

# ENVIRONMENTAL MANAGEMENT

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Paper 5014/11  
Paper 11

## **Key messages**

Candidates need to read all questions carefully to prevent the missing key information (such as plotting information on a graph).

Some candidates should avoid answering a question too narrowly, for example, focusing a response on population change since 1800 on the last couple of decades.

Generally the candidates had a good understanding of most topics on this paper.

## **General comments**

It is pleasing to see that in the most part, candidates are answering questions fully rather than merely bullet pointing key ideas or concepts. This allows credit to be given for explanations where this is relevant.

Candidates were able to describe the location of the selected area (in this case the tundra) fairly well, although some descriptions failed to gain full credit

## **Comments on specific questions**

### ***Section A***

#### **Question 1**

- (a) (i) Some candidates were able to recall the geological feature.
- (ii) This was known by some candidates.
- (iii) Some candidates did not answer this in sufficient depth.
- (b) Some candidates were able to demonstrate their knowledge of the nature of coal.
- (c) Generally, responses showed an understanding of the impact on emissions and climate change. Stronger responses also cited the longevity of the radioactive source and the amount of energy produced.

#### **Question 2**

- (a) (i) Using the information on the map, some candidates were able to describe the trend and supported this with data.
- (ii) Most candidates answered this correctly.
- (iii) Stronger responses stated the reasons why water use/extraction may need to be controlled.
- (iv) Most candidates understood the reason for prioritising use and were able to make the correct selection from the options presented.

- (b) (i) Candidates understood strategies for supplying additional water to an area, citing a range of different methods.
- (ii) Similarly, methods of water conservation appeared to be well understood.

### Question 3

- (a) (i) The majority of candidates successfully identified the type of electricity generation as being wind powered using the visual information.
- (ii) The picture was used well to describe the site used for generation.
- (iii) Candidates generally understood the advantages of using wind power; some erroneously stated there was no cost, omitting the cost of developing the structures and their maintenance.
- (iv) While the advantages of the technology were known, the description of the equipment used in diagram form proved challenging. Some candidates showed a schematic system for solar power rather than the required wind power.
- (b) (i) Many candidates concentrated on the damage that would have occurred locally and did not describe in sufficient detail the impact of neighbouring external factors on acid rain.
- (ii) The majority of candidates were able to name an impact of acid rain on the natural environment.

### Question 4

- (a) (i) Stronger responses used the diagram to correctly identify denitrifying bacteria.
- (ii) Some candidates were able to answer this correctly.
- (iii) This question was interpreted well by many candidates.
- (b) A wide range of answers were provided by candidates. For some candidates there was potential for a more expansive explanation.
- (c) This was attempted by the majority of candidates; more extensive responses were required by some candidates.

## Section B

### Question 5

- (a) (i) Candidates were required to describe the location of the tundra biome. This was attempted by most of the cohort with varying success. Candidates who performed well were able to identify the location in relation to continents as well as the link to the Arctic Circle. This skill of writing such complete descriptions should be encouraged.
- (ii) While the majority of candidates identified that temperature changes would have an impact, not all candidates described the area as reducing, some incorrectly suggested that the area would disappear whereas others focussed on flooding.
- (iii) Many candidates correctly named at least one gas. The most common error was citing nitrogen, rather than one its oxides, as a gas that contributes to global warming. Nitrogen is naturally occurring in the atmosphere and is not thought to contribute to global warming. Some of the sources of the gases stated would have benefitted from some expansion from the short statements that were provided.
- (b) (i) The majority of candidates successfully completed the plotting of the additional points. Here, the most common error was linked to the incorrect use of scale by some candidates. Almost all joined the plotted points to the existing line.

- (ii) These questions focused on data and were well attempted by most of the cohort. Many candidates correctly identified the number of months below freezing and the month with the highest precipitation. Candidates found the final question on range the most challenging.
- (iii) Generally, this question was not well answered. Many candidates described plants that are not present within the tundra. Some candidates did identify features correctly but many of these candidates did not describe the reason for these features particularly well.
- (c) (i) Although defined in a variety of ways, most candidates were able to correctly describe the term 'consumer'.
- (ii) Many candidates appeared to misread this question and either related their answer to the arctic fox (which was already present in the tundra) or to the impact of the red fox leaving its natural range. While both were often explained well, they did not address the question that was asked. Those candidates that did respond to the question appropriately, typically correctly described different effects on the tundra ecosystem.
- (d) (i) Generally candidates demonstrated a good understanding of how oil was formed. The most common error seen was to explain this in relation to the tundra rather than the sea bed.
- (ii) Most candidates did this accurately.
- (iii) Most candidates were able to provide a good reason for the development of the pipeline, linked either to safety or the reduction in transportation time / distance.
- (e) (i) Many candidates were able to apply their knowledge and the information in the diagram to form good conclusions. Better responses gave clear and complete descriptions of their suggestions, whereas the suggestions made in some weaker answers were too brief.
- (ii) Candidates gave some good reasons for positioning the pipeline above the ground, but many focussed on only one reason.
- (f) Better performing candidates gave a balanced argument covering both sides of the issue. Most were able to describe the limitations and advantages of fossil fuels.

### Question 6

- (a) (i) Most candidates plotted the data on the graph accurately.
- (ii) This question required the candidates to read data from the graph. The most common error was to not interpret the information on the axis, thus omitting to multiply their answer by a million.
- (iii) Some responses to this question were muddled in their reasoning and commented merely on more recent factors rather than the reasons for changes since 1800. Other common errors included relating the answer to a particular country rather than the world population.
- (b) (i) This question provided a wide range of potential answers using the source picture as stimulus. The better answers identified the needs of larger populations to be fed and housed; the need for resources for industry and the demands for improved communication links, all of which will impact the forest.
- (ii) A calculation based question that was answered successfully by most of those who attempted it.
- (iii) The majority of candidates spoke about the reduction in rate of loss and carefully referenced data to perform well in this question.
- (iv) Most responses correctly identified the great awareness of land clearance or the increase in legislation as being a potential reason for the change seen.

- (c) (i)** While this is a topic that was clearly familiar to most candidates, some suggestions lacked sufficient explanation. Better performing candidates gave clear and complete explanations.
- (ii)** Candidates often wrote at length; their responses did not always show a depth of understanding of the topic.
- (d)** Some candidates identified one strong example but additional examples often linked back directly to deforestation.
- (e) (i)** The most common errors were to not label one or both axes, or to not apply an appropriate scale to the graphs. Many candidates only used a small proportion of the available space.
- (ii)** Most candidates identified the correct country: Kenya.
- (iii)** The reasons for the differing numbers of national parks were well articulated.
- (iv)** Naming another strategy proved challenging for some. A wide range of potential answers were seen.
- (f)** This question was tackled with differing degrees of success. Most candidates wrote about the need for reforestation / planting. The stronger responses also included a broader range of strategies and explained their impact well.

# ENVIRONMENTAL MANAGEMENT

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Paper 5014/12  
Paper 12

## Key messages

Candidates need to correctly apply the command word to a question, i.e. “describe”.

It is important that the definitions of technical terms are well understood.

## General comments

Most candidates attempted the majority of questions, demonstrating the range of their knowledge. Some found **Question 5** challenging.

The majority of candidates completed their responses fully and there has been a move away from single word and bullet pointed answers.

## Comments on specific questions

### *Section A*

#### **Question 1**

- (a) (i) Some candidates were able to calculate the percentage of organic matter in the soil using the data in the diagram.
- (ii) The majority of answers were correct.
- (iii) Most candidates were able to identify the role of the weathering of rock in soil formation.
- (b) The role of earthworms in the soil proved challenging for many to explain accurately. A number of candidates did not clearly explain the significance of gas exchange or water ingress from the tunnelling effect of worms.
- (c) A wide range of responses were seen. The accurate naming of a substance to change the pH of the soil proved to be the most challenging aspect.

#### **Question 2**

- (a) (i) The majority of candidates identified the change in fish catch. Stronger answers backed up the statement with accurate data.
- (ii) This was a well understood concept and most candidates were able to describe strategies for sustainable fishing. Fewer candidates named both the size of the nets and the size of the mesh; most citing one of these features.
- (b) (i) The majority of candidates were able to give a valid reason for the large size of the Norwegian fishing industry.
- (ii) Many candidates were able to identify the relevant island from the map.
- (iii) A wide range of valid reasons were cited for the reasons to protect the fish in this zone.

### Question 3

- (a) (i) The majority of candidates were able to plot the bar accurately on the graph. Some candidates needed to use rulers to avoid irregularity of some of the lines plotted.
- (ii) Few candidates stated that rainfall was irregular or unpredictable.
- (iii) Many candidates did not compare the rainfall on 26 September with the total rainfall for the previous 8 months. Many stated that there was no rainfall, which was incorrect.
- (iv) A question looking at the impacts of unpredictable and irregular rainfall, this proved challenging with relatively few candidates gaining full credit.
- (v) A number of candidates did not identify this climate as being a desert.
- (vi) The majority of candidates were able to name the equipment used to measure rainfall.
- (b) (i) Candidates often missed the significance of the impact of the conditions on the ability to retain water when rainfall occurs. Stronger answers articulated this clearly.
- (ii) Stronger responses described the significance of underground water supplies.

### Question 4

- (a) (i) Many candidates found this a challenging.
- (ii) Some candidates found it challenging to explain the reasons for the instructions in relation to the potential damage that may be caused. Stronger responses were precise rather than vague or general.
- (iii) Candidates needed to use one of the other statements on the sign board. A wide variety of potential answers were seen and some candidates did not link back to the appropriate statements.
- (b) (i) This was attempted by most candidates and a wide range of potential organisations were stated.
- (ii) This was answered well by most candidates.

### Section B

#### Question 5

- (a) (i) This was attempted by most candidates. Good responses were clear and precise.
- (ii) The process was understood by most candidates.
- (iii) Using data from the table, most responses correctly identified the countries that met the descriptors.
- (iv) There was some accurate plotting of bars and ranking.
- (v) Some candidates understood that population increase could occur due to migration.
- (b) (i) This was attempted successfully in most cases.
- (ii) Most responses showed an understanding of an appropriate change in shape to the pyramid.
- (iii) Some candidates did not follow the instructions in the question to give a description of the differences in the shape of the population pyramids. Some gave reasons for the difference.
- (iv) A range of responses of differing quality were seen.

- (v) Most candidates were able to suggest some strategies.
  - (vi) Some responses showed a clear understanding of the problems a country might face with an aging population and a wide range of answers were seen. Some candidates gave answers that were too absolute, i.e. “there will be no young people” rather than “there will be fewer young people”.
- (c) (i) Interpretation of the graph was successfully achieved by most candidates, who were able to identify the trend in stage three.
- (ii) Fewer candidates were able to identify that stage three was also the stage where the population grew most rapidly.
  - (iii) Not many responses fully tackled the reasons why death rates might fall.
  - (iv) Candidates need to ensure that they understand the limitations of the demographic transition model.
- (d) This was tackled with a range of success, with relatively few responses focussing adequately on the impact of population growth on soil erosion and desertification.

### Question 6

- (a) (i) The pie graph was completed by most candidates; some did not shade the segments according to the key.
- (ii) Most candidates were able to identify gases that would be correctly included in the “other” category.
  - (iii) This was a well understood topic and most successfully identified a gas and its source.
  - (iv) Some responses were too generalised. There was also a misconception that acid rain would burn the skin.
- (b) (i) Some candidates were able to label the layer correctly.
- (ii) Most candidates were able to determine the appropriate figure from the diagram.
  - (iii) Most candidates were able to determine the range of pressure in the troposphere.
  - (iv) This proved relatively straightforward for most candidates; the most common error was to relate to pressure rather than temperature. Candidates must read the instructions carefully.
  - (v) A number of candidates were unable to describe two additional characteristics of the troposphere.
- (c) (i) The knowledge of different weather measuring devices was well known.
- (ii) Candidates were asked to describe how the device shown measured and recorded wind speed. While most understood that the wind rotated the cups, a lack of clear description beyond this became a limitation to some candidates.
  - (iii) The advantages of using wind power as a replacement for fossil fuels was widely known and understood. The reasons for the converse argument were less well explained in some cases.
- (d) (i) The completion of the divided bar graph proved challenging for some candidates. These candidates chose to overlay each category rather than using the space provided. Similarly, some candidates did not shade the bars according to the key.
- (ii) The majority of answers correctly calculated the percentage of electricity generated by the two fossil fuel types.
  - (iii) Most candidates were able to name an additional fossil fuel.
  - (iv) This was well answered by those who attempted it.

- (e) This longer response question was attempted with varying levels of success. Better performing candidates gave a more balanced view. There were also a few misconceptions, in particular in the nature of nuclear power; some stated there was no waste and that it was a renewable resource. While the fuel source will last a long time, it still only has a finite life. Overall, there was an understanding of the issues.

# ENVIRONMENTAL MANAGEMENT

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Paper 5014/21  
Paper 21

## Key Messages

- Read the source material and the question carefully.
- Use data from either graphs or tables to help describe trends or patterns.
- Avoid statements such as 'plant growth will be affected' without any further detail. Candidates should always suggest how the growth might be affected and use their own knowledge to support their suggestion.
- Both axes of any graph should be labelled with units.

## General comments

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

## Comments on specific questions

### Question 1

- (a) (i) Most candidates were able to complete the table correctly.
- (ii) Most candidates carried out an appropriate calculation and gave the answer to one decimal place like the source data in the table.
- (b) (i) Most candidates were able to identify the three wettest months as the time when mining would not be possible.
- (ii) Many candidates made a sensible suggestion as to the impact on miners of not being able to work for three months.
- (iii) Although many candidates wrote at length their answers often lacked the specific details that would lead to an increase in disease.
- (iv) Some candidates wrote about dust and noise pollution without giving specific examples as to how the environment would be affected.
- (c) (i) Many candidates suggested that the miners should be given food and medical insurance. Only a small number of candidates considered the safety equipment the miners would need.
- (ii) Most candidates gave at least one good reason why the miners were not paid compensation by their employers.
- (d) Methods of land restoration after mining were generally well known and many candidates gained three or four marks for careful descriptions of land restoration.
- (e) Only a minority of candidates correctly identified the newest and oldest waste pile from the descriptions given in the question. The oldest waste pile would have the largest colony of plants.

- (f) (i) Most candidates plotted the graph correctly but a significant number of candidates failed to label both axes and include the units.
  - (ii) Most candidates correctly identified the trend shown by the graph.
  - (iii) Very few candidates managed to gain maximum marks for their explanations of the findings of the survey. This was usually caused by not clearly using information from the table to help support their own knowledge.
  - (iv) Very few candidates approached this question from the point of view of sampling methods. Candidates were not expected to know about this type of mining.
  - (v) Many candidates gave an outline of an experiment but did not describe a reliable method that could have been performed in a laboratory. Some descriptions did include plants being dust free while others were treated with dust but most other experimental details were not given.
- (g) (i) Most candidates completed the calculation correctly and showed their working clearly.
  - (ii) Stronger candidates gave clear advantages for both the block-makers and the mine owners. Some candidates did not clearly distinguish between the block makers and the mine owners.

## Question 2

- (a) (i) Nearly all the candidates completed a key and then indicated an area for crops and an area for livestock. A minority of candidates incorrectly located crops in the high mountains.
  - (ii) Most candidates gave at least one good reason for their choice of location of crops and livestock.
  - (iii) Candidates that appreciated that wells gave access to water from underground usually gained both marks. A significant number of candidates incorrectly suggested the wells were filled directly from the dam.
- (b) Many candidates gave at least one reason why a government would be reluctant to declare a drought. However, only a small number of candidates developed their ideas sufficiently to gain the maximum three marks.
- (c) (i) Many candidates could not describe a random sampling method.
  - (ii) Most candidates gave good questions that could have been included in a questionnaire.
  - (iii) Most candidates completed the table correctly and gave the answer to one decimal place.
  - (iv) This question was quite demanding for candidates. There were many descriptions of animals being drought resistant but the fact that some animals can extract more water from food was missed.

# ENVIRONMENTAL MANAGEMENT

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Paper 5014/22  
Paper 22

## Key Messages

- Read the source material and the question carefully.
- Use data from either graphs or tables to help describe trends or patterns.
- Avoid statements such as 'plant growth will be affected' without any further detail. Candidates should always suggest how the growth might be affected and use their own knowledge to support their suggestion.
- Both axes of any graph should be labelled with units.

## General comments

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

## Comments on specific questions

### Question 1

- (a) Most candidates were able to define the term biodiversity.
- (b) Some candidates looked at the location map of Kenya instead of the map of the Lake Victoria basin as instructed in the stem of the question. This meant that their answers to (i) and (ii) were incorrect.
- (c) (i) Very few candidates were able to make an appropriate explanation for why the scientist took water samples at 18:00. Stronger candidates realised that this was a form of control in the experiment.
- (ii) Most candidates correctly completed the table and gave their answer to one decimal place like the source data.
- (iii) Many candidates found this question straightforward and wrote clearly about the differences in the water samples. Some candidates did not answer the question as they described the results at each site rather than the differences between the water samples.
- (iv) Some candidates wrote about pollution in general terms instead of suggesting two sources of the chemical pollution caused by vehicle washing. Although a large number of candidates gave the detergent or soap used to wash the vehicles as an answer only a small number of candidates mentioned oil or petrol.
- (v) Some candidates sketched graphs or pictograms instead of tally charts. Others constructed data tables but did not complete the chart with tally marks. Headings were frequently missing.
- (d) (i) There were some excellent explanations of how eutrophication could occur in Lake Victoria with many candidates describing eutrophication in a logical, sequential manner.
- (ii) Protein was the most common advantage suggested for eating fish.

- (iii) Most candidates thought eating fish at the lakeside restaurants was unhealthy but their reasons were often too vague. There were references to pollution or eutrophication, but these needed to be substantiated with the name of a pollutant such as sewage or phosphate.
- (e) (i) Very few candidates explained that plan two was better than plan one because having five sites instead of three was more representative. More candidates referred to counting snails being better than looking for them, with a number referring to the importance of having a fixed time for the counting.
  - (ii) Some candidates described the plans instead of stating that the scientist needed to find sites where vehicles were not being washed as a control, or a way of comparing the number of snails at sites, with and without vehicle washing.
  - (iii) Most candidates correctly calculated the average and completed the table of results for plan three.
  - (iv) Very few candidates suggested another method that could be used to find the numbers of snails, such as using a quadrat. Most answers were a variation of the method used in plan three such as finding even more sites and counting the snails.
  - (v) A large number of candidates knew that bilharzia was a disease carried by snails.
  - (vi) The explanations of how bilharzia moves from an infected human to a snail were more accurate than the explanations of how it moves from a snail to an uninfected human. Many candidates incorrectly wrote about the snail entering feet.
  - (vii) There were some thoughtful answers explaining how fewer snails meant fewer eggs for young fish to feed on.
- (f) (i) A number of candidates completed the sites in the reverse order, most cloudy to least cloudy. Some wrote the results in the table instead of the sites A to D.
  - (ii) Many answers only suggested that fertilisers and pesticides increased sediments. The more detailed answers referred to overcultivation, overgrazing, wind erosion and surface run-off.

## Question 2

- (a) (i) A number of candidates thought the researcher chose the four villages because they were on a transect line. The successful explanations referred to the wetland, the savanna and the lake.
  - (ii) Most candidates correctly referred to random or systematic sampling.
  - (iii) Very few candidates explained that the researcher interviewed males and females in the villages to avoid bias. There were many answers referring to males working outside and females working in the house.
  - (iv) Many candidates seemed to link the structured questionnaire to the villagers not being able to read. There were some thoughtful answers about ensuring all the villagers had the same questions to answer and that there would be reliable data that could be analysed.
- (b) (i) Most candidates gained full marks for drawing the bar graph and completing the key. A small minority constructed line graphs. The most common error was not labelling the y-axis.
  - (ii) Although some candidates gained full marks for explaining how the savanna and wetland households had similar amounts of assets and gave examples, others wrote in vague terms about the standard of living.
  - (iii) The strongest answers wrote about the effect of extreme weather on crops and how a low supply and a high demand increases prices.
  - (iv) There were many good questions formulated about crop-growing in the savanna area.

- (c) Strong responses described ways that the government could encourage a sustainable way of the life in the Nyando District written using the background information provided throughout the paper. These ways included sustainable approaches to farming, energy production, ecotourism and fishing in Lake Victoria and regulations to control pollution. Weaker answers did not relate to the government or to a rural area in Africa.