss how pollution from factories could be reduced were less successful.

(c)   This question was very well answered with full marks for a discussion of ozone depletion and global warming being common. A not insignificant number knew something markworthy about how ozone is depleted.

Question 5

(a)   This was well answered, although sequences outside of those anticipated by the Examiners had to be accepted. The most common reasons for loss of marks was getting things in the wrong sequence.

(b)   This was well answered with many candidates achieving full marks for a discussion of ash as a fertiliser and destruction of weeds or pests.

(c)(i)   Many were able to discuss the idea of the forest recovering, less the notion of this being so because of the small size of the plots cleared.

(ii)   A significant minority talked about loss of forest for road and house building etc., but a good number were able to discuss the need for more food and thus more land, leading to more pressure, bigger plots and lack of time for recovery. Many gained two marks on this question.

Question 6

(a)(i)   The vast majority of candidates were able to complete the graph correctly.

(ii)   Many candidates lost the mark here, because although having correctly noticed the upward and downward trend in the two age groups, they failed to give a comparative answer.

(b)   Very few were able to get maximum marks here. One common problem was to discuss the lack of people to work the land, failing to see that this is a developed country.

(c)   This question was answered well with discussion of birth control, education of women and government guidelines on family size all gaining credit.

Paper 0680/02
Paper 2

General comments

On this paper there was a significant difference in candidate performance between **Questions 1** and **2**. Although much less noticeable for high performing candidates, a clear majority of candidates achieved better on **Question 2**.

The fact that **Question 1** was drawn from the lithosphere section of the syllabus might have been a factor. In the typical answer to **Question 1** from less academically strong candidates, there was a steady accumulation of marks until part **(d)(iii)** was reached; from this point onwards, some parts of questions were not attempted, while in others question needs were regularly misinterpreted. Some candidates introduced alternative energy sources too early into the second half of part **(d)(iii)**; the majority failed to mention them in part **(f)** in which they would have been relevant. Instead of referring to strategies for conservation and management of fuel and mineral resources in part **(f)**, a significant minority continued the mining theme from part **(e)** and gave answers about relative advantages and disadvantages of different types of mining.

In answers to **Question 2** there was a much more even distribution of marks; answers to the irrigation related questions on pages 10 and 11 were particularly strong. Supporting case study knowledge for the named irrigated area requested in part **(b)(vi)** was most precise among candidates who chose an example from their country of residence or world region. This was the first time that GM crops had been examined directly; for this reason, a large amount of background information was supplied within the questions. Many of the more able candidates took the opportunity to extend the discussion about GM crops in the final part of the question; many of the less able candidates were able to select at least some relevant information worthy of credit at a lower level.

All questions were answered by the majority of candidates. Shortage of time for finishing the paper was not an issue except in a few exceptional cases. Questions which required construction only, for which no lines were provided, such as **Question 1 (d)(ii)** and **Question 2 (a)(i)**, were the ones left unanswered most frequently, even though skills based questions like these were the ones with some of the highest average marks. As usual, there was a tendency for candidates to consume the first two lines for repeating the question, without having begun to answer the question itself. Therefore some candidates did need to continue answers, especially to longer questions, into the spaces below the lines. This was quite acceptable; everything, was marked provided that the candidate made clear exactly which question was being answered; nevertheless, it would have been better examination technique to have given more direct answers, particularly as filling the number of lines available is synonymous with having fully answered the question in the minds of many candidates. Not all candidates made best use of the two guides to the amount of detail expected to each question – the sub-mark and number of lines.

Another general failing in examination technique was exposed most clearly in parts **(a)** and **(b)** of **Question 2**; this was the failure by many candidates to use and quote information from the graphs, despite in some cases precise instructions in the question to do so. The result was many answers about the general causes of flooding in **(b)(iii)** and the general reasons for the use of irrigation water in **(b)(v)**, unrelated to the rainfall data provided.

Comments on specific questions

Question 1

The needs of part **(a)** were well appreciated by candidates. In inferior answers there was little development beyond what was provided in the stem of the question. Although most candidates mentioned photosynthesis, only good candidates provided further relevant details. References to plants as primary producers and importance of sunlight and heat in relation to the water cycle were characteristic inclusions in answers worth three or four marks. Some 'guessing' of answers was in evidence in **(b)(i)**. A few candidates chose the dangerous route of giving two names per rock type; all six of them needed to be correct for a full mark answer. Other answers were clinically precise. Use of rocks in building or construction was the way most frequently described in **(b)(ii)**. Choice of marble or limestone seemed to offer the best opportunities for fuller description, which allowed the second mark to be claimed. Some answers to **(b)(iii)** were very clear

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and accurate. If the formation of only one type was understood, it was more likely to be igneous than metamorphic. Many candidates gave less than accurate answers because they had the idea that metamorphic rock was a 'mixture' of igneous and sedimentary rocks, or that sedimentary and igneous were in some way 'combined' to form metamorphic rocks. Also the role of heat and pressure in the formation of both igneous and metamorphic rocks caused a problem for some who had an idea about their formation without full understanding. Many candidates also struggled to find the precise expression needed for an effective answer to **(b)(iv)**; 'hard' and 'soft', 'impermeable' and 'permeable' were common examples of answers that could not be credited. However, smaller particle size for soil was acceptable; more complete answers which included reference to composition or structure of soil were quite rare.

Many answers to **(c)(i)** lacked evidence of candidate knowledge. The majority of candidates tried to give an answer based on what the diagram showed, with varying degrees of success. References to typical depths or widths were infrequent. The two most obvious answers to **(c)(ii)** were fish and minerals (especially oil and natural gas). One of the most common answers was rock, which was not allowed. Answers to **(c)(iii)** tended to be dominated by concentration upon only one reason such as lack of technology or cost; this generated answers which were too shallow or narrow for all three marks. Those answers which included problems for both discovery and exploitation were the most successful. Inclusion of weather conditions, whilst not compulsory for a full mark answer, was one of the characteristics of good answers.

Many candidates in part **(d)(i)** managed to state two similarities such as fossil fuels, non-renewable resource or formation from the decomposition of organic materials. One common answer that was not credited was 'all come from underground'; this was considered to be less precise than those that were accepted. Despite having shown a divided bar graph in part **(d)(ii)**, some candidates contrived to draw other types of graphs, such as drawing separate bars from the left side within the frame provided. Those candidates who did not mark on the scale were the ones most likely to make mistakes in showing segment sizes accurately. It was necessary for the shading shown in the key to match that used in the graph; this was not always the case, with wider spacing for the shading in the graph than in the key or the use of pen in the key and pencil in the graph. 'Increased demand' was a common, but inadequate, answer to the first half of part **(d)(iii)**, because in effect the candidate was doing no more than restating what was already given in the question. More successful routes for answering this question included references to growing world population, higher levels of economic development, more and greater use of technology and the relative ease and cheapness of use of fossil fuels. The second half of the question posed more problems than the first, especially when candidates tried to base their answers upon other sources of energy. There was a tendency to write answers in too general a manner; points that were potentially mark earning were made, such as relative cheapness, availability, ease of use, widespread uses, but these gained marks only when individual fuels were named and used in an appropriate manner for the question. This was easiest to do for oil because of its great importance for cars and other means of transport. Answers which contrasted coal with oil or gas in terms of higher costs of extraction, less easy use, lower heating efficiency or more pollution, were the ones most likely to gain all five marks. Such answers were fewer in number than might have been expected. The most common misunderstanding was that coal's relative decline in importance was due to exhaustion and shorter life expectancy than oil and gas.

Both parts of **(e)** were higher scoring than the questions that went before and after them. The majority of candidates recognised that the photograph showed an example of an opencast mine in part **(e)(i)**, even if they did not always focus upon description of methods. Some wandered away from the question into advantages of this type of mining compared with underground mining; it became a matter of chance whether anything relevant to method was included. Good understanding of what was meant by sustainable showed through many of the answers to part **(e)(ii)**; what candidates found more difficult to demonstrate was general understanding applied to this example. The easiest way to do this was by comment about the size of the area used for mining. A minority of candidates, who tried to argue that it was an example of sustainable development, usually on the grounds that the site could be filled in and reclaimed after mining ceases, faced an uphill task considering the depth and width of the mine, and the statement within the question about the number of years that known resources of copper were expected to last.

Four strategies for conservation and management of the Earth's fuel and mineral resources are listed in the syllabus; of these, new technology leading to the alternative and renewable resources was the only one regularly used in answers to part **(f)(i)**. Recycling appeared from time to time, and there was an occasional mention of insulation in buildings. Those candidates who tried to name the fourth strategy, increased efficiency in energy use, were rarely successful. The principal reason for this was because most tried to view this solely in terms of reduced consumption by cutting down on total amount of energy used. This is not the same as energy efficiency. One result was the suggestion that quotas should be placed on amounts of minerals mined and used. The idea of quotas appeared to come from the syllabus section on fishing; it did not translate into the context of fuel and mineral resources. Having struggled to name valid strategies in

(f)(i), it was not surprising that explanation of the problems associated with conservation and management of resources in part **(f)(ii)** was inadequate in most answers. Often there was nothing better than one or two general points, largely revolving around the problems of bringing changes to the established habits and practices of people, companies and governments. Consequently, answers worth more than one or two marks to part **(f)** were more frequent than those worth four or more marks. The best answers invariably included full coverage of the problems associated with replacing fossil fuels by alternatives such as cost of development, slowness of discovery and application of new technology and limitations imposed by the lack of suitable natural conditions.

Although responses from able candidates were strong throughout **Question 1**, those from less able candidates tailed off noticeably in the second half of the question. Questions about fossil fuels and alternative energy sources set in previous papers elicited stronger answers than here. The underlying problem was that so many failed to realise the possibility and desirability of using knowledge of alternative energy, sources such as water, wind and geothermal, in the final part of the question.

Question 2

Part **(a)(i)** was well answered, as is usually the case with questions involving practical skills. The main problem encountered by candidates was placement of the dots or crosses at equal intervals. A few candidates took no notice of the axis marked for temperature and superimposed their line graph over the rainfall bars with very limited success. Some others, almost invariably weak candidates, used bars which can never be used for plotting continuous data such as temperatures. Part **(a)(ii)** turned out to be one of the most difficult questions on the paper. The most common answer was 'hot all year', which suggested that candidates were focusing upon 'Equator' instead of 'south of the Equator'. Others referred to rainfall as well as temperature without success. All that was required for the mark was recognition that temperatures were lowest in June and July, mid-winter in the southern hemisphere. The clear answer to part **(a)(iii)** was April to October, which most gave, although a few were careless with the use of letters for the months and stated August to October. The expected answer to part **(a)(iv)** was savanna (or one of its alternative names), although tropical monsoon (not on the climate part of the syllabus) was allowed. When the question for part **(a)(v)** was set, it was assumed that most would answer wet season and use examples of farm tasks by way of explanation. While wet season was the most popular choice, some candidates made out a good case for dry season, such as work associated with obtaining and using irrigation water. These answers were also credited on their merits.

It was recognised that in part **(b)** this would be the first time that the majority of candidates had seen a dispersion diagram. This was why there was a skills focus in parts **(b)(i)** and **(ii)** to obtain and use the rainfall ranges shown. The majority gave the best answers of 1120 and 350, although a degree of tolerance was allowed. Some gave 1200 as the highest value, obviously using the value at the top of the graph axis, which demonstrated less understanding, although at the same time many gave a value above 300 for the lowest rainfall total. The disappointment in part **(b)(iii)** was that, having been led into interpretation of the graph, so many candidates deserted the graph and the example of Zumbo and gave general causes of flooding. Only more able candidates appreciated that the diagram showed a wide spread of annual values around the mean, resulting in several years with significantly higher rainfall totals above 1000 mm. It seemed almost inevitable that the first two lines of answers to part **(b)(iv)** were filled with repetition of details given in the stem of the question. Some candidates dealt only with health or income. For the majority this was a high scoring question, in which good knowledge of water related diseases was displayed, which would have been worth more marks if they had been available.

Part **(b)(v)** led to a repeat of the inadequacies in answering observed in **(b)(iii)**. The instruction to quote values from the graph to support the answer was ignored by many. Candidates had plenty of choice since both the climate graph and dispersion diagram were suitable for use. The answers given to part **(b)(vi)** were some of the best on the paper, particularly when an example from the home country was chosen. A few answers suffered from an over-emphasis on reasons why irrigation water was needed instead of water collection and use. The quality of answers to part **(b)(vii)** varied greatly. The best answers were given by candidates who focused on the question theme of damage to the environment, leading to comments about salination and damage caused by building large dams or by the removal of water from surface and underground stores. Good coverage of one of these was adequate for all three marks. The weakest environment related answers came from those candidates who over-concentrated on soil erosion; they failed to appreciate that excessive use of irrigation water is more likely to lead to salination than soil erosion. The trickle drip type of irrigation illustrated in part **(b)(viii)** was familiar to virtually all candidates. Despite this, there were many one mark answers, because comment was not directed towards the environmental theme of the question. Instead the focus in many answers was upon good crop growth.

One mark answers to part **(c)(i)** were also the most common; something valid was stated for either GM crops or established crops without the difference being established. Many candidates did not realise that the pie graph in part **(c)(ii)** had already been started. For some of them the meaning of 'others' was a problem. It was expected that candidates would obtain the answer to part **(c)(iii)** by subtraction from the percentages given in the opening part of the question. It was a surprise to find that some used a protractor and worked it out exactly from the graph, which produced an acceptable answer slightly above 1.0%. It might have been expected that everyone would give the correct answer to part **(c)(iv)**, but in some answers countries other than the USA were named.

Typically there was a high level of correlation between candidate ability and answer quality to both parts of **(d)**. Weaker candidates relied heavily upon the information supplied. Some sensibly underlined key parts of the information to make selection for their answers easier. The weakest of all wrote out only one statement for the scientist and environmentalist in part **(d)(i)**, while the strongest used the information provided as a trigger for broader explanation. Many candidates appeared to find making a choice between viewpoints of scientists and environmentalists difficult in **(d)(ii)**; their preference would have been for a question that allowed both points of view to be developed. As a result, some answers suffered from an approach that was too two-sided for the question set. Those familiar with the use of GM crops, and with a definite view of their own, produced good quality answers by making a range of relevant points, whilst at the same time showing an awareness of the merits of the other person's viewpoint. Overall the environmentalist viewpoint was the one most often used, as might have been expected.

The answers given to **Question 2** were more consistent than those to the first question. Even when candidates went through a sticky patch in answering, they soon reached other questions with which they felt more comfortable. There were few gaps, although it was noticeable that weaker candidates struggled to fill all the lines allocated to answers in part **(d)**, despite the amount of information provided.

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Paper 0680/03

Coursework

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General comments

Some good environmental topics were investigated and the presentation was generally good. There was a tendency from some Centres to ignore the sustainable element in the marking. Any environmental issue must be looked at, from the aspect of sustainable development, for it to gain good marks as a piece of environmental coursework; this led to some instances of **Assessment Objective C** being over marked. Candidates, in some instances, need to be advised to tailor their investigation to this end more effectively.

Comments on specific questions

Assessment Objective A

Candidates continue to do well in **Assessment Objective A** showing that they link well the point of their investigations to the teaching that they have had of the syllabus.

Assessment Objective B

Some good solid practical investigations were carried out by most candidates. Many candidates do very well here due to their enthusiasm for investigating their chosen topics and this illustrates the benefit of coursework in that candidates are able to discover facts about relevant local issues.

Analysis of data continues to be the weakest area. Some candidates think it is enough to present the information without saying something about it. This is particularly true for the results of surveys and questionnaires.

Assessment Objective C

Candidates continue to let themselves down in **Assessment Objective C**. This is the hardest part of the investigation and maybe more teaching is required to get candidates to see how issues can be managed for the future. It is here that weaker candidates perform poorly and ill chosen topics fall down. The advice is to choose a resource that has a limit to its use and an environmental consequence and then to discuss how a future plan could be developed to manage this to the best for all parties involved.

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Paper 0680/04
Paper 4
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General comments

The paper was set in Malawi, a developing country in Africa. There were four questions, each presenting source data and information requiring a variety of responses from drawing tables and graphs to making suggestions about sustainable methods of using resources. The Examiners were pleased to see that nearly all candidates attempted every section on the paper and their written answers were usually easily read and understood. There was no evidence of candidates failing to complete the paper due to lack of time.

Comments on specific questions

Question 1

This question tested the candidates' ability to gather and process data in a scientifically valid manner as well as identify and describe trends in data. The ways in which woodland with crops could be used in a sustainable manner was also considered.

(a) Candidates needed to consider which plan of action for gathering information was least likely to give a reliable answer. If plan A was chosen then the weaknesses were that no information was gathered from the other two paths and the count was only done on one day. If plan C was chosen then again only one path was sampled and wood was not counted or weighed. Unfortunately some candidates selected plan B which was more reliable than either of the other plans so no marks could be awarded.

(b) Nearly all candidates drew a table as the question asked and many gave two sensible headings for columns or rows.

(c) Most candidates correctly calculated the number of bundles used in one week but a surprising number of candidates did not multiply 365 days by 33 to give the best answer. The alternatives of a leap year 366 days or 52 weeks were allowed.

(d) Only a small number of candidates suggested two good improvements such as sampling for more than one day or finding the weight of each bundle or sampling at different times of the year.

(e)(i) The graphs were usually correctly orientated and labelled but there were often errors in the scales chosen by the candidates and plotting the data. The Examiners did make some allowance for the small graphical area provided in the examination paper.

(ii) The increase in charcoal consumption was often correctly found from the data table.

(iii) A range of likely values was accepted but this question proved to be difficult for many candidates, the values given were often large over- or under-estimates.

(iv) Some candidates seemed to have confused coal with charcoal. The Examiners hoped that a link with increasing population would be made. From this a number of ideas could be used to explain an increase in consumption.

(f)(i) Candidates were asked to describe the changes in nitrate availability between points A-E. This was clearly done and candidates stated that there was an increase to a maximum at C and then a decrease.

(ii) The change could have been described from A to E or a comparison between sample points after three years and at first cultivation. Only a small number of candidates wrote down every reading from the table or tried to explain the changes in nitrate availability.

(iii) This proved to be a demanding question because candidates could often only state that there would be a low level of nitrates or the nitrate level had not had time to recover without going on to explain why this would happen.

(iv) A diagram and details of a method of agroforestry cultivation were presented and candidates were asked to explain how four guidelines would encourage the sustainable use of this area. The Examiners were surprised to find that many candidates did not state that seeds and fruits could be a source of food for humans or farm animals. It was also suggested that the seeds could be used to plant more trees. The link between cutting trees for fastest growth at the time of the rainy season (given in the introduction of the paper) was made, but not as frequently as expected. Concepts of sustainable management of a resource are central to this examination and every paper provides an opportunity for the candidates to demonstrate their understanding of these concepts.

Question 2

The supply of water from a waterhole and a well was described in words and a diagram.

(a) Candidates often correctly stated one advantage of having a well, such as time saved compared to walking to a waterhole, but many statements about the better quality of the well water were too vague to be given credit. However in parts **(ii)** and **(iii)** there were many good answers which included all the alternatives stated in the mark scheme.

(b) Candidates were asked to explain why peoples' health would improve after the well had been built. Many candidates correctly suggested that there would be more water for washing themselves or clothes, also cooking with clean water without bacteria. Unfortunately some answers could not gain full credit as there were only vague references to clean or contaminated water.

Question 3

This question focused on fishing activities in a large lake and most candidates responded well to each section.

(a) Most candidates correctly suggested protein as well as some valid alternatives. In part **(ii)** a wide variety of valid fishing controls were stated and they were often backed up by good explanations. It was clear that the need to control fishing was well understood by most candidates.

(b) Many candidates carefully constructed questions about the supply of fish and gave alternative answers in a similar style to **Question 1** and **Question 2**. One mark was awarded for good layout and one mark for each question that helped to find out more information. Only a small number of candidates gave rather general questions such as how do you feel about the fishing that were not awarded marks.

(c) A number of diseases related to water were correctly stated and in many cases the symptoms and method of disease spread were well known.

Question 4

This question considered the different values of people directly and indirectly involved in trading elephant ivory.

(a) Some candidates could express the idea that the villagers could directly benefit from jobs and/or money from hunting for ivory as well as the country earning more money and so developing infrastructure. Unfortunately some candidates did not realise that the question was about international trade and so they suggested, from the source, that villagers would gain money guiding ecotourists. In **(ii)** the idea that limits would be needed to stop the supply of ivory declining and then the money that was earned from selling it was not communicated well enough to gain two marks.

(b) Those candidates that understood that an ecotourist is specifically interested in seeing wildlife often correctly suggested that they might not approve of killing the elephants or reducing their numbers by selling ivory. This question proved difficult for the majority of candidates. In **(ii)** there were a wide variety of correct answers and it was clear that candidates appreciated how big and potentially dangerous an elephant is.

Overall

The candidates usually attempted all the parts of all the questions. However, the Examiners were a little disappointed to see that candidates did not always develop their answers to gain a second mark even though they seemed to have fully understood the question and have relevant knowledge.