

ENVIRONMENTAL MANAGEMENT

Paper 5014/12

Paper 1 Theory

Key messages

- Candidates should be precise in their answers and avoid generalities (such as 'pollution').
- Many responses could have been improved with greater accurate use of key scientific terms.
- Answers should link to the command verbs within the question (describe, explain etc.).
- Numerical responses should be calculated to a similar level of accuracy to the source data.
- If the question asks for a trend, the general trend from the information should be given. This can be exemplified by using the data.
- When drawing graphs, candidates should ensure that each axis is labelled and units are provided. A suitable linear scale should be drawn which uses at least half the area of the graph paper.

General comments

The majority of candidates attempted all questions on the paper. This strategy is effective as it may enable weaker responses to gain some credit even if answers are incomplete. Candidates should be aware of the importance of the command words such as 'describe' or 'explain' as these will provide key information about the style of response required. Some questions also required the answer to be tailored to a specific context. This was sometimes not acknowledged within the answer provided by the candidates.

Whilst many candidates were able to answer each question, there were still opportunities to be more precise with detail and, where needed, specific examples. This was particularly important for the six mark, level of response question. Evidence of preparation was clear in many scripts, although candidates should be aware they need to consider a range of points and ensure that their response includes a clear conclusion.

Questions involving calculations showed good engagement. It is important to show relevant working as some credit may be awarded even if there is an arithmetic error within the final answer. Candidates should be aware of the level of accuracy provided within any data they use and reflect this within their final answer. This may mean rounding up or down if appropriate.

Comments on specific questions

Section A

Question 1

- (a) An accessible first question to the paper; most candidates achieved full credit, a few incorrectly matched oxygen and carbon dioxide.
- (b) Most candidates were able to correctly identify chlorophyll.
- (c) The majority of responses correctly identified respiration. A small number incorrectly named photosynthesis.
- (d) Candidates found this question more challenging; there were a number of examples where the response omitted to explain why the conditions they had identified would increase crop yield. A common mistake was to say that greenhouses gave plants more sunlight.

Question 2

- (a) A significant number of candidates were able to interpret the photograph correctly and state that this showed an example of a commercial arable farm.
- (b) Many correct responses were seen with candidates naming a wide range of suitable methods for improving yield.
- (c) Slightly more challenging, the cohort generally showed good knowledge of the topic and understood the risk of salinisation. Soil erosion was also commonly mentioned.

Question 3

- (a) This question provided some stimulus information to help shape the candidate's response. Whilst generally completed well, a few candidates misinterpreted the question and explained how effective the poster was in delivering its message.
- (b) Candidates were able to provide relevant suggestions for the reasons why cholera outbreaks are more common in LEDCs. The most frequently seen error was a lack of sufficient detail within an example.

Question 4

- (a) Candidates provided a good range of reasons for high population density in cities, although some misinterpreted the question and gave reasons for a high birth rate. A few responses identified that the reason for high population density was the limited amount of land available with a large population.
- (b) The majority of candidates across the cohort were confidently able to provide two distinct methods for managing population size.

Section B

Question 5

- (a) (i) The photograph was correctly interpreted by the majority of the cohort and a correct answer was given. Very few candidates did not attempt an answer.
- (ii) Although most candidates were aware of the environmental impacts of the mine, often naming air, water or noise pollution, many did not go on to explain the impact. As a result, they did not fully address the question set.
- (iii) Candidates showed awareness of how sedimentary rocks are formed. Very few related their answer specifically to limestone.
- (iv) Candidates showed a good understanding of the variety of factors that affect the decision to open a mine, citing economic and environment factors. Weather or climatic conditions were common misconceptions.
- (b) (i) Most candidates were able to correctly interpret the graph and identify the year as being 2016.
- (ii) Whilst it was clear that most candidates were confident in using the data in the graph, there was often a misreading of the question, causing some to focus upon the trend in cement production or the difference between production and consumption, which limited access to full credit for many.
- (iii) The majority of candidates attempted this calculation and most of these gained full credit for the correct answer of 311.4/311. Where the candidate showed their working, it was possible to award credit if a correct stage in the calculation was given, even if the final answer was incorrect.

Question 6

- (a) (i) Most candidates completed the graph with the additional information given. There were few examples of inaccurate plotting, although candidates were expected to draw a bar of the same width as the others already shown.
- (ii) Candidates showed confidence in using the data to complete this calculation to achieve an answer of 30.
- (b) (i) This question, requiring candidates to interpret information from a map, was completed with varying levels of success. Candidates must refer to compass points rather than right, left, above or below. Similarly, positions should be precise, i.e. West coast of Africa rather than 'around Africa'. A significant number of candidates described areas that do not have major marine fish populations.
- (ii) Candidates were able to name strategies for managing marine fish populations. The command verb 'describe' indicated that the named strategies needed some further development rather than simply naming to gain full credit. This was done with varying degrees of success.

Question 7

- (a) (i) This question was generally handled well and a wide range of plausible reasons for water scarcity were given credit.
- (ii) Candidates made some well-reasoned suggestions for a lack of data within the selected area. Suggestions of an issue with accessibility or a lack of resident population were the most popular responses.
- (b) Impacts of drought were clearly stated by most candidates.
- (c) This slightly longer question required candidates to provide advantages and disadvantages of different methods of supplying water. The majority of candidates who attempted it gave a range of good suggestions, although there were some factual inaccuracies within some of the weaker scripts. Relatively few identified the limitations of bottled water to deal with the range of ways water is used rather than direct consumption.

Question 8

- (a) (i) The calculation was completed correctly by most candidates.
- (ii) Using the data in the table, most correctly identified that diesel engines are causing most harm.
- (iii) In questions such as this, where candidates are required to produce a bar chart from the data provided, the axes must be labelled and units given. Some responses showed difficulty in applying a suitable linear scale. Candidates should commence their scale at zero and use at least half of the graph paper provided.
- (b) Candidates provided some good suggestions as to how governments could encourage the use of electric vehicles. Weaker responses such as 'make laws' were not given credit without a suitable explanation. Most responses contained a balance of taxation, subsidies and increasing awareness.
- (c) Candidates were able to state that carbon dioxide causes global warming. They were often able to identify the problems associated with global warming. However, they had difficulty outlining why reducing carbon dioxide emissions was of global importance. There was also a level of confusion within some scripts, incorrectly attributing carbon dioxide increases to ozone depletion.

Question 9

- (a) Candidates were required to compare nuclear power with fossil fuels. Whilst there were a range of comparisons that could be made, many responses focused on either one or the other, thus were not given credit.
- (b) An appropriate table was successfully completed by most candidates, although there was a range of common errors within the presentation of the data. Candidates should ensure that each column

in the table has a full heading and that units are given in the column heading and not next to each entry in the table, where applicable.

- (c) A question which assessed the implications of the data used by the candidates. This proved to be challenging for many, although stronger candidates provided valid reasons linked to limited supply and the risk to supplies due to political instability. Many had concerns about the danger of exposure to radioactivity.
- (d) A six mark, level of response question, allowing a range of potential answers and allowing the candidate to demonstrate their broader knowledge about the topic. Virtually all candidates attempted this question and there were some comprehensive answers.

Candidates realised that the demand for energy is ever increasing. They also acknowledged that the amount of uranium needed to generate energy is far smaller than if fossil fuels were used. It was widely known that nuclear power stations do not produce carbon dioxide or sulfur dioxide. Candidates were also able to identify problems associated with nuclear power generation. Higher level responses additionally discussed the benefits (and disadvantages) of using renewable energy sources.

ENVIRONMENTAL MANAGEMENT

Paper 5014/22
Paper 2 Management in Context

Key messages

- Candidates should clearly understand that climate change is not caused by ozone depletion or acid rain.
- Greater practice with graph drawing would be of benefit to many candidates.
- Candidates should be able to describe and evaluate all the methods of estimating biodiversity listed on the syllabus, such as pitfall traps, pooters, quadrats, transects and random and systematic sampling.
- Candidates should read the question carefully to avoid giving answers that have already been provided in the question. This is often the case in questions that ask for one 'other reason'.

General comments

Candidates found the longer answer questions, worth four marks, to be challenging. Responses to these questions tended to be vague or repetitious. Candidates may find that using bullet points to help structure longer answers helps them to give focused responses.

Candidates found suggesting limitations for experimental methods challenging.

Comments on specific questions

Question 1

- (a) (i) The trend in the graph of a gradual increase was well observed.
- (ii) The percentage of 6.8% was usually correct.
- (iii) Most responses gave two relevant advantages of living in urban areas. 'Better standard of living' was considered too vague.
- (iv) Stronger responses focused on the question asked and gave reasons why people living in rural areas were concerned about urbanisation rather than general statements about urbanisation.
- (v) Some responses included two reasons that were the same. For example, 'better healthcare' and 'better health'.
- (b) (i) Most candidates stated months that were correct, with a minority confusing the wet and dry season.
- (ii) A number of calculated ranges used the temperature data rather than the rainfall data. In many cases, those candidates who showed their working were able to gain credit if their method was correct, even if they made an error in their final answer.
- (iii) The higher-achieving candidates suggested ways the climate affected crop growth and supported their answer with the data. For example, 'it is hot all year and higher temperatures lead to more photosynthesis'. Weaker responses did not answer the question as they simply listed information from the data without suggesting how this affected crop growth.
- (c) (i) The impacts of soil erosion were well known and many responses also included impacts that could be seen on the photograph.

- (ii) Intercropping appeared more familiar to candidates than bunds. A number of weaker responses repeated the intercropping explanation for bunds.
- (iii) The description of total area of forest cover was well done, with good use of the data. Good responses included an overall trend and then gave specific details, such as, 'decreased then increased, 1940 to 1980 decreased, fluctuated and then increased from 2000 to 2019'.
- (iv) Weak responses listed the statements made by each landowner. More able candidates added further detail to the discussion. For example, 'Yes, because farmers are given a financial incentive to reduce deforestation, which encourages ecotourism and generates foreign income'. 'No, because the forms would discourage illiterate farmers, there will be a reduction in export, the government is spending more and as it is not compulsory farmers can leave whenever they like'.
- (v) Many good responses explained why climate change is an impact of deforestation. There were a number of responses that linked climate change to ozone depletion or acid rain.
- (vi) 'Loss of habitat' was a common correct answer, and many other correct reasons were stated. The response, 'death' was not sufficiently detailed.

Question 2

- (a) (i) Reversed food chains and chains with more than four trophic levels were commonly seen and did not gain credit.
- (ii) Many correct responses were credited, with 'for camouflage' being the most common.
- (iii) Some good responses that used the information in the factsheet and added their own reason to this were seen, such as, 'ozone depletion has led to an increase in UV radiation'.
- (b) (i) The majority of candidates gained credit for this question. The incorrect answer **B** was occasionally seen.
- (ii) Many candidates needed to apply the correct methods to the drawing of graphs: fully labelled axes with linear scales and bars drawn of equal width with a ruler.
- (iii) Candidates found suggesting a limitation challenging.
- (c) (i) Most responses stated that random sampling reduces bias.
- (ii) Most responses suggested either that averaging could be used or that anomalous results could be identified.
- (iii) Candidates found suggesting two limitations challenging. Vague answers such as, 'it is at night', did not answer the question in sufficient detail. Stronger responses were more thoughtful and included details of why this might be a problem.
- (iv) The size of the quadrat chosen was often unsuitable, such as 1 cm² or 10 m². It was rare to see reference to taking an average of repeated results, and very few responses referenced scaling up the counted number of frogs to the whole area.

Question 3

- (a) (i) Good responses were seen. Weaker responses gave impacts that were not economic.
- (ii) Candidates were familiar with disaster preparation planning.
- (b) (i) It was insufficient to say a generator generates electricity. Stronger responses linked the rotation of the turbine to the rotation of the generator. Some answers did not make it clear that hot water becomes steam and that the steam is then condensed back into water. Occasionally, references to wind power were seen.
- (ii) Many good responses were seen.

- (iii) The opportunities for people living near volcanoes were well known with stronger candidates giving details such as increased soil fertility and the extraction of minerals. Weaker answers were limited to 'more minerals'.
- (c) (i) A few tables did not include column headings and did not separate out the data for weeks 6 and 7.
- (ii) Some responses showed confusion about what decreasing pH indicated about acidity.
- (iii) Abiotic components were well known. Occasionally, pH was stated when 'other' abiotic components were asked for.
- (d) (i) Some vague responses stated 'factories'. The strongest answers were able to clearly state 'combustion of fossil fuels.'
- (ii) An impact of acid rain was well known. Some responses stated acidification of lakes which had already been given in the question.