

# ENVIRONMENTAL MANAGEMENT

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Paper 5014/11  
Paper 11

## Key messages

Candidates usually made good use of the resources provided in the question paper, carefully studying them to extract relevant information to answer the questions set.

Some candidates found questions about fishing, soils and cyclones challenging.

## General comments

In **Section A**, **Questions 1** and **4** were well answered. Candidates found **Question 3** challenging. In **Section B** candidates scored marginally better on **Question 5** than on **Question 6**, although **Question 6(b)** and the first three parts of **Question 6(c)** were well answered. Knowledge and understanding of El Nino and eutrophication was much improved on past years. Candidates need to ensure that they have good understanding of other syllabus areas such as exploitation and management of fish stocks, the development and decline of cyclones, soils in terms of soil organisms and air and water within the soils and differential heating by the sun at different latitudes.

Candidates' use of the resources in the paper was generally very good. Graphical skills, too, were excellent.

## Comments on specific questions

### **Section A**

#### **Question 1**

- (a) (i) Most candidates correctly identified where plates were formed and destroyed, but were less good at identifying the continental plate.
- (ii) This was well understood.
- (b) (i) Most candidates answered this well, though some just gave one feature and so were unable to gain full credit.
- (ii) Earthquake or tsunami was stated by all candidates.
- (c) Candidates needed to explain things such as, if roads are blocked by lava or ash flows it is more difficult to access the area, or if evacuation is not carried out in advance then relief efforts will be more difficult.

#### **Question 2**

- (a) (i) Nearly all candidates got the catch right. Fewer were accurate enough in identifying the year.
- (ii) Candidates need to ensure that they understand the meaning of "fish quotas". If they had noted the rapid decline in fish stocks shown on the graph they could have inferred that they were needed to stop that decline.
- (iii) Candidates need to ensure that they understand the terminology. They found the question challenging.

- (b) Some good responses were seen detailing items such as increased size of boats and nets, sonar to track shoals, refrigerated vessels, etc.
- (c) (i) The majority of candidates correctly stated that there were too few fish to reproduce.
  - (ii) Candidates needed to think carefully about their answer to this question. The most frequent response was that they did not want people who worked in the fishing industry to have no work and income.

### Question 3

- (a) (i) Weaker candidates listed the countries when a description of their distribution was required. Stronger candidates noted the cluster in Central America and the north of South America and the tropical location.
  - (ii) The fact that they are grown in the south whereas the north is too cold and that the importing countries are wealthy or developed countries were expected to be the most common answers. Candidates must make use of the information given on the map; this will allow them to gain credit.
- (b) Nearly all candidates correctly completed the graph.
- (c) (i) Candidates found this challenging. The main creditable responses given concerned the income received by the workers. Mention could also have been made of how the money earned would aid development.
  - (ii) Subsistence farming was understood well.

### Question 4

- (a) (i) Credit was given for what could be seen in the photograph, such as the type, shape and spacing of the trees. Some candidates wrote about the mountain in the background. When answering this type of question candidates need to only describe what is shown. They should avoid answers based on their own knowledge rather than on the photograph.
  - (ii) A minority of candidates correctly identified taiga.
- (b) Candidates needed to have knowledge of the climate so that they could write about the short growing season, the very cold winters, etc. Some credit could be gained by inferring rocky ground from the photograph.
- (c) This was well answered with many candidates able to gain credit on both parts.

### Section B

#### Question 5

- (a) (i) Most candidates completed the graph well. A few needed to be more accurate in plotting the 45%. Candidates must ensure that they answer the question in the form requested, not every question will include answer lines.
  - (ii) Many candidates ignored the role of air in soil and wrote about photosynthesis using the carbon dioxide in the air. The roles of water for hydration, for use in photosynthesis and for supplying minerals in solution from the soil were known by some candidates.
  - (iii) Strong candidates achieved full credit by identifying their role in decomposition, aeration and nitrogen fixing. Only a few mentioned worms or fungi.
- (b) (i) Most candidates correctly chose 2.5–3.0 times.
  - (ii) The size of graph paper in the question paper was chosen so the graphs could be drawn to a sensible scale using the whole of the graph paper. Quite a few candidates chose scales that meant only a small proportion of the graph paper was used. This made accurate plotting more

difficult for them. Many candidates were awarded most of the available credit. The most common reasons for scoring less than maximum credit were:

- y axis lacking a label
- inaccurate putting of points
- y axis not to scale

Some candidates drew bar graphs, but if they were plotted accurately they could still gain maximum credit.

- (iii) Candidates need to ensure that they understood the term *per person*. A large number of candidates wrote “an increase in population”.
- (c) (i) This was well answered with nearly every candidate correctly stating “Africa”.
- (ii) Careful study of the map shows North America and Oceania have the highest consumption. Candidates often chose one of these in combination with Europe or South America.
- (iii) Most candidates identified wealth as a major factor. Some thoughtful candidates wrote about religious beliefs (vegetarian), tradition and even availability of refrigeration
- (iv) Strong candidates showed an understanding of overgrazing and how it caused soil erosion, trampling was explained less often. Most candidates gained credit for “water pollution” even if they had no credit for “soil erosion”, with most referring to faeces.
- (d) (i) and (ii) Both these parts were usually correct.
- (iii) Most candidates understood the concern over methane emissions. A few gained credit for the concern over deforestation and its impact on climate change. Some weaker candidates needed to read the question more carefully as they wrote about other environmental aspects rather than the impact on climate.
- (e) (i) A few answered “17%”, care must be taken in reading and understanding the resource. The majority noted that just one stream was affected in 2012.
- (ii) Almost all used the resource well and gained maximum credit.
- (f) The best answers dealt with the excess fertilisers being washed into water courses and the subsequent impact of eutrophication. Candidates went on to offer sensible ways of trying to replace or limit the use of fertilisers and/or preventing them reaching water courses. A few wrote about skimming algal blooms from rivers and lakes and pumping oxygen into the water. At Level 2 most could give a good explanation of eutrophication. They then needed to look at remedial action in some detail to achieve the higher level. Weaker candidates gave very brief descriptions or wrote about the effects of pesticides. Some thought that fertilisers were the same as pesticides or herbicides.

### Question 6

- (a) (i) Only a few of the candidates used their knowledge and the diagram to explain the difference in areas heated by the two rays shown. Some also correctly identified albedo as being important and the fact that as light waves travel a longer distance through the atmosphere at the Arctic Circle there is more energy lost through reflection. Some candidates needed to explain their answers in greater detail; just saying that the sun is vertical or shines directly on the Equator was too vague. Some still think that distance from the sun is the cause.
- (ii) This was generally well answered.
- (b) All the candidates correctly interpreted the unusual graphic to gain most of the available credit.
- (c) (i) and (ii) Yet again there was good interpretation of the resource by nearly all candidates.
- (iii) The correct answer of 6-7 degrees south was given by the majority. Others needed to be more accurate as they stated 5 or 10 degrees south.

- (iv) Candidates needed to be aware that cyclones formed over warm water and that this provided their energy. Therefore the lack of water on land and the fact that sea temperatures decrease away from the Tropics would explain why the cyclone weakened.
- (v) Better answers showed knowledge of the origins of cyclones and that the low pressure causes sea level to rise. Aided by the strong winds this leads to storm surges – the inundation of low-lying coastal areas by the sea. Weaker answers discussed how the low-lying nature of the land would increase the flood risk from heavy rain and a few noted that such areas are often densely populated.
- (vi) This was much better answered than the previous two parts. Many candidates knew enough about the precautions against cyclone damage to achieve maximum credit.
- (d) (i) Most candidates were clear about the roles of wind and water currents. Although some did not understand that the ocean currents are separate bodies, i.e. the warm current will not heat the cold current. However the use of the resource and the understanding of El Nino were good
- (iii) The majority of candidates correctly stated that the advantage was for agriculture.
- (e) (i) Candidates understood the food web.
- (ii) Candidates needed to make clear that death through starvation lead to a reduction in numbers, or that sharks were at the next level in the web to seals and penguins. Many candidates incorrectly stated that all the fish, etc. would die. There is a reduction in zooplankton, so there will still be some food for fish and whales as well as other creatures at higher trophic levels.
- (f) Candidates should have compared the impacts of the three climatic hazards. The best answers did that, with some noting that cyclones may cause more damage in monetary terms as buildings, etc. are destroyed, but that droughts frequently lead to the greatest number of deaths and migrations. These better answers also looked at environmental impacts. Many referred to the length of time that these events may last, and the cost involved to countries of various levels of development. Where weaker candidates did refer to the effects, these were often listed and repetitive, rather than comparative. As with all these types of questions, there is no single correct answer, rather candidates are rewarded for the quality of the explanation and conclusions.

# ENVIRONMENTAL MANAGEMENT

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Paper 5014/12  
Paper 12

## Key messages

Candidates need to make full use of the resources provided when answering questions.

Where descriptions are required it is essential that candidates provide details rather than vague statements.

Some candidates' explanations need to give reasons rather than just descriptions to be awarded most credit.

## General comments

In **Section A** candidates gained most credit on **Questions 1** and **2**. In **Section B**, in general candidates performed slightly better on **Question 5** than on **Question 6**; they found parts **6(a)** and **6(d)** challenging. Both illustrate the key point above about using the information in the resources provided. As stated in the comments on specific questions, the diagram for **Question 6(a)** showed that at **X** there was no subduction as both plates were continental. This was overlooked by the majority of candidates. In **Question 6(d)(ii)** candidates wrote about the changes in numbers of plant species, with many identifying the sharp increase from 1989 onwards. However, in the next part they often overlooked their answer to part **(ii)**, did not take note of the graph and wrote about birds decreasing the number of plant species.

The final part of each question is still an area that requires some improvement. For example in **Question 5(f)** many candidates wrote solely about cyclones and did not consider other climatic hazards. Unfortunately quite a number who did try to compare, based their comparisons on earthquakes. In **Question 6(f)**, answers were better as the question required advantages and disadvantages which most candidates covered. However, many answers were lists with little explanation, especially as to how volcanoes can be dangerous.

On a positive note, candidate knowledge of the negative impact of fertilisers (eutrophication) and of El Nino events was very good.

## Comments on specific questions

### **Section A**

#### **Question 1**

- (a) (i) The graph was completed well by almost all the candidates.
- (ii) A few forgot to include natural gas with coal and oil.
- (iii) Some good suggestions were seen, usually concerning lack of rainfall, lack of suitable dam sites and the cost for a developing nation of setting up HEP schemes.
- (b) Most candidates gave a correct response to the increase in demand; fewer candidates suggested why carbon dioxide emissions increased so little.
- (c) The stronger candidates noted the piling of waste on the surface, loss of habitat due to this and the creation of pit buildings and transport routes. Very few mentioned the collapse of underground workings. A large number of candidates wrote about open cast mining which severely limited the amount of credit they could be awarded.

## Question 2

- (a) Nearly all candidates correctly identified the water cycle processes.
- (b)(i) Farming, irrigation and HEP were frequently correctly given by candidates.
- (ii) There were many reasons. The most frequent ones given by candidates were that in areas such as the Arctic or high mountains there were few people to use it, or it was there as ice rather than water. Contaminated water or water deep underground also figured frequently. A few ignored the fresh water of the question and wrote about saline water.
- (c)(i) This was well answered.
- (ii) Many candidates wrote about the high cost and were awarded partial credit. Only the stronger candidates were able to gain the additional credit either by noting the high energy demand or that many parts of the world do not have access to the oceans.

## Question 3

- (a)(i) Nearly all candidates correctly completed the graph.
- (ii) Most described the seasonal change. Few mentioned that there is rain all year.
- (iii) Few realised that because this was a tropical climate temperatures were suitable for crop growth all year, allowing double or even treble cropping. Even July, August and September had sufficient rainfall for agriculture. Disadvantages were often vague or incorrect; phrases such as “there is a lot of rain” are insufficient for credit. Others wrote about summer drought.
- (b)(i) Candidates must ensure that they have an understanding of what a tundra climate is like. Better candidates were able to give reasons such as low temperatures, short growing season and permafrost leading to water logging of the surface.
- (ii) A greenhouse or some other building to keep out the elements was needed for the initial credit. Further credit awarded was for some feature that would allow growth such as heating or watering.

## Question 4

- (a) The best answers described the coniferous forest in the background and then the fairly sparse vegetation in the foreground and right of the picture. Other candidates needed to distinguish between the different vegetation in different areas and to concentrate on describing what they could see of the vegetation in the photograph. Some described the landscape instead of the vegetation.
- (b)(i) The mention of gullying and its impact on the usefulness of the land was rare. Slopes were mentioned by many; they needed to realise the slopes were steep and then explain why this was a problem.
- (ii) Deforestation was correctly suggested by many candidates. Weaker candidates tended to state it was due to wind or rain.
- (c)(i) Candidates needed to use a word other than desert when explaining the term. In fact, desertification refers to the degradation of the land so that it becomes infertile and can occur without an area literally becoming a desert.
- (ii) Some good answers were seen to this question, usually starting with maintaining vegetation cover in a variety of ways. Methods of maintaining soil fertility were also given frequently. Irrigation was also commonly suggested. This needed to be controlled irrigation such as trickle drip. Excessive watering can lead to salinisation and therefore desertification.

## Section B

### Question 5

- (a) All parts of (a) were well answered.
- (b) (i) Nearly all candidates correctly identified that availability of water and soil made fertile by alluvial deposits explained the location of the intensive farming. Fewer candidates explained why extensive cattle farming was carried out away from the river
- (ii) This question was well answered as candidates noted the drought and described its likely impacts. A few wrote about crops instead of cattle.
- (iii) The best answers produced thorough explanations that included the heavy rain, the preceding drought years and their likely impact on the vegetation and soil. Weak answers just noted the heavy rain but without noticing the preceding drought and did not explain why that year had particularly bad soil erosion.
- (iv) The impacts when excess fertilisers are washed into water bodies were well covered by many candidates with the basics of eutrophication well-understood. Some candidates confused fertilisers with pesticides and their answers gained little credit.
- (v) Many candidates were able to give a variety of ideas, usually involving controlled irrigation, such as trickle drip, organic fertilisers, crop rotation, mixed cropping and various methods to prevent soil erosion.
- (c) (i) Answers had to refer to a period of little or no **rain**. A shortage of water was insufficient, as this applies to hot deserts nearly all the time.
- (ii) Most candidates correctly identified Europe.
- (iii) The better answers noted that the areas were close to or between the Tropics and then gave specifics such as southern Asia, eastern South America, for example. A few even noted that droughts were more common on the eastern side of continents. Weaker answers consisted of a list of continents without more specific detail; to gain more credit a general description of the distribution was needed.
- (iv) Desertification and global warming were regularly stated as human causes of droughts by the stronger candidates. Some candidates wrote about ozone destruction, usually incorrectly blaming it on carbon dioxide.
- (d) Few candidates achieved maximum credit; they needed to explain, as the command words were "Suggest why ...". Many erroneously thought that increased temperatures from global warming would cause vegetation to burst into flames. Drought, leading to vegetation drying out, contributes to increased bush fires. Candidates needed to explain why bush fires could lead to mass extinctions. Few candidates noted that increased temperatures affect habitats so that, for example, animals adapted to polar conditions would die out. Some excellent answers covered melting ice sheets, the subsequent rise in sea level and the extinction of life on low-lying islands and impacts on corals and attendant species.
- (e) Candidates used the information in the diagram to answer the question well. A few thought that the heavy rains caused the other changes.
- (f) To achieve Level 3, candidates needed to investigate at least two climatic hazards. Candidates could, at best, achieve the top of Level 2 by stating they agreed with the statement and writing about the damage cyclones can do. Some candidates did compare with other hazards, but often chose earthquakes which are not climatic hazards. A number of candidates stated that a cyclone destroys everything in its path; this is overstating the hazard. Few mentioned the damaging storm surges that occur as the low pressure allows sea level to rise and the strong winds drive massive waves onshore.

The best answers wrote about floods and/or droughts as well. They compared and explained the relative impacts, such as cyclones may cause damage that costs most to repair but that droughts affect wider areas for longer and probably kill more people.

### Question 6

- (a) (i)** This question was answered correctly by nearly all the candidates.
- (ii)** This proved a challenging question. Candidates needed to look carefully at the diagram of the Earth; it would have helped them answer this and the next part of the question. At X the two continental plates are moving towards each other, stating that would have gained partial credit. Some candidates thought the plates were moving apart and volcanic eruptions created the mountains. Stronger candidates identified the movement and went on to describe crumpling of folding to create the mountains
- (iii)** Careful use of the resource was needed. The diagram showed that there was no subduction and therefore no melting of a plate to create magma. Few stated this and many contradicted their previous answer.
- (b) (i) and (ii)** The majority of candidates noted divergence and could then draw the arrows correctly. Some labelled the fault at the mid-oceanic ridge.
- (c) (i)** Most correctly stated Surtsey was south or south-west of Iceland.
- (ii)** It is important to read the information given in the question carefully. The stem to part **(c)** stated that the island was volcanic, however, quite a few candidates chose sedimentary or metamorphic.
- (d) (i)** Nearly all the candidates correctly gave an answer of 21 or 22.
- (ii)** In questions of this type, it is necessary to look carefully at the graph and identify rates of change, dates and figures. The best answers identified various stages of growth and periods of no growth and linked those to dates and actual figures read from the graph. Candidates needed to follow this pattern rather than stating simply “they have increased”. Candidates earned credit by identifying the starting point of zero and an end point of 56/67.
- (iii)** Candidates needed to use the graph to see that from 1989 the period of no growth ended and rapid growth in plant species began. Many wrote about the birds eating the plants so the number of species decreased. Candidates need to be clear about the meaning of the term species. Some thought that if the birds spread the seeds across the Surtsey, new species would appear; this is not the case, it will lead to an increase in the number of plants rather than number of species. Some got credit for noting the increase, but only the best answers stated that the birds transported seeds there in their feathers or droppings. The main reason was, in fact, that the birds’ droppings provided the nutrients for new species to grow, whether the seeds were brought in by the birds or the wind.
- (iv)** Candidates need to ensure that they know the meaning of the term “vegetational succession”. The best answers described the change from bare rock/soil through to climax vegetation as each plant altered and enriched the soil. Some gave examples as a way of describing, which was perfectly acceptable.
- (e) (i)** Quite a number of candidates thought the energy that was converted to electricity was provided by the water rather than by the heat of the Earth. Many gained some credit for stating that steam turned the turbine. Some mentioned the heating of the water by the rocks, but few mentioned the cold water being pumped into the rock. The diagram showed hot water rising to the surface. However, many candidates stated that steam rose to the surface. The drop in pressure at the surface allows the hot water to change to pressurised steam/water vapour.
- (ii)** Some of the candidates identified the hot rocks that underlie the volcanic island of Iceland. Many others thought it was the presence of water that made it suitable for geothermal energy, even though the water is re-used.
- (iii)** Candidates often find the concept of sustainability challenging. It is to do with the heat energy from the interior of the Earth being to all intents and purposes renewable, so this energy source is



available for future generations no matter how much is used now. Some stated it is a renewable energy source without stating what the source is. Weaker candidates wrote about the water and quite a few wrote about it being non-polluting, which is true but does not make it sustainable.

- (iv) Environmentalists are concerned with the effects of extracting and burning fossil fuels other than with the fact that they are rapidly depleting. So the best answers included the release of carbon dioxide, a greenhouse gas leading to global warming. Many also covered the release of sulfur and nitrogen oxides that cause acid rain. Some candidates incorrectly thought that carbon dioxide destroys the ozone layer.
- (f) As for **Question 5(f)**, candidates needed to concentrate on two aspects, the positive and the negative sides of living near an active volcano. Frequently candidates just decided that advantages or disadvantages were greater and wrote a one-sided response. Some listed points with no explanation. Better answers covered both sides and reached a conclusion. The best answers discussed the type and the frequency of eruptions. Those volcanoes that just emit a small amount of lava on rare occasions are probably safe to live with; those that are explosive and unpredictable are best avoided.

# ENVIRONMENTAL MANAGEMENT

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Paper 5014/21  
Alternative to Coursework

## Key messages

- Candidates should be reminded to read the source material and the question carefully to ensure they answer the question as set.
- Where relevant they should use data from either graphs or tables to help describe trends or patterns.
- Answers should be precise and should avoid statements which are vague. Candidates should always make suggestions using precise terminology such as “concentration”, “volume”, “mass”.
- Both axes of any graph should be fully 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, UAE. Many candidates understood and made good use of the source material and their written responses were clearly expressed. The mathematical and graphical questions were challenging for a minority of candidates.

Candidates appeared to have had no problems completing the paper in the time available.

## Comments on specific questions

### Question 1

- (a) Candidates nearly always entered correctly calculated data into the table.
- (b) (i) Most candidates completed the diagram with sampling quadrats in the correct positions. Candidates needed to study the positions of the seven quadrats already completed to make sure they used the given coordinates correctly.
- (ii) Most candidates stated the range correctly.
- (iii) Many candidates gave correct answers to this question.
- (iv) The majority of candidates multiplied their answer to (iii) by 922 to give the estimated total dry mass.
- (v) Stronger candidates were able to identify that the roots of the plants were not sampled and this accounted for the missing biomass.
- (iv) Most candidates correctly suggested that repeating the sampling method would provide more data to improve reliability.
- (c) (i) Nearly all the candidates recognised that the biomass had increased over the three years. Fewer candidates gained full credit by suggesting that the biomass increased by about 200 g each year.
- (ii) Many candidates found this question challenging with only the stronger candidates suggesting a valid conservation plan.

- (d) (i) Stronger candidates gave sensible methods and often gained full credit. However, many candidates found this a demanding question and repeated variations of the sampling method given in the question.
- (ii) Most candidates provided a table with space to complete data for 10 quadrats as well as suitable headings.
- (e) (i) Most candidates clearly understood that the plants would grow faster as the organic matter was a natural fertilizer.
- (ii) Many candidates identified at least one risk of adding organic matter. The risk of disease and eutrophication were the two most common responses.
- (f) (i) Most candidates identified the use of air conditioning in a hot climate and therefore the need for more fuel to generate electricity to run the air conditioning units.
- (ii) Nearly all candidates correctly identified photosynthesis as the process that captures carbon dioxide.
- (iii) Most candidates made one good suggestion regarding the possible advantages of carbon capture. Stronger candidates provided a second and third good suggestion.

## Question 2

- (a) (i) Most candidates explained at least one reason why the red palm weevil is now a severe pest.
- (b) (i) Most candidates could not suggest two factors that needed to be kept the same.
- (ii) Many candidates understood the concept of a control and explained the need to compare the performance of the pesticides against water.
- (iii) Most candidates completed the tables correctly.
- (iv) There were many ways candidates could express differences shown by the results. Stronger candidates were able to give clear comparisons that were valid from the table of data and gained credit.
- (v) This proved to be challenging for many candidates.
- (c) (i) Most graphs were completed correctly. There were some plotting errors and incomplete axis labels usually on the x axis.
- (d) (i) Most candidates selected a time for spraying as required by the question. In many cases the candidate went on to justify their choice. However weaker candidates were unable to justify their choice.
- (ii) Nearly all candidates suggested a sensible safety measure.
- (iii) Many candidates suggested introducing a natural predator or referred to biological control as an alternative method to using pesticides. Some candidates recommended cutting down all the palm trees.
- e) (i) Nearly all candidates made at least one good suggestion as to why the government wanted to set up research laboratories. Most candidates gave two or three suggestions worthy of credit.
- (ii) All the points on the mark scheme were seen regularly and most candidates gained at least partial credit.

# ENVIRONMENTAL MANAGEMENT

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Paper 5014/22

Paper 22

## Key messages

- Candidates should be reminded to read the source material and the question carefully to ensure they answer the question as set.
- Where relevant they should use data from either graphs or tables to help describe trends or patterns.
- Answers should be precise and should avoid statements which are vague. Candidates should always make suggestions using precise terminology such as “concentration”, “volume”, “mass”.
- Both axes of any graph should be fully 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, Oman. Many candidates understood and made good use of the source material and their written responses were clearly expressed. The mathematical and graphical questions were challenging for a minority of candidates.

Candidates appeared to have had no problems completing the paper in the time available.

## Comments on specific questions

### Question 1

- (a) (i) Candidates suggested some advantages of developing small businesses. All the points on the mark scheme were seen.
- (ii) Candidates needed to look carefully at the map to be able to identify the benefits of the location of Oman. A scale was provided to allow candidates to estimate distances but very few candidates made use of the scale.
- (iii) Most candidates had some appreciation of the term “environmental impact assessment”. However often candidates found it difficult to express their ideas.
- (iv) Candidates who had taken note of the information given about Oman gave good answers for the supply of water and the generation of electricity. Unfortunately some candidates simply gave descriptions of HEP which was not practical in this location.
- (v) The calculations required to provide the answers were usually carried out successfully for sodium carbonate. There were fewer correct answers for caustic soda.
- (b) Most candidates made at least one good suggestion as to how to manage waste chemicals. Answers referring to treatment to make the chemicals less toxic and carefully constructed landfill gained full credit.
- (c) Most candidates provided sensible advantages of enlarging the port.

## Question 2

- (a) Good answers took careful account of the data provided and included good reasons why it was not possible to grow vegetables in fields. Comments such as “there is no rainfall in some months” were too vague to be given credit.
- (b)(i) The strongest candidates were able to explain clearly how evaporating water could cool plants in a greenhouse. Many candidates suggested, wrongly, that when the water condensed on the leaves it had a cooling effect.
- (ii) Candidates could gain full credit by either suggesting reasons why this system could be sustainable or might not be sustainable. This was a demanding questions but stronger candidates usually gained credit.
- (ii) Most candidates clearly identified either one or two health benefits of eating vegetables.

## Question 3

- (a)(i) Most candidates correctly identified the effect of increasing salinity on mass and length. However many candidates did not identify that there was no significant change in diameter.
- (ii) Only a minority of candidates clearly explained why the scientist divided the field into three plots. There were a large number of factors that could have been suggested as staying the same. This would allow a comparison to be made. Weaker answers suggested that it was convenient for the scientist to have plots next to each other.
- (iii) Most candidates correctly identified August and then gave a suitable reason for their choice.
- (iv) Nearly all candidates completed the table correctly.
- (v) Nearly all candidates completed the calculation correctly.
- (b)(i) Most graphs were completed correctly. There were some plotting errors and incomplete axis labels.
- (ii) Most candidates correctly selected **A** and **D** and then gave a sensible reason for their choice.
- (c)(i) Many candidates understood the need for a control and could explain its purpose.
- (ii) Candidates nearly always presented a table format. A significant number of candidates did not include a column for water only, so they could only be awarded a maximum of 2 marks.
- (iii) Most candidates gave very clear and orderly accounts of how to set up a dish of seeds for this experiment. However, some candidates failed to specify 10 seeds in the dish.
- (d)(ii) Stronger candidates gave good answers gaining full credit. Other candidates described the process of nitrogen fixation which did not answer the question.
- (ii) Candidates familiar with the role of seedbanks gained credit. Unfortunately some candidates confused this with an ordinary grain store against famine.
- (iii) Candidates who had some recall of different methods of plant breeding usually gained full credit.