ENVIRONMENTAL MANAGEMENT

Paper 5014/11

Paper 11

Key Messages

- Increase likelihood of answering the question set by reading each question more than once; by underlining key words, especially command words, the words which tell candidates what to do.
- Question instructions most frequently ignored were 'Explain why...' in **Question 5(a)(iv)**, 'Describe the evidence from the values and the graph ...' in **Question 5(c)(vii)** and in the second part of **Question 6(a)(iv)** 'explain why tropical rainforests are competitive communities'.
- The number of marks shown and the amount of space provided give a guide to the length of answer required, and candidates who exceed the space provided may be wasting time giving unnecessary or irrelevant detail. It is helpful if candidates confine their answers to the space provided. Sometimes, the need arises to cross out an answer to part of a question and replace it with a new answer elsewhere. If this is done, candidates should make a simple reference to the location of the new answer.
- Questions which suffered from limited candidate coverage in relation to number of marks available included **Questions 2(b)**, **5(a)(iv)**, **6(a)(iv)** and **6(d)(i)**. Each one was a four mark question to which many one and two mark answers were given due to narrow answers containing only one or two relevant points.

General Comments

In **Section A**, the least well answered individual questions were **Questions 1(a)(ii)**, **2(a)(iii)** and **4(a)(i)**. Consistently the best answered questions were **Questions 3(b)(ii)** and **3(c)** about commercial and subsistence farms. In general, candidates performed better when answering the short questions in **Section A** than the longer ones in **Section B**.

Pressure of time to complete this paper was not an issue. Conscientious candidates had time to look back and check their answers, and add to them if considered necessary, sometimes on the blank page. The question most frequently left unanswered was **Question 6(b)(i)**, by those candidates who did not understand the meaning of 'habitats'. Elsewhere, widespread familiarity with the topics examined was shown.

Most noticeable were the varying standards of performance on the same question between different candidates; questions answered well by some candidates in a Centre were answered equally badly by others in the same Centre. This meant that general patterns of performance were difficult to identify.

Some candidates made better use than others of the resources provided in the questions. Questions which required direct use of values from the graphs, such as **Question 2(a)(i)** and **(ii)** were much better answered than those which involved graph use and then explanation as in **Question 2(a)(iii)**. Virtually all the candidates' own line graphs drawn for **Question 5(c)(vi)** showed very clearly the dramatic decline in weight of breeding age tuna after 1995, after some years of fluctuating total weights. They showed it much better than the list of values used for plotting the graph. Many of the answers to **Question 5(c)(vii)** would have gained more credit if candidates had spent more time describing what their own graphs showed, instead of an over-reliance on merely repeating raw values. Information in the boxes about tuna fishing in the Mediterranean compared old and new fishing methods. The information provided the basis for answering **Questions 5(d)(i)**, **(ii)** and **(iii)**, but did not give the direct answers since all three questions required explanation, not description. In **Question 6(b)(ii)** candidates were asked to use the information given which meant that candidates who filled the spaces in the table with plant producers not referred to, sometimes from water as well as land, were introducing non-relevant content. A few candidates completed food webs for other biomes, notably savannah and tundra, using their own knowledge instead of the information given for rainforests.

Comments on Specific Questions

Section A

Question 1

(a)

(i) Some candidates understood the diagram fully and correctly identified each of the rocks. Others were unable to identify any of the rock types.

(ii) Most of the candidates found this challenging. Those who chose metamorphic, for example, justified their choice on the basis that the pressure needed to convert decomposed trees into coal with time was the same, and on the same scale, as that needed to create metamorphic rocks.

(b) The best answers came from those candidates who made clear selections of two individual rock types that are widely used in industry. Limestone and sandstone were often successful choices. Those who began with two from sedimentary, igneous and metamorphic struggled, even when they did include references to individual rocks, often basalt and granite. Uses known to candidates were restricted to building stone.

(c) Many answers began well, usually with references to environmental damage. The best answers came from those who looked for and covered a broader range of objections.

Question 2

(a)

(i) Almost all of the candidates were able to use the graphs to give the correct answer.

(ii) Again, use of the graphs to find the correct answer was done successfully by most candidates.

(iii) Candidates found it difficult to explain the high amount of infiltration in December due to much higher precipitation than evaporation.

(iv) The problem of dry soil, drought or insufficient soil moisture in June was almost universally recognised. Most candidates, however, only stated one reason for the problem, without giving another reason or elaborating more fully. In other words, they answered as if it was a two mark instead of a three mark question.

(b) A systematic approach to answering yielded the most credit here. Those who began with plants taking in water through their roots and followed this through to transpiration of moisture into the atmosphere through their leaves and stomata mostly gained full credit. Also relevant were references to interception of precipitation. As in the previous part, most answers were of the type required, but without sufficient detail for full credit to be awarded.

Question 3

(a) Both parts of this question were well answered.

(b)

(i) Again, this part was well answered.

(ii) This was the best answered individual question in **Section A**. Answers were characterised by references to a broad range of factors including fertilisers, machinery, higher yielding seeds and more widespread use of irrigation.

(c) Most candidates chose to write about commercial farming which opened up their answers to a wide range of possible environmental effects from overuse of fertilisers, pesticides, machinery and irrigation. A few made progress after choosing subsistence, especially if they answered in terms of increasing population pressure.

Question 4

(a)

(i) The essential characteristic of 'dry land farming' is farming without the use of irrigation water in dry areas with limited rainfall availability. In very few of the answers was this non-use of irrigation water directly stated or even hinted at.

(ii) Provided that the candidates concentrated on explaining how the methods conserved water by reducing evaporation and allowing surface and ground water levels to recover, they were able to earn more marks here.

(b) Most candidates clearly understood why the wall had been built. Those who also realised the importance of wind in drying out both plants and soil were the ones most likely to receive full credit.

(c) Candidates who understood that effects such as soil erosion and desertification were relevant received credit, whereas those who gave more general answers about loss of soil fertility gained little credit. There was a wide range in answer quality to this part.

Section B

Question 5

(a)

(i) Most candidates began well by shading in the gently sloping zone between the land and the continental slope.

(ii) Simple terms such as 'flatter' or 'more gently sloping' were awarded credit here. These were considered to be better than 'higher in the ocean', one of the common answers which was not credited. A few gained credit for stating the depth (below 200 metres).

(iii) Understanding was shown when candidates began to explain what happens along constructive plate boundaries.

(iv) Some of the answers lacked explanation. In extreme cases all the answer lines were filled by repeating question information and any further comment was largely confined to emphasising the existence of high productivity without giving any reasons for it. The question discriminated well between these candidates, and those who explained the advantages of shallowness and why nutrients are so plentiful on the continental shelf. The command words 'Explain why' were all important.

(v) Most candidates struggled to identify two factors here. Many managed to include some mention of great water depth among their general comments. Only some of the more able candidates described the problems of discovery in the deepest parts of the ocean and/or problems caused by increased distances from the shore.

(b)

(i) Accepting the answer of 75, irrespective of whether the unit (million tonnes) was given or not, allowed almost all to gain credit here.

(ii) The two human factors that were most clearly different were increased demand from population growth and improved fishing technology. Many gave both of these factors. Some answered entirely by reference to improved technology but were only awarded full credit when the nature and purpose of the improved technology were totally different, such as sonars for discovery and refrigerated factory ships for processing at sea.

(iii) Knowledge about El Nino was shown to be greater and more secure in answers here than on previous occasions when it has been examined. The periodic replacement of cold Peruvian current water by warm water from further west in the Pacific, and its effects on coastal fish resources, were widely understood and on occasions accurately explained in some detail. Less able candidates were often aware that changes in water temperature were responsible without having the understanding to explain this accurately or fully.

(iv) The best answers were given by candidates who began with a clear answer to the question posed. The choice of human factors was easier to explain, especially by candidates who used the El Nino example to show how natural changes are often temporary and balance out over time. Humans were stated as the ones increasing their presence through higher demand and increasing dominance due to improved technology.

(c) The various parts of this question were consistently the best answered on the paper.

(i) The most convincing answers came from candidates who understood that natural stocks are only sustainable when they can be replenished by young fish allowed to grow to maturity. Sustainability as a concept was so well understood among candidates that the majority were awarded at least partial credit.

(ii) The best answer was considered to be 25 % using the sectors for 'depleted or exhausted' and 'over-fished' from the pie graph. The alternative answer of 77 % from those candidates who also included the fully-fished was considered less good and awarded only partial credit.

(iii) The intention of this question was to make candidates look at the map before describing locations of breeding grounds in **(c)(iv)**.

(iv) The better answers included a description of a more general nature, such as a more southerly location off the coast of Africa, as well as closer detail about locations of some of the four separate areas.

(v) The exhausted breeding grounds gave the evidence needed and was used by the majority of candidates.

(vi) It was quicker and easier to draw a line graph than a bar graph but there were candidates who ignored the instruction to 'draw a line graph'. Most chose a sensible vertical scale based on large squares in the graph paper, which increased their chances of drawing an accurate graph.

(vii) Virtually all candidates correctly related decline in weight of tuna fish between 1970 and 2005 to its place in box **C**. How successfully a candidate completed the rest of the question depended upon further description from either graph or values (about half the candidates), and use of the graph and size of the differences between critical dates, notably the big decrease of 90 000 tonnes between 1995 and 2000 shown by the steepest gradient on the line graph (a minority of candidates).

(d)

(i) The weakest answers were from candidates who merely repeated information from the boxes without satisfying the needs of the command word 'Explain'. The best answers were given by candidates who used their own words to comment on the significance of the improvements in technology stated or suggested in the boxes, especially when written in the context of comparing old and new fishing methods.

(ii) The key to answering this part well was for candidates to realise that modern export-orientated large boats did not need to call at European ports, making it much more difficult for EU officials to check catches. A less convincing argument used by many candidates was that larger catch sizes made checking more difficult.

(iii) This was easier to answer when candidates approached it in a systematic way, by trying to explain separately 'industrial' (based on the scale or business orientation of modern operations) and 'fish farming' (based on feeding and fattening up the tuna in cages). The award of credit for the latter was more common than for the former.

Question 6

Among more able candidates, consistency of answering the various parts of **Question 6** was as high as it had been for **Question 5**. Maintaining consistency proved more difficult for less able candidates, with **(b)(i)**, **(d)(i)** and **(f)** providing the great challenges for them.

(a)

(i) A range of values was allowed here (46 to 52) and many candidates' answers lay within this range.

(ii) Some repeated their answers to **(a)(i)** here which showed that they did not understand the term 'canopy layer'.

(iii) Many knew buttress or above the surface roots. Less well known was the existence of shallow root systems below the surface. There were many long root answers which limited the credit awarded.

(iv) The vast majority of candidates showed that they understood the great competition for sunlight within tropical rainforest communities and related this to evidence in the diagram such as height of the tall trees, forest density and layer structure. Only a few completed the question set by referring to the hot, wet climate, thereby attempting to explain why these communities are so competitive.

(v) Niche was widely understood. References to lianas using the trees as support for reaching sunlight were awarded credit. Those who clearly recognised that the creepers did this while their roots were anchored in the ground (and that they are therefore not parasitic plants) received further credit.

(b)

(i) A proportion of candidates did not understand the term 'habitat'. In some cases this was the only question that was left unattempted. A few candidates deserted the tropical rainforest and began to compare it either with the savannah, or to compare savannah with another biome such as tundra. Most successful were those candidates who began by identifying two habitats within the rainforest, often forest canopy and forest floor. Then all that a candidate needed to do was to use the diagram and information provided to relate species, food and habitat. The diagram could be used to its maximum.

(ii) Provided that candidates obeyed the question instruction to use the information given, the diagram could be used to do most of the work. Inserting fruit, berries and leaves in the box for producers was better than trees, grasses and flowers, because they came from the source. Fewer less acceptable answers were seen in the boxes for primary and secondary consumers, even if some candidates placed tapir instead of jaguar or snakes in the secondary consumers box. Further credit was available for candidates who drew arrows to link producers and consumers, as is customary in food web diagrams. Only a minority of candidates attempted to do this.

(iii) This was well answered in general. References to humans as omnivores, however stated, and to higher levels of technology were common.

(iv) The expected and most frequent answer was 'decomposers'. Even so a significant minority gave the answer 'primary producers'.

(c)

(i) Some tried to answer this directly from the diagram which led to many suggesting 'plate movements'. The theory is continental drift (the older term) or plate tectonics.

(ii) A majority of candidates correctly referred to the collision and destruction of the plate boundary as the Indian plate moved northwards. Mention of fold mountains was usually a confirmation of good candidate understanding. Some other candidates tried to answer in relation to a constructive plate boundary. Many did this irrespective of whether constructive boundary had been referred to in the first part of **Question 5**, which suggested a limited understanding of plate tectonics. In turn this made it difficult for them to apply any knowledge they had to particular situations.

(d)

(i) The question was more about loss of biodiversity than loss of forests. Candidates who recognised this gave the best answers. They were the ones more likely to focus upon the uniqueness of many of Madagascar's diverse species, which was the theme in the information provided at the start of **(d)**. They were also the ones most likely to explain its importance to people as potential sources of medicines and as a gene pool for crops. Much of the content given by other candidates, who focused on rainforest clearance, overlapped with later parts of the question.

(ii) Among the three organisations named, it soon became clear that the activities of WWF were better than known than those of CITES, while only a small percentage of candidates selected IUCN. Candidates in the latter group gave the least information. The quickest route to gaining full credit was for candidates to include something specific in their answers about the chosen organisation's work. The work of WWF, for example providing funds for pandas in China or for tiger survival in India, was referred to most.

(e)

(i) The environmental importance of ecotourism was better known and more widely appreciated than its social role in considering the needs, and maintaining the culture and traditions, of local communities.

(ii) The better answers came from candidates who recognised the importance of an income for local people so that illegal activities such as hunting and poaching decreased. Having the local communities on board greatly increases the chances that any official measures of protection, such as National Parks and Forest Reserves, will be successful in preserving forests and the species within them.

(f)

(i) In general candidates gave good answers to this part, especially those who realised that their knowledge of photosynthesis and greenhouse effect was relevant to the question. Some answers were more at the local than global scale, about the hydrological cycle and amounts of precipitation, which could also be made relevant to the question. It was rare for the answer to receive no credit.

(ii) The advantage referred to most was income and the most commonly mentioned disadvantage was continued forest clearances (either illegal or allowed) despite receiving the money. Few candidates were sufficiently confident in answering to give the full and balanced response needed for a full credit answer.

ENVIRONMENTAL MANAGEMENT

Paper 5014/12

Paper 1

Key Messages

- Only short answers are expected to the questions in **Section A**. Candidates should make the essential points succinctly and then move on to the next question. Beware of extending answers beyond the lines left for answering. This increased the chances of candidates rushing **Question 6** and not answering it in the same detail as earlier answers, or even missing out answers to some parts altogether.

- Likewise control the length of answers given to **Question 5**. Candidates can go back and add more once they have finished all of **Question 6** if they have time to spare.

- Increase likelihood of answering the question set by reading each question more than once; by underlining key words, especially command words, the words which tell candidates what to do.

- Focus on what the question is asking. **Question 4(a)(i)** required description from the photograph. In **Question 5(d)(i)** the question focus was 'methods used to reduce the risk of buildings collapsing', not earthquake drills and preparation of emergency services. In **Question 6(e)(i)** 'physical conditions' for dam building, not human reasons, was the question focus.

- Apply your knowledge, and comment according to the question theme. Some candidates did not pay as much attention as they should have done to 'great loss of life' in **Question 5(b)(ii)** and to 'people living in the area' in **Question 6(e)(ii)**. Instead they gave more general answers about earthquake damage in the former, and about environmental and economic disadvantages of dam building in the latter.

- Take careful note of the number of marks for the question. For three, four and five mark questions it is highly likely that a variety of points need to be made, or details about an example given, instead of just repeating one idea.

- Refer to relevant examples to illustrate the general points you are making, even if the question does not ask this. Candidates will gain credit for doing so because this reinforces the points being made.

- In this examination, some candidates made relevant and effective passing references to examples of ocean currents carrying nutrients in **Question 2(a)**, to earthquakes they had studied such as Bam and Kobe in **Question 5(b)(ii)** and to the Three Gorges Dam in **Question 6(e)(ii)**, which increased the worth of their answers.

General Comments

A few able candidates (and sometimes very able candidates) did not complete the paper when it was obvious from the consistent quality of all their earlier answers that they would have been able to answer the remaining questions. Time management on this paper is needed, which is why it is stated as the first key message. At the same time, there were even more examples of candidates completing all the questions and regularly extending their answers beyond the lines left for answering. Candidates work and write at different speeds. Nevertheless, it would be a good guide rule for all candidates on this paper not to extend their answers until they have completed all the questions, and then to go back and extend where they feel they could or needed to. As a general rule the first one or two marking points for a question are easier to receive credit for than any further marking points.

Candidates seemed to be comfortable with the topics covered and many had been very well prepared to answer the topics examined and questions set. Some candidates found the various parts of **Question 6(c)** the most testing questions on the paper as they struggled to apply any knowledge they had of underground

water stores to these examples. **Questions 5(b)(i)** and **(ii)** were consistently the best answered questions on the paper.

Comments on Specific Questions

Section A

Question 1

(a)

(i) A description such as 'larger with depth', 'increased size' or any similar alternative, was all that was needed for credit to be awarded. Even so, quite a few candidates repeated the word 'change' from the question without stating what the change was.

(ii) Layer 4 was the correct answer here and this was the layer most frequently selected.

(iii) The rock is the source of the particles. A significant number of candidates incorrectly tried to use the vegetation label in the diagram as the basis for their answers.

(iv) Instead of explaining the changes in particle size as stated in the question, many candidates described them. Reference to weathering in the answer was good, as it indicated that the candidate was indeed trying to explain.

(v) Candidates tended to find answering this part either easy or difficult, with few in between. There were some candidates who tried to give definitions of each one, without actually answering the question, such as 'this is the amount of space in the soil' for pore space.

(b) The two most common valid answers were soil drainage and mixing with sand. Many gave one without the other or did not elaborate upon their choice. Incorrect references to irrigation were not uncommon.

Question 2

(a) In general, this was well answered. Most candidates referred to the continental shelf and explained in terms of its advantages for both available light and nutrients. In the better answers, the sources of the nutrients were identified as well.

(b) Answers within the range of 42 to 44 per cent were accepted.

(c) A number of candidates produced a lot of calculations but did not always produce the easily worked out answer of 70 % in **(i)**. The position of the decimal point was a problem for a few, while others merely stated 7.0 as given in the table for tonnage instead of giving the answer as a percentage. The purpose of the three short questions in **(b)**, **(c)(i)** and **(c)(ii)** was to make candidates aware of the scale of the bycatch problem, to provide them with greater perspective before answering **(d)**.

(d) Most candidates appreciated the wasteful and non-sustainable nature of bycatch. Even greater understanding was shown by those candidates who recognised its likely adverse effects on future fishing stocks and preservation of endangered species. Candidates showed a greater familiarity with this topic than they had with soils in the previous question.

Question 3

Across the ability range, this was consistently the best answered of the four questions in this section, helped by the detail that most candidates were able to find for the last part of the question.

(a)

(i) West was the only compass direction accepted. East and north-west were the most commonly given incorrect answers; the former was easier to understand than the latter.

(ii) Answers between 800 and 900 kilometres were accepted. Incorrect answers tended to give distances higher than this and it appeared that candidates were following the expected path shown by the line, instead of going from the leading cloud edge to the south eastern corner

of Luzon. Among less able candidates, 600 kilometres was a frequently given answer, which coincided with the limit of the scale line drawn on the map.

(iii) Some comment on the overall pattern of cloud, as well as finer details, improved the quality of answers here.

(iv) A greater level of understanding was necessary to answer this effectively. Only a minority clearly and unambiguously stated low pressure, and explained it in terms of air rising due to very warm sea surfaces.

(b) This was well answered, particularly the advice section, which in most answers was given more attention than weather warnings. Indeed some candidates did not specifically state any weather warnings but partial credit was awarded if they were inferred. Otherwise, plentiful advice was given, and in most answers a range of advice, about not going out to sea, boarding up windows, evacuating to hurricane shelters, stocking up on essentials and listening to the radio.

Question 4

This was the question that more able candidates consistently answered best. Many of the less able candidates could only make one or two relevant points in each part.

(a)

(i) As always with photograph based questions, it was how carefully candidates looked at the photograph and described what could be seen that determined how well they answered this part. They were given a clear focus on differences, but many only stated the major difference in variety of vegetation present between the foreground and the background without giving any further description. They did not look for other differences or they drifted into describing features of either tropical rainforests or coniferous forests using knowledge instead of photographic evidence.

(ii) Soil erosion formed the basis to most answers. How well this was explained in terms of bare ground, less vegetation interception, lack of roots to bind soil together, and reduced nutrient cycling determined the credit awarded.

(b) This had the widest range in terms of quality of response. Replanting was the method most commonly referred to. In better answers, a wider range of methods were described, including selective logging, agro-forestry and community forestry, all supported by active management and monitoring. From some candidates, their breadth of coverage was impressive.

Section B

Question 5

Candidates showed good familiarity with the tectonic related topics. Able candidates maintained high standards of performance throughout. Others included some weaker answers, caused most often either by not focusing well on the needs of the question, or by not looking for a sufficiently wide range of relevant points for the number of marks available.

(a)

(i) The answer that showed the greatest understanding here was for the whole north to south length of the constructive plate boundary within the Atlantic Ocean to be shaded in. Some candidates merely shaded in the areas where the direction arrows are shown, which was not awarded credit.

(ii) The best answer, and the one that was easiest to explain, was ‘north of Africa’. References to destructive plate boundaries, and what happens there, received credit. Those who chose the west of Africa struggled to give as convincing an explanation, and any credit awarded was usually for comments about the general relationships between plate boundaries and the occurrence of earthquakes.

(iii) Good knowledge about what happens at a constructive plate boundary was shown here.

(b)

(i) The best way to answer this part was for candidates to look for three different pieces of evidence on the map. The majority did this, but even those who only mentioned two pieces of evidence were able to gain full credit by commenting further on the significance of the evidence.

(ii) Many candidates made wide references to causes of death and while doing so, showed good knowledge of both primary and secondary effects of earthquakes. Some candidates concentrated too much on describing the nature of the damage caused, instead of how the damage led to loss of life.

(c)

(i) Answers needed to be precise in order to gain credit here. The north-south and east-west fault lines were shown on the map to cross near L'Aquila. It is to this that candidates needed to refer. More general answers about being close to two fault lines or near to previous earthquakes were not detailed enough.

(ii) Candidates who began by stating where the damage to buildings was greatest (in the old centre) often went on to receive full credit. Others who did not state a location tended to give answers that were too general in nature.

(iii) Answers here suggested that the role of sniffer dogs was the better understood of the two. There seemed to be a strong positive relationship between candidates mentioning the spread of water related diseases in their answers to **(b)(ii)**, and appreciating the reasons for the provision of chemical toilets. The most frequent incorrect suggestion was that they provided shelter for the homeless.

(iv) This part was well answered by many. The best answers were those that described the damage to buildings as might be expected in a developing country, but then explained why the responses were more like those of a developed country. These answers showed great understanding, even more so when damage was compared with that from another earthquake which they had studied, providing an even better context. Candidates who tried to argue that the effect and responses were more like those of a developing country throughout, gave answers which were much less convincing. The weakest answers came from those candidates who did not make clear whether the responses were more like those of a developed or a developing country, or who merely repeated information given without comment. A few left this part unanswered, despite answering all the other parts of the question.

(d)

(i) The key to answering this part well was for candidates to focus on methods to make buildings earthquake proof. Those who broadened their answers to include all measures to reduce earthquake deaths often filled all the answer lines without having described a relevant construction method.

(ii) Breadth of answering was the main determinant of answer quality here. The source materials offered plentiful evidence about why many buildings in L'Aquila were not earthquake proof. Other relevant comments often seen were about the damage that can be caused, even to well-built structures, by very strong earthquakes and repeated after-shocks, as well as references to land-use zoning.

(iii) Candidates who were brave enough to stick with pre-existing knowledge that earthquakes cannot be predicted, despite the geologist's message in the speech bubbles, gave the most convincing answers here. Only simple explanation was needed once candidates had demonstrated their understanding.

(e)

(i) Precision in answering was important here. Answers which relied heavily on noting the presence of minerals, without making clear whether this referred to added soil fertility or to economic use, gained little credit. Candidates who concentrated on economic activities in volcanic areas, such as fertile soils for farming, sulfur deposits, tourism and geothermal power were more likely to be awarded full credit. In a few cases, the entire answer was about volcanoes giving warning signs before erupting, so that people had time to move

away. However, this line of answering doesn't explain why large numbers of people can live there in the first place. Without the possibilities of making a living, no one would live there, irrespective of whether it was considered safe or not.

(ii) Answers showed that warning signs were well known, the most common references being to smoke, gases and small earthquake shocks. A few answers went too far, mentioning ash and lava, more indicative of an eruption than a warning sign, and credit was not awarded.

(f)

(i) Candidates understood well the issues raised here and in general, answers were fuller than those for **(ii)**, helped by the simpler need only to identify disadvantages. Logistics, cost and waste of money, time and effort were the frequently listed disadvantages of policy **A**. Stating the disadvantages of policy **B** was done most strongly when candidates included details about how and why people's lives are at risk during major volcanic eruptions.

(ii) The weakest answers were from those who did not express an opinion, making meaningful explanation impossible. The strongest answers came from those who supported their view with broader comment about preparations for reducing losses from natural disasters, and why they are more likely to be done in more developed countries than in developing countries.

Question 6

(a)

(i) Many candidates calculated the number of degrees for each sector. This was not an essential requirement, since the percentages given in the boxes could have been used directly in association with the circle markers at 20 % intervals. Accurately drawn pie graphs dominated. A few candidates began at 12 o'clock, and drew all three sectors from this starting point, leaving 30 % of the circle empty. A few others completed the pie graph correctly without completing the key for sectors.

(ii) The best way to show 626 in the pictograph was full shading in six of the figures and part shading in the seventh. More than half of the candidates did this correctly. Some of the others missed this question out.

(b)

(i) Some candidates did no more than repeat percentages from the table, without any comment. Others showed good technique by selecting and stating a key difference between continents, such as agriculture and industry as different main water uses, and then supporting their answers by selecting two or three percentages for illustration. Some candidates added up total percentages for different uses for each of developed and developing continents, which was another valid technique for answering, particularly when the totals were converted into average values to allow for the different numbers of developing and developed continents in the table.

(ii) Similar techniques worked for providing answers here as well.

(iii) Partial credit was usually awarded here for comment about lack of industry due to limited economic development, and thus the continued dominance of agriculture. Only those who looked for other reasons for agricultural importance in developing countries, such as feeding growing populations and earning export income, gained further credit. Only a few considered why so much irrigation water was needed, for example for dry seasons, deserts and droughts, which was another valid line of answering.

(c)

(i) Some candidates missed this part out. Of those who shaded in the diagrams, some did not understand and shaded in all types of rock. Others partly understood by confining their shading to the permeable rocks without either limiting it to the layers below the water table or filling in the layers of both sandstone and limestone. A number of candidates confined their shading to the layers below the water table and shaded in both sandstone and limestone layers. The more complete and accurate the answer here, the greater the chance of an accurate and well developed answer to **(c)(ii)**.

(ii) The strongest answers included references to the arrangement of permeable and impermeable rocks, as well as to rock structure (downfolds and sloping rocks) with permeable rocks outcropping on the land surface. There were exceptions to the general relationship and it was clear that some candidates were much more comfortable with written explanation than with diagrams. Some of them were able to use their knowledge about the formation of underground water stores to gain partial credit even though they were unable to apply their knowledge to these particular examples.

(iii) The most convincing answers were given by candidates who specified rainwater as the source and who understood that outcrops of impermeable rock lead to runoff over the surface and not infiltration into the ground.

(iv) A lot of candidates realised that the wells tap into the deepest water, without being able to explain the full significance of this in terms of a reliable water supply should water levels fall.

(d)

(i) The majority measured how much the water had dropped and almost invariably arrived at the correct answer of 25 metres. Some incorrectly measured other things, such as difference in well depth.

(ii) Provided that candidates did more than merely repeat word for word what was written in the introductory question information, explanations for greater cost due to greater depth often gained full credit. Those who had measured the difference in the depths of the old and new wells as about 40 metres in the previous question were able to gain some credit for their measurement if repeated again.

(iii) The choice of unsustainable was much easier to defend in this example, because of all the evidence for needing to go deeper and deeper to obtain water, a sure sign that water use is exceeding water replenishment. Attempts to support the minority choice of sustainable were usually written in a more general way, not well related to this example. Occasionally it was possible to reward well-argued sustainable answers with partial credit.

(e)

(i) Candidates who focused on the question theme of physical conditions needed for dam building gave the best (and often the shortest) answers. Relief, climate and river features were all referred to in many answers. In answers where candidate expression was less precise, such as mountainous areas, valleys, rainfall and rivers with little use of adjectives, it was often possible to give partial credit for conveying at least a general impression of the physical conditions needed. The main problem for most candidates was focusing on physical conditions. Most candidates gave human factors for part or much of their answers, mentioning in particular huge sums of money and low population density in the area where the dam was going to be built.

(ii) Some candidates repeated their answers to **(i)** here. Answers were often more about the general disadvantages of building large dams, which were well known, instead of the particular disadvantages in relation to local people living in the area. Answers entirely focused on people losing their homes, livelihoods and good farmland to face an uncertain future were rare. Most commonly mentioned was the destruction of natural vegetation and wildlife habitats, relevant to this question only when referred to in terms of loss of income or livelihoods for local inhabitants, and not broader environmental concerns.

(iii) The full range of answer quality was seen here. Some candidates managed to put together powerful answers about India's looming water crisis by combining, inter-relating and commenting on information in the table. In the best answers, lower than average water resources was used in combination with high and increasing total population, in order to show how already high demands for water in agriculture would increase to feed more people and bring on the water crisis. Weaker candidates answered by isolating separated pieces of information, such as population increase or high water demands of agriculture. The weakest candidates merely repeated information from the table without attempting to comment on its significance for the question.

(vi) A wide variety of suggestions were made for reducing water use. The most common suggestions, which best matched syllabus content, were use of irrigation methods such as trickle drip and clay pot as less wasteful users of water, and use of crops needing less water such as new GM drought resistant varieties. Also in the syllabus is dry farming, referred to by only a few, indicating that this was less widely known and understood. Other suggestions were marked on their merits. Some breadth was needed for full credit to be awarded; reference to at least two different ways was needed. This was not a problem as most candidates did look for more than one way in this question.

ENVIRONMENTAL MANAGEMENT

Paper 5014/21

Alternative to Coursework

Key message

Centres should work through past papers to help candidates see how to make the best use of the information given for each question.

General Comments

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

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

Comments on Specific Questions

Question 1

(a)

(i) Many candidates correctly identified a nutrient found in fish and rice. Only specific vitamins or minerals were given credit.

(ii) Many candidates did not seem to fully appreciate the advantage of this crop growing so fast that it would survive changes of water level, and yield an earlier harvest. There was a tendency for candidates to repeat the question as their answer.

(iii) The tables were nearly all clearly drawn with appropriate headings, although a small number of candidates did not produce a table that could be used to record the data for seven days.

(iv) Most candidates managed to make a sensible statement about the advantage of using several samples. References to precision or accuracy were inappropriate here.

(b)

(i) The additional measurements the candidates could have suggested were mostly very clearly stated and all the alternatives on the mark scheme were seen.

(ii) The idea that the samples of fish should be taken in exactly the same way each time was only expressed by a small number of candidates, as was the idea of comparing catches over a long time period. Many suggested taking more samples but often this was over a very short time period, either a few days or a week. The Examiners were looking for references to time periods longer than this.

(c)

(i)(ii) A significant number of candidates stated their answers the wrong way around. The data in the table had enough pointers to select **A** and then **C** as the correct answers.

(iii) This question was well answered by most candidates. They often appreciated that with population growth overfishing would be possible. Disease and pollution were also often given as valid additional points.

(d) Many candidates worked out the logical consequences of fish clearance by electrofishing. Very few breeding stock would be left and the food chains would be altered. Many fish would go to waste.

(e)

(i) Control of fishing was very well understood by most candidates with all the alternative marking points regularly seen.

(ii) Most candidates expressed the view that the entry onto the red list would help to conserve the species, quoting the reasons given in the mark scheme. A minority gave well-argued reasons why it would not help the species and these answers usually gained maximum credit.

(f) This question required candidates to assess the relative merits of two alternative schemes to dam a river. Most used the information given to clearly identify the advantages of each scheme.

Question 2

(a)

(i) Most candidates selected **C** and **B** as correct answers and showed correct working to support at least one of their answers.

(ii) The vast majority of graphs were clearly plotted without errors. A small number of graphs did not have clear labels on both axes.

(iii) Candidates could have given either 2005 or 2008 as a correct answer for the year in which the trees reached maturity. Answers that gave two years such as 2008 and 2010 were not given credit.

(iv) Nearly all of the candidates correctly arrived at the first part of the calculation, 26.25. However, only a small number went on to multiply this number by ten to give the final value. This suggests that in most cases the candidates had not read the question carefully enough.

(b)

(i) Most candidates gained full credit here for referring to a hot and wet climate.

(ii) Knowledge of the role of mosquitoes in spreading malaria was seen in nearly all answers. Some statements, however, lacked the clarity needed to gain maximum credit.

(iii) There were a large number of very good answers gaining full credit. The Examiners were pleased to see that candidates had a good knowledge of methods of malaria prevention.

Question 3

(a)

(i) Careful reading of the table of climatic information ensured that many candidates gained credit. However, some candidates incorrectly stated just a single month suggesting that insufficient attention had been given to the information provided. There were a few examples of candidates highlighting parts of the table that they had worked out must be the best answer. This practice is to be encouraged.

(ii) Three relevant jobs were required to gain full credit and a wide range of sensible suggestions were seen. There were some instances of two stated jobs being so similar that credit could not be given. Answers with fewer than three jobs were also seen.

(b)

(i) Nearly all the candidates presented three further questions to extend the questionnaire and their layout often gained credit. At least one of the questions had to have more than two alternative answers. In a minority of cases two questions were of such a similar nature that they could not both be credited.

(ii) This question asked candidates to think carefully about future developments they would allow and those developments that would be better restricted or banned. Nearly all of the candidates understood the nature of the question and gained most of the credit available. There were instances of candidates presenting a list of ideas with insufficient explanation to gain maximum credit. Overall this question was well answered.

ENVIRONMENTAL MANAGEMENT

Paper 5014/22

Alternative to Coursework

Key Message

Centres should work through past papers to help candidates see how to make the best use of the information given for each question.

General Comments

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

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

Comments on Specific Questions

Question 1

(a)

(i) Many candidates correctly identified the apparatus as a rain gauge.

(ii) Candidates who only plotted one of the variables correctly gained credit for this. There were a good number of completely correct graphs with the axes fully labelled.

(iii) Most candidates gave a clear description of the relationship. Stronger answers included a reference to appropriate figures.

(iv) The correct answer of 75 % was given by the majority of candidates.

(v) The table was completed successfully by most of the candidates. A small number of candidates did not attempt this question.

(b)

(i) This question required the candidates to think of possible disadvantages of growing two crops. There was a wide range of sensible answers that gained credit. In some cases only one idea was expressed. Candidates should look at the mark allocation for a question as an indication of the number of points that are required.

(ii) The ideas suggested for the advantages of diversity on a farm were very sensible and most candidates gained credit here.

(iii) Crop rotation was mentioned or described by some candidates. These candidates had realised that this is one of the best ways to maintain productivity on a farm.

(iv) A number of candidates realised that planting a few trees each year would maintain production of cloves as well as providing a supply of firewood. Candidates who just suggested that the new trees would increase production every year were not given credit as they had missed the point.

Question 2

(a)

(i) Most candidates realised that the fish sample had to be selected at random. There were answers suggesting that specific sizes or ages of fish should be selected, but this could not have been the method used to obtain the data in the table.

(ii) The information provided was used by many candidates to identify snapper as the fish most affected by fishing activity, and sensible reasons were given for this choice. A minority of candidates just named the fish that was smallest to start with which was an incorrect approach to the question being asked.

(iii) This question proved to be demanding as very few candidates seemed to appreciate that fish could have moved from one area to another as an explanation for the longer than average fish. A measuring or recording error was actually the most likely explanation but this was rarely given.

(iv) Nearly all of the candidates realised that the specifications of fishing net construction were important here. Many only stated one idea, but there were good examples of further details such as the shape or size of the holes in the mesh being used.

(v) This was a challenging question. Most candidates wanted to record more aspects of the fish being caught, whereas a better extension of the research would have been to record the same variable and to repeat the sampling in the same way over a longer time and in other areas, such as around another island. Very few candidates gained full credit.

(b)

(i) The majority of candidates correctly re-ordered the given statements.

(ii) Almost all of the candidates drew suitable tables and the majority used the length of the fish as one of the headings. Many gained full credit.

(iii) The changes brought about by overfishing were usually well understood. The fact that there were very few fish left to breed, and that even small fish were being removed before they had been able to breed, were ideas that were frequently explored. Changes in the food chain were suggested less frequently, but where they were, a good example of predator prey relationship was often described.

Question 3

(a)

(i) Nearly all of the candidates realised that tourism would be encouraged.

(ii) Candidates did not always seem to regard collecting seed as the starting point for production of 20 000 new trees. A minority described tree growth in general terms without answering the question.

(iii) Some candidates made a range of sensible suggestions as to how to assess the performance of the newly planted trees over time. A minority just discussed the growth of trees without specifically addressing the question.

(b)

(i) With few exceptions, the brief of drawing one road and three paths was carried out successfully. Nearly all the additions were in a logical place on the base map and helpful keys were often given.

(ii) A wide range of sensible improvements were suggested and supporting reasons were usually given. Most candidates scored highly on this question.

(c)

(i) Nearly all of the candidates presented three further questions to extend the questionnaire and many gained credit for their layout. At least one of the questions had to have more than two alternative answers. In a minority of cases two questions were of such a similar nature that they could not both be credited.

(ii) Many candidates did not seem to be very familiar with methods of processing information from questionnaires. The requirement here was to count up each type of response and then express this as a percentage. As an alternative, some candidates suggested plotting a pie chart for which credit was given.

(d)

(i) All of the marking points were seen although a minority of answers were not clearly stated.

(ii) Nearly all of the candidates gave good answers and referred to raising the standard of living for the island population.