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ENVIRONMENTAL MANAGEMENT

Paper 0680/12
Paper 1 Theory

Key messages

- Candidates showed knowledge of a wide range of topics and were generally able to use and interpret data.
- Population data presented in the form of pyramids was an area of the syllabus that was less understood.
- More practice in describing data trends and patterns on maps is recommended.
- Candidates must read all questions thoroughly and use all the resources provided.
- Some responses were too general to gain full credit: candidates should be encouraged to give specific details to support and develop main ideas.
- Candidates should be encouraged to show their working in all calculations even if this is not specifically asked for in the question.

General comments

Candidates are reminded to use the maximum number of marks a question can award as a guide to the number of points they should make in their responses. Similarly, they should ensure they understand the importance of command words such as 'describe' or 'explain' as these will provide key information about the style of response required.

There was generally a high standard of spelling and punctuation; candidates were well prepared for most styles of question presented to them although they fared less well in those requiring the description of trends or distributions from a map. Terms such as 'above' and 'below' should be replaced with more accurate ordinal terms such as 'north' or 'south'.

Plotting of graphical data was generally strong, with most candidates accurately applying a suitable linear scale and ensuring plots were in the same order and style as the existing examples. Some responses did not complete the key although instructed to within the question – care must be taken to read all questions and instructions thoroughly.

Comments on specific questions

Section A

Question 1

(a) (i) The majority of candidates were able to name a sedimentary rock. The majority stated one named in the syllabus but any correct answer was given credit.

(ii) Most responses attempted to explain how sedimentary rocks are changed into metamorphic rocks. The requirement for high temperature and pressure was commonly included within these answers.

(b) A wide range of responses were given credit; suitable responses included references to the cost effectiveness of the process and the restrictions that could be placed on a mining company due to the environmental impact of the extraction. A common misconception was that the rocks would be too hot, linked to the description given of their formation in **1(a)(ii)**.

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Question 2

(a) Candidates were required to describe the distribution of *high* population density on a world map. It was clear that many candidates were well prepared for this type of question, giving precise details of these locations. Weaker responses were too general in their descriptions, naming a continent or using terms such as 'above' or 'below' rather than reference to ordinal directions (e.g. north, south). Some attempted to also describe the trends for low and medium density which were not required within the question.

(b) Many responses successfully named at least one reason for low population density in parts of the world. The majority cited the impact of extreme climate conditions or the lack of a water supply.

Question 3

(a) (i) While a slightly different presentation of information, many candidates were able to identify the soil type with these characteristics.

(ii) Successful responses identified that the crop might not have sufficient access to water if the soil drained too quickly. Many also highlighted the risk of leaching of nutrients essential for plant growth.

(b) Methods of increasing yield were well-known. A wide range of different responses was seen, demonstrating both traditional and modern approaches to the issue.

(c) Many responses correctly named two distinct methods of water treatment. Weaker responses were sometimes a little vague and/or focused on methods of distribution rather than treatment.

Question 4

This question was attempted by most candidates. The focus of the marking was on the naming and ordering of the different layers rather than the thickness of layers or artistic ability.

Question 5

(a) (i) This question required candidates to read and understand the text about algal build-up. A wide range of suggestions were given credit such as the fact that it is difficult to monitor death in the sea unless the fish are washed up onto the shore. Others also correctly identified that the algae are harmless when wet or that fish extract oxygen from the water with their gills and are therefore not affected by the gas in the atmosphere.

(ii) The question required two impacts the algae would have on local people. The majority identified the impact on shellfish collection (for either re-sale or personal use) and also tourism. Responses that named health-related issues did not gain credit, as these were excluded by the question.

(iii) Most candidates were able to suggest one impact on the beach ecosystem, although a few responses were too general and talked about algae impacting on biodiversity without any specific information.

(b) The majority of candidates were prepared for a question relating to eutrophication. However, not all read the question carefully, as it focused on the build-up of the algal bloom rather than the later impacts. A few responses gave incorrect information about chemical toxins.

Question 6

(a) Most candidates were familiar with the benefits of living near a volcano, mainly referring to farming, mining, family ties and tourism. Some specifically mentioned the mining/extraction of sulfur, using the information in the photograph.

(b) Many responses were able to secure maximum marks for this question, identifying the key information from the chart. Some provided significantly more detail that was required to obtain the available marks, but it was clear that they understood the significance of the data.

(c) Many candidates gave a good answer, comparing the views of older residents who were sceptical with those measures the authorities were taking. Most referred to the comments in the stimulus

material on page 10 although there were some theoretical answers which were creditworthy. Other answers were extended by suggesting further methods of managing the impacts. It was expected that responses contained some development of the ideas within the stimulus material rather than a simple re-statement.

(d) (i) This series of questions exposed some misconceptions and incorrect naming of different effects of air pollution. It was expected that candidates would name acid rain.

(ii) Many responses were too vague to receive credit for this mark. It was expected that responses should include a reference to combustion/burning of fuels/materials.

(e) (i) While candidates were familiar with carbon dioxide as a gas, the impact of high carbon dioxide concentrations in soil was a less-familiar concept. Some responses attempted to use knowledge of photosynthesis to answer the question, which did not apply to this context. Those that carefully analysed the information supplied in the question were generally successful in describing the link between the volcanic vents and the distribution of trees.

(ii) Candidates were generally successful in identifying a problem caused by high carbon dioxide levels in the atmosphere.

Question 7

(a) (i) Most candidates completed the graph correctly and neatly. A few did not complete the key and therefore did not gain that allocated mark.

(ii) This question required candidates to describe the trends in coal production and coal consumption during the period. While many completed this correctly and concisely, some responses contained too much detail. It is not expected that candidates quote changes on a year-by-year basis when overall trends are required.

(iii) The majority of candidates correctly identified that coal consumption was greater than coal production. A few incorrect responses displayed confusion between imports and exports.

(iv) A few responses showed confusion between energy demand and energy generation. This sometimes caused an unnecessary focus on the difference between renewable and non-renewable sources. The most common correct responses focused on the growth of the global population, the increase in the general standard of living and the increase in use of appliances.

(b) Candidates were well prepared for a question on the formation of coal. Responses were generally more precise than when similar questions have been set on previous papers. There was some confusion over the timescales that would be needed to form coal and also a failure to differentiate between animal and plant remains, although the majority understood the need for time to be spent under layers of sediment and the importance of heat and pressure within the process.

(c) (i) Most candidates were able to name another renewable energy resource. This topic appears to be well-understood.

(ii) Similarly, most candidates were able to suggest at least one reason why wave power might not be used to produce electricity. Most correctly identified the need for a suitable coastline/water source although there was some confusion between tidal and wave power.

(d) The question required the completion of a calculation which was accessible to the majority of candidates. A few incorrectly divided their answer by the 2016 figure.

(e) (i) Many candidates did not appreciate that population pyramids record percentages and thus the proportion of each age group in a population. The pyramids do not give total numbers or show birth rates and death rates. Many responses failed to use data from the 1950 population pyramid as support.

(ii) While many responses did use the data in the population pyramids to answer this question, some responses focused on birth and death rates, which are not shown in the pyramids.

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(iii) This question required candidates to describe the shape of the predicted population pyramid for 2050. Many provided additional details, such as references to the number of dependants and theories on the shape, which were not required for this particular question.

(iv) A more-challenging question. The population pyramid infers that there is little difference in the proportion of population in the 0–29 age groups, which suggests stability.

(v) The majority of candidates were able to theorise why the population pyramid may differ in the future. Common themes were the impact of another change in national policy, the risk of disease and possible advances in medicines and nutrition.

(vi) The majority of candidates answered this question with confidence. The most common error was to refer to national population policies, which was excluded by the question.

Question 8

The level of response question allows candidates to write a more extensive answer, facilitating a detailed and balanced response. Candidates are expected to consider multiple aspects of an issue in a coherent and structured way.

The cohort as a whole was able to write with some clarity. Some candidates showed evidence of planning and structuring responses before commencing to write, a skill worth developing for high mark achievement in this style of question.

Candidates gained credit for explaining how zoos can raise money and educate people, thus enabling possibilities of conserving biodiversity. Some responses focused on criticising the negative aspects of zoos without connecting them to conservation of biodiversity. Some candidates misunderstood the meaning of captive breeding and confused this with selective breeding, including accounts of how animals can be bred (or even hybridised) to create varieties more suited to the modern environment.

Strong responses made comparisons to alternative methods of conserving biodiversity, such as national parks and biosphere reserves, though greater clarity could have been achieved in the development of these ideas.

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ENVIRONMENTAL MANAGEMENT

Paper 0680/22
Paper 2 Management in Context

Key messages

Candidates should:

- Remember that not all questions require writing on answer lines, some need information to be written in a table or added to a diagram.
- Read the whole of each question carefully; for instance, when a grid is provided for plotting, check whether a line graph or bar chart should be plotted.
- Show working when completing calculations, especially when more than one mark is available for the answer.
- Consider the command word and mark allocation for a question before starting to write a response: e.g. a question with the command word 'Describe' and three marks allocated probably requires at least three pieces of information in the response.

General comments

This paper invited candidates to consider environmental issues as well as methods of gathering and interpreting data in the context of one country, Ghana.

Many candidates understood and made good use of the source material, and written responses were sufficiently clearly expressed that examiners could be confident of awarding marks. The mathematical and graphical questions did present difficulties in some instances.

Candidates generally had no problems completing the paper in the time available.

Overall, the pattern of this paper was 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 in each question.

Comments on specific questions

Question 1

(a) Most candidates correctly calculated the number of people involved in agricultural production in Ghana in 2018.

(b) (i) Many candidates found this question about how a farmer could use the apparatus in the diagram to measure the length of the giant land snail shell challenging. For full credit, candidates needed to describe the method of opening out the measuring callipers to determine the distance between the two ends of the giant land snail shell and then holding the callipers against the ruler to measure the distance in mm or cm. The farmer would also record the measurement. Some candidates wrote about using the ruler to measure the length of the snail and the callipers to measure the width. A minority of candidates removed the shell from the body of the snail.

(ii) Candidates found it challenging to suggest one reason why the farmer did not measure the body length of the giant land snail. Some responses suggested that the body length was not as important as the shell length; however, the paper specifies that the snails were a source of food.

Creditable suggestions included that part of the snail's body could not be measured because it was inside the shell and that the snail kept moving, making accurate measurement difficult.

(c) (i) Many candidates plotted the data correctly and fully labelled both axes. Some candidates did not include the unit 'cm' on the y-axis although they did label the x-axis 'week'. A minority of candidates used less than half the space provided.

(ii) Some candidates did not draw a straight line between each plotted point for diet **A** and another straight line between each plotted point for diet **B** on their graphs. Some candidates did not appear to be using a ruler. Most candidates labelled the lines.

(iii) Most candidates correctly described both trends as increasing.

(iv) Nearly all candidates completed the calculation of the range in shell length for diet **A** correctly.

(v) Many candidates drew lines on their graphs to successfully find the average length of shell at 14 weeks for each diet.

(vi) Some explanations about why the giant land snails fed on diet **B** are called the experimental group and the giant land snails on diet **A** are called the control group were too vague to gain credit. Most successful responses specified that the snails on diet **B** were being fed additional calcium.

(vii) Most responses correctly explained that giant land snails were described as *primary consumers* because they only eat producers or plants. Some of these answers demonstrated good understanding with reference to herbivores and food chains or trophic levels.

(viii) Few candidates were able to suggest that calcium would make the shell of the giant land snails stronger or harder.

(ix) Only a few candidates were able to provide enough description of how limestone is formed to gain full credit.

(d) This question required candidates to explain, using information from the table, why the farms were in a good location for keeping giant land snails. Many responses repeated the information that giant land snails grow best in warm and humid conditions without any development. The stronger responses used the data from the table to explain that the climate was hot and wet, so plants grew well which meant the snails had plenty of food. Some responses included calculations of temperature range and average monthly rainfall.

(e) (i) Many candidates drew five trees in a good location to shelter the new giant land snail enclosure. A small number of responses did not use the symbol for a tree given in the key to the diagram.

(ii) This question required candidates to suggest reasons why giant land snail farming is a sustainable activity. Many candidates made at least one sensible suggestion with reference to food for people or for the snails, but few candidates gained full credit. The amount of marks available for a question can help to guide candidates as to the amount of detail required in the response.

(f) (i) Many responses correctly suggested systematic or random sampling but did not gain full credit due to mismatching descriptions, e.g. stating random sampling but then giving systematic selection methods.

(ii) Suitable questions were required to match the format of the questionnaire, i.e. have a yes or no answer and relate to farming giant land snails.

(iii) Some candidates wrote conclusions that did not use the results of the student's questionnaire in the table. Those candidates who accurately summarised the results of all three questions gained full credit.

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Question 2

(a) Most candidates were able to suggest at least one reason why Ghana is building new wind turbines. The most common reasons were about reliable winds and wind power being a renewable source of energy.

(b) (i) Many candidates correctly calculated the area of the new offshore oil field shown on the map. Those who showed their working were sometimes able to gain partial credit when the final answer was incorrect. Some candidates wrote the unit as km instead of km^2.

(ii) Most candidates suggested the damage caused by oil spills as one of the reasons why some people think the oil fields will not benefit the people of Ghana. Other reasons that were given related to the lack of job opportunities, exporting the oil and effects on the fishing industry.

(iii) There were many excellent responses describing the impacts of oil pollution on marine and coastal ecosystems. The most common were about oil spills blocking out sunlight and preventing photosynthesis and oil covering birds' feathers preventing them from flying. There also good descriptions of the effect of oil on fish and marine food chains.

Question 3

(a) (i) Most candidates made one good suggestion about the risks to the health of the people shown burning plastic insulation from the copper wire at the e-waste dump shown in the photograph. Two different suggestions were needed to gain full credit.

(ii) Many candidates explained that the direction of the wind meant that burning plastic-covered copper wire in the e-waste dump caused health problems for people in the informal settlement. A few candidates wrote about factories in the industrial area polluting the water.

(b) (i) Candidates found suggesting why the student did not collect samples from the e-waste dump challenging. Some made suggestions about the type or quality of the wire.

(ii) Most candidates completed the table correctly.

(iii) Many candidates found calculating the length of wire **R**, in metres, needed to give the same mass of copper as 1.0 m of wire **P** challenging.

(iv) Many also found **c**alculating the length of wire **P** needed to give 1.0 kg of copper to sell challenging.

(c) (i) Most candidates suggested at least one reason why giving some metal buyers a machine that removes the plastic insulation from copper wire has not stopped the problem of copper wire burning. Some candidates mistakenly wrote about the machines being expensive when the metal buyers had been given the machines.

(ii) Few candidates gained full credit. Candidates often correctly identified the need for more places to put the e-waste. Some candidates wrote in general terms about pollution or misinterpreted the question, writing about exporting and importing waste.

(d) (i) Almost all candidates were able to suggest at least one reason why the flooding around the Odaw river and Korle lagoon is more widespread now than in the past. The silt deposited in the lagoon was frequently suggested as a reason for the increased flooding. Many responses developed the idea of less vegetation in the area so there was less uptake of water by plants causing more runoff. A few candidates wrote detailed answers about the effect of climate change with reference to global warming and rising sea levels.

(ii) This question proved challenging for most candidates. The stronger responses demonstrated sound knowledge that toxic deposits and lack of oxygen would lead to the death of aquatic plants and animals. Other responses referred to contamination, pollution, death, silt and lack of food.

(iii) Answers to this question were generally successful. Most candidates described several ways the economy of the capital city could be disrupted by flooding. There were references to damaged infrastructure and the cost of repairs, damage to farms and lack of food, contaminated water

causing disease and problems with exports and imports. A few responses displayed misinterpretation of the question and described ways of managing the impacts of the flood on the population rather than on the economy.

(iv) Many candidates found giving two strategies for improving water quality in the Odaw river and Korle lagoon challenging. The best responses gave suggestions on moving the e-waste dump away from the river and sewage treatment. Some responses mistakenly discussed ways of improving the quality of fresh water available for people to use.

(v) Almost all candidates suggested that the drains have not been built because of the high cost. Some stated that the drains would take the pollution to the sea and that this would be a problem.

(e) (i) This question required a description of the life cycle of the malaria parasite. Stronger responses showed a sound understanding of the life cycle and often gained full credit. Some responses confused the malaria parasite (plasmodium) with the mosquito while others thought the disease was transmitted from person to person or by contaminated water. Many candidates only gained credit for knowing that the disease was carried by female mosquitoes.

(ii) Candidates who found **3(e)(i)** challenging usually struggled to describe strategies to control the malaria parasite. The most common answers were about draining or pouring oil over stagnant water, using insect repellent, using mosquito nets and spraying insecticides.

(f) (i) Many candidates gained full credit by explaining that the government ban would give time for young fish to mature and for mature fish to breed, thereby increasing the number of fish.

(ii) There were many detailed responses describing other ways overfishing can be managed along the coast of Ghana. The most popular way was the use of quotas. There was some good understanding of the importance of small nets to catch fewer fish and large mesh size to allow small fish to escape. Some references to using the ‘correct’ net and mesh size were too vague to gain credit, and some confusion between small nets and large meshes was also evident. Other ways included restricted areas, such as economic exclusion zones, marine protected areas and marine reserves. Pole and line fishing was also mentioned. Some candidates wrote about closed seasons although the question referred to ‘other’ ways.