

A LEVEL

Examiners' report

GEOGRAPHY

H481

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Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates. The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report. A full copy of the question paper can be downloaded from OCR.



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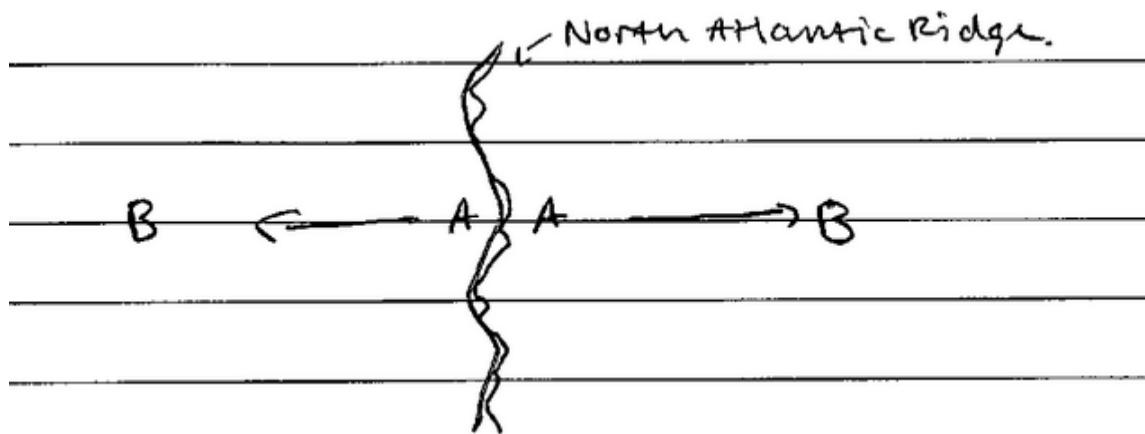
Paper 3 series overview

This second paper of the reformed A Level specification generated a wide range in quality of answers with responses to all optional questions. In terms of popularity among the options, Hazardous environments was chosen by about ninety per cent of the entry. Just over half of the candidates selected Disease dilemmas, nearly thirty per cent Climate change with the remaining answers split more or less evenly between Exploring oceans and Future of food.

Among the upper quartile of candidates, answers across an individual paper were authoritative as regards geographical content and focused in the content's application to the particular question. In particular in Section C, essays were analytical and evaluative. Candidates not achieving this upper level tended to have less secure grasp of the geography and struggled to apply the knowledge and understanding they did possess to the actual question. Candidates in the lower quartile were quite often characterised by an uneven performance across the eight questions making up a complete paper. In some cases this was clearly the result of poor time management while others suggested that their revision efforts had been disproportionately applied across the two Options they had studied.

	AfL	<p>There is a paucity of sketch maps and diagrams which is often to the detriment of the quality of description and explanation. Candidates should be encouraged to employ these throughout the course and to learn how to make effective use under timed conditions. Exemplar 1 below from a response to Q5b highlights how a few simple lines and labels can convey knowledge and understanding (in this case of the process of sea floor spreading and palaeomagnetism) and thereby lifting an answer.</p>
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Exemplar 1



A couple of practical issues made for considerable difficulties for examiners. When additional

answer booklets were used, it was not always clear as to where a question continued due to the absence of clear labelling by the candidate as to which question they were answering. Candidates should be reminded that organisation of their answer booklet, such as clear labelling, is their responsibility.

The second issue once again was illegible handwriting from a significant number of candidates resulting in examiners being unable to decipher individual words, nor make sense of phrases and / or whole sentences. Candidates are therefore, placing themselves at a considerable disadvantage by this failure to communicate clearly.

Section A overview

The two sub-parts in each Option in this Section test different Assessment Objectives (AO). Sub-part (a) assessed, geographical skills (AO3) whereas sub-part (b) assessed, knowledge and understanding (AO1). The former sub-part is best answered using three concise statements that express limitations of the resource as regards it being a source of information concerning the particular focus in the question. There were too many candidates who wrote at length, offering description and even explanation of the particular topic.

Sub-part (b) uses the command word 'Explain' and it is important that responses demonstrate knowledge and understanding through focused explanation. Extensive descriptive narratives are unhelpful here.

Question 1 (a)

Topic 3.1 – Climate Change

1 (a) Identify three limitations of Fig. 1 as a source of information about greenhouse and icehouse conditions. [3]

The figure was a table showing geological periods and ice ages. Most candidates identified the absence of any time scale as a limitation along with the incomplete nature of the table as regards icehouse and greenhouse conditions previously existing. Other limitations commonly offered concerned the severity and spatial extent of icehouse and / or greenhouse conditions.

Question 1 (b)

(b) Explain methods used to reconstruct past climate. [6]

The majority of responses offered ice core examination as one method. Those able to explain the analysis of gases released from the ice as indicating climate changes were convincing. Evidence from pollen analysis and fossils were also often quoted. Many candidates chose tree ring analysis as a method with the majority able to explain the relationship between width of tree ring and climate change as Exemplar 2 highlights. This candidate displays thorough knowledge and understanding of how tree ring analysis can aid in the reconstruction of past climates.

Examiners were especially pleased to come across candidates who recognised that different methods offered insights into different time scales of climate change, ice cores hundreds of thousands of years, tree rings shorter timescales measured in hundreds of years.

Exemplar 2

One way to gather evidence to try and establish past climate is to study tree rings, this shows each year of growth and the rate of which the tree grows helps to determine the temperature in that area because trees grow less in a colder climate, therefore if the distance between the tree rings were small for a period of years it would suggest that there were colder temperatures during that period of time.

Question 2 (a)

Topic 3.2 – Disease Dilemmas

2 (a) Identify three limitations of Fig. 2 as a source of information about direct strategies to mitigate against an epidemic of a contagious disease. [3]

Limitations of the photograph showing a warning sign against an infectious disease outside an African village focused on the narrow perspective such a resource offers. More successful responses drew on candidate's knowledge and understanding of the care with which one has to use such informal representations. For example, how representative is the image of direct strategies, who took the photograph and for what purpose? The effectiveness of the sign as a direct strategy was questioned, for example by reference to literacy levels, that the sign was written in English and that there was no actual physical barrier preventing people leaving or entering the location.

Question 2 (b)

(b) Explain the role of an international organisation in providing global strategies to combat disease. [6]

Most candidates wrote at least 'reasonable' responses explaining the role of an organisation such as the World Health Organisation, Red Cross and major pharmaceutical companies such as GlaxoSmithKline. The key element of convincing responses was the extent to which they focused on functions that help combat disease such as research into treatments, collection and dissemination of health data, issuing predictions of disease outbreaks and helping manage outbreaks.

Question 3 (a)

Topic 3.3 – Exploring Oceans

3 (a) Identify three limitations of **Fig. 3** as a source of information about radioactive pollution. [3]

Candidates were generally effective when identifying limitations of the bar graph showing radioactivity in the Northern Baltic Sea. They tended to focus on sampling issues such as what was the depth at which the readings were taken, time of year, had there been change over time in the reliability and or accuracy of the instruments and more precise locational information.

Question 3 (b)

(b) Explain horizontal and vertical variations in temperature in the world's oceans. [6]

Most candidates had a 'reasonable' grasp of how and why temperature varies in the oceans but few wrote in a 'thorough' manner. Explanations of variations in solar insolation input between low and high latitudes (angle of insolation) or the role warm and cold ocean currents play were only rarely written with authority. Most candidates were aware of the thermocline but few could link its existence to the depth of water sunlight is able to penetrate and the energy transfer from sunlight to water molecules.

Question 4 (a)

Topic 3.4 – Future of Food

4 (a) Identify three limitations of **Fig. 4** as a source of information about food security in Somalia. [3]

A choropleth map of Somalia was the resource to be assessed. The majority of candidates identified appropriate limitations such as the qualitative nature of the terms describing the five categories of food security, the time of year the data refer to and the 'cliff-edge' nature of the shading regime. In addition the possibility of variation within an area designated in a single category was frequently cited.

Question 4 (b)

(b) Explain how feeding the world is a complex system.

[6]

Candidates who picked up on the word 'system' in the question tended to be more successful than those that did not. They identified complexities relating to inputs such as physical and economic variations and outputs that did not always offer food security in the locations they originated from. The increased globalisation of the global food system was often remarked on as adding complexity such as the availability of food stuffs in AC locations when the foods were 'out of season' locally. Exemplar 3, an extract from a candidate response demonstrates an effective approach to the question, aided by its real world setting.

Exemplar 3

which adds complexity to the process. Sainsbury's bananas for example are harvested in Ecuador, then shipped and stored in the midland England - and then distributed via thousands of lorries across the UK. Shippments

Question 5 (a)

Topic 3.5 – Hazardous Earth

5 (a) Identify three limitations of Fig. 5 as a source of information about earthquakes occurring in Iran. [3]

The vast majority of responses contained three appropriate limitations. Frequently cited were the absence of magnitude data, the difficulty of reading from the y axis with its intervals of 50 (number of earthquakes) and the three yearly nature of the x axis. The lack of locational data and changes in reliability and or accuracy of recording earthquakes over time also appeared in many responses.

Question 5 (b)

(b) Explain the evidence for sea-floor spreading.

[6]

This particular sub-part highlights the need to 'explain' and not simply 'describe' the process in question. Those who could link the formation of the symmetrical pattern of alternating stripes of polarity on either side of a mid-oceanic ridge to sea floor spreading tended to climb readily into Level 3, especially when combined with another factor such as variations in the age of sea floor sediments across ocean basins. Other factors quoted by candidates included the fit in outline shape of the continents, the distribution of similar age glacial features in different continents, fossil evidence from different continents and the 'slab pull' process at subduction zones helping energise sea floor spreading.

Section B overview

In this Section, the one question in each Option links some aspect of the content of that Option with an element of the course from one of the compulsory topics in either landscape Systems, Earth's Life Support Systems, Changing Spaces; Making Places or Global Connections.

While there was a full range in the quality of responses written in this Section, many candidates found the demands of the command words used, namely 'Examine' or 'Assess' a challenge. The crucial task for candidates is to examine or assess the affect, impact or influence of something by another factor. It is the quality of the links made by the candidate that determine the outcome in terms of the assessment.

It is also the case that while the questions do not explicitly demand exemplification, the concise use of real world examples nearly always adds conviction and authority to a response.

12 marks are available for each question with these distributed across 4 Levels. Responses written in full prose making good use of paragraphs with the support of real exemplification can potentially reach the top Level.

Question 6

Topic 3.1 – Climate Change

6 Examine how impacts of climate change can affect informal representations of place.

[12]

A key influence on the quality of answers was the degree to which a candidate understood what informal representations of place meant. Given this is an important element in the content of the compulsory Changing Spaces; Making Places topic, examiners were disappointed to encounter significant numbers of answers where this understanding was limited.

Any impact of climate change was relevant with coastal flooding, temperature rise and ecosystem change frequently discussed. There was, however, a very restricted coverage of the diversity of possible informal representations. Media images of coastal flooding such as in Bangladesh, wild fires in California or coral bleaching on the Great Barrier Reef were commonly cited. Candidates also mentioned how perceptions are altering with pictures of positive impacts of climate change such as vineyards in the United Kingdom.

Question 7

Topic 3.2 – Disease Dilemmas

7 Assess how patterns of diseases are influenced by changes in **one** landscape system you have studied. [12]

One of three landscape systems (coastal, glaciated and dryland) is the linked compulsory element targeted here. Among the responses focused on coastal systems, the rise in sea level and associated increase in flooding were frequently mentioned. Candidates then linked this with the potential for the existence of stagnant water bodies allowing insect vectors and water-borne diseases to become more prevalent. The extract from a candidate response in Exemplar 4 demonstrates the approach many candidates took.

Those looking at changes in glaciated landscapes tended to note that the melting of permafrost has the potential to release diseases trapped in the frozen soil. This would include the thawing of diseased carcasses of animals. Exemplar 4 frequently cited the release of anthrax spores from a previously frozen reindeer carcass in the Russian tundra. It was encouraging to read discussions suggesting that the reduction in extent of glacial and peri-glacial areas due to global warming represents diminishing barriers to disease diffusion.

Answers focused on dryland landscapes tended to see either an increase in water availability or expansion of deserts as aiding or restricting disease spread respectively.

Exemplar 4

Flooding can also pollute water sources, giving rise to epidemics of water-borne diseases such as cholera which can rapidly spread throughout communities. Flooding due to eustatic changes at coastlines can also provide further breeding grounds for disease vectors such as the Anopheles mosquito for Malaria, increasing prevalence of vector-borne communicable diseases.

Question 8

Topic 3.3 – Exploring Oceans

8 Assess how the use of oceans is affected by issues of global governance in relation to either human rights **or** territorial integrity. [12]

The majority of answers assessed global governance of oceans in terms of territorial integrity. There was an encouraging level of authority in regard to governance of the oceans with responses referring to the role of the United Nations Convention on the Law of the Sea (UNCLOS). The UNCLOS defined zones of ocean management were known by many with their responses using the territorial challenges current in the South China Sea. The use of a real world example tended to raise the quality of a response. Exemplar 5 makes a valid point regarding the use of oceans as escape routes for people escaping human rights abuses and with the addition of an example would have been indicative of 'comprehensive application'.

Exemplar 5

Increased conflict in an area may also increase gender inequality and ~~poor~~ make many more desperate to leave. This can increase the prevalence of trafficking. Many ~~desperate~~ ^{vulnerable} people who are desperate to escape violations of human rights may unknowingly turn to traffickers for help. A lot of the time, traffickers may move people across the sea as it is cheaper, ~~shorter~~ ^{shorter} flight and easier to hide people in a boat.

Question 9

Topic 3.4 – Future of Food

9 Examine how changes in the global food system have been influenced by time-space compression. [12]

Time –space compression was well understood and applied generally to good effect by the majority of candidates. Answers tended to focus on the supply aspects of the global food system with factors such as reduction in travel times allowing foods, especially more perishable items (soft fruit and vegetables) to be transported greater distances. This change was also linked to a reduction in seasonality in the availability of certain foods (strawberries at Christmas) but it would have been encouraging to read candidates offer the point that this only applies to ACs whose populations have the disposable income to afford the higher cost of such produce.

Areas where much more could have been made of changes brought about by time-space compression were the role of migrant labour, the growing influence of TNCs such as agro-chemical and machinery suppliers and the impacts of land grabbing by countries far removed spatially from locations where land has been acquired.

Question 10

Topic 3.5 – Hazardous Earth

10 Examine how impacts of seismic activity are severely worsened by the water cycle.

[12]

	Misconception	<p>A key influence on the quality of responses was a candidate's understanding of the term 'seismic'. For many this meant volcanic eruptions, sometimes in addition to earthquake activity but occasionally exclusively. While volcanic eruptions occur in association with earthquakes, seismic activity does not include pyroclastic flows, lahars or ash clouds formed by lava erupting under an ice sheet.</p>

As well as the issue highlighted in the Misconception box, the other influence on the quality of responses was the extent to which a candidate knew and understood the water cycle and applied their material in that context. For example, it was most convincing to read of the ocean water store being affected by the uplift of the sea-bed due to seismic activity which then resulted in a major transfer of water from the sea onto the land as a tsunami.

Many discussions made reference to the accumulation of water in the soil and rock store which then made landslides more likely when seismic activity occurred. Similarly, effective use was made of the triggering of snow and ice avalanches as a consequence of earthquakes, with the Gorkha event of 2015 being frequently cited. The most common association made between earthquakes and the water cycle was in the context of liquefaction. Candidates made the valid comment that with relatively saturated soils seismic tremors cause the ground to behave in the manner of water thereby denting any support to buildings' foundations and so causing collapse.

It was also encouraging to read those accounts mentioning how relief and recovery after an earthquake can be affected negatively by the water cycle. In this context the impacts of heavy rainfall such as mass movements and flooding on transport and the lives of displaced people in refugee camps were mentioned.

Section C overview

Two questions are available in each Option for this Section of the exam paper, with candidates selecting one to respond to for their two chosen topics. The 33 marks available for each answer are weighted as follows, 9 marks to AO1, 24 marks to AO2. This is a very clear signal as to the requirement to write analytical and evaluative discursive responses. The use of command words and or phrases, such as 'To what extent ...', 'Assess the success of ...', or simply 'Discuss.' Requires candidates to construct responses that put forward a case acknowledging points for and against the proposition in the question. Full prose, paragraphed writing is key to delivering the argument with relevant real world exemplification deployed in support of the points being made.

	AfL	<p>The Specification states the requirement to study case studies in each of the five Options. It is important that candidates appreciate their responsibility towards including more up to date material than is included in the textbook, published in 2016. For example, how and why mitigation and adaptation strategies are developing in the context of risks from climate change or the study of an oil spill.</p> <p>The Geography in this Specification is set firmly in the real world and this requires candidates to investigate contemporary developments in patterns and processes.</p>
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Question 11

Topic 3.1 – Climate Change

11* 'Predicting what the future will hold for the carbon cycle is essential when responding to climate change'. Discuss. [33]

This question was less frequently seen by examiners of the two in the Option. It was disappointing that too few candidates were secure in their knowledge and understanding of the carbon cycle. In particular, the important distinction between the fast and slow carbon cycles was rarely discussed. The more convincing discussions made authoritative use of terms such as 'flux', 'sink' and 'sequester' as well as employing ideas such as feedback to highlight the relationship between the carbon cycle and climate change.

Candidates tended to focus more on the responses to climate change they were aware of and did not link these clearly enough to the carbon cycle. A minority of candidates saw this question as an opportunity to 'write all they could remember' of mitigation and adaptation strategies. Measures such as those aimed at reducing carbon emissions were well known such as various international agreements (Kyoto, Copenhagen, Paris), cap and trade schemes and replacement of fossil fuel energy generation by renewables. Geoengineering, such as artificial plants absorbing CO₂ and fertilising oceans to stimulate phytoplankton growth were mentioned by some but hardly ever linked explicitly with the carbon cycle.

A very few considered the effectiveness of predictions such as the need to make assumptions and simplify both natural processes and human actions when modelling in order to predict. In this context comments about the level of detail required were rarely included. The role of chance was not well known but comments about the 'rights' of LIDCs and EDCs to improve the lives of their populations which is likely to involve increased energy demand were included by a good number. It was interesting to read comments about just how complex and dynamic the carbon cycle is which makes predictions so challenging.

Question 12

12* To what extent are national and sub-national policies more effective than international responses to climate change? [33]

This was by far the more popular of the two questions in this Option. Candidates were generally secure in their knowledge of international responses to climate change. Kyoto and Paris were frequently mentioned with varying degrees of authority as regards their details. The setting of targets as regards carbon emissions linked to restricting temperature rise was mentioned by most. It was encouraging that the majority were able to describe the aims of the various protocols and to assess their relative effectiveness in terms of compliance or otherwise by various nation states. If there was a weakness it was that too much was made of Kyoto in contrast to the Paris Conference of 2015 given that this more recent agreement has superseded Kyoto in terms of international policies. The weaker responses barely, if at all mentioned Paris. That said, the inherent flaws in Kyoto were well used in many of the more convincing discussions. The tensions evident at the international scale were also well outlined among the upper quartile candidates. Less convincing discussions tended to rely on simply stating that President Trump did not believe in global warming and so had pulled the USA out of the agreement signed at Paris. The other international scale policy mentioned frequently was that of the EU. The EU's emissions trading system (EUETS) was assessed with candidates pointing out the benefits of a smaller group of countries working together especially given that inevitably they are located close by each other and so share similar issues.

National policies were most often set in the context of ACs such as Denmark, the UK or Germany. There were detailed descriptions of national policies such as Denmark's aim to move to zero-emission cars by 2035, reducing methane emissions from agriculture and reduction in the use of oil and gas for heating.

Sub-nationally was quite often ignored in the weaker answers but was a feature of the stronger ones. The examples most cited were those of California and Copenhagen. Cap and trade, promotion of renewable technologies, climate proof neighbourhoods were mentioned as being positive steps taken by communities.

Evaluation of the national and sub-national scales tended to suggest that it can be a more straightforward task to arrive at a policy covering smaller spatial areas and that co-ordinating implementation and policing is easier. It was a feature of the more sophisticated discussions that the symbolic value of large scale international accord has value and that while the handful of countries responsible for a disproportionately large share may not fully agree, the fact that global warming is just that, global, means that international policies are significant.

Question 13

Topic 3.2 – Disease Dilemmas

13* To what extent are the socio-economic impacts of a communicable disease more severe than the socio-economic impacts of a non-communicable disease? [33]

	Misconception	<p>Disappointingly a significant number of candidates did not read the question with sufficient care and so mis-interpreted it. The question asks about the socio-economic impacts 'of a disease' be it either communicable or non-communicable. Many candidates wrote about the socio-economic causes that led to communicable / non-communicable diseases thereby not answering the question set.</p>

This was the more popular of the two questions in the Option. Candidates were secure in their knowledge of the two groups of diseases in terms of how these spread and offering appropriate examples. They were also sensible in the choice of socio-economic factors such as illness preventing attendance of school or work, loss of earnings, additional costs such as extra heating, social isolation, potential disability and ultimately death removing a member of a family with various consequences depending on the age of the deceased. Many extended the socio-economic impacts beyond the individual or immediate family to society, for example in the loss of productive capacity in an economy due to widespread illness or the cost of health care and its impact on the overall government budget.

A good number of candidates chose to use the epidemiological transition to give some structure to their discussion. Points concerning the continued prevalence of communicable diseases among LIDCs were frequently made with specific references to diseases such as malaria, cholera and tuberculosis. The shift to non-communicable disease being more significant among ACs and increasingly EDCs was well known although candidates were less secure in their appreciation of disease patterns among EDCs such as Latin America. The rise of diseases such as diabetes, Alzheimer/dementia and heart disease was a frequent feature in discussions.

Assessments of the relative severity of the impacts of the two groups of diseases sometimes followed a simplistic argument based on an increasing gradient of severity from AC to EDC to LIDC, with usually no reference to EDCs. Such arguments were unconvincing unless they made the point that in general, people and governments in ACs had more resources to cope with disease compared to the situation in most LIDCs. A more substantive point is that socio-economic impacts are always worse for the poor wherever they live. Access to health care is a significant influence on the impacts of disease no matter where the patient lives. The extract from the candidate's response in Exemplar 6 deals with this issue directly in the context of the UK.

Exemplar 6

While those in the middle class ~~do~~ can get cancer they are more likely to survive & importantly afford treatment as those earning little money can't pay. This can lead to an over reliance on benefits which strains the government, & this is^{also} a perfect example of socio-economic inequality. The impacts generated by cancer ~~nothing~~

Question 14

14* Assess the success of mitigation strategies to combat global pandemics.

[33]

Those answering this question tended to make effective use of examples of diseases that had been successfully combatted. The most commonly cited pandemic was smallpox with candidates being aware of the strategies taken to deal with this once very common disease. A good number of discussions associated the recent efforts to deal with polio with those that dealt with smallpox, a worldwide co-ordinated programme of education and vaccination. Some helpful evaluation came in the spatial context of areas where polio eradication is proving difficult to achieve due to particular local issues, such as in Afghanistan, Pakistan and Nigeria.

The H1N1 influenza pandemic of 2009-2010 was a useful source of material to assess the success of strategies for many candidates. The majority knew the fundamental facts of the outbreak and its spread but the key evaluation point that the disease's impact was most severe in Africa and South-east Asia where health care provision is less comprehensive was made by only a few.

Some candidates made effective use of the rise of cancers around the world, with the World Health Organisation highlighting that cancer is the leading cause of death worldwide with lung cancers the single most common cause of cancer death. Assessments of the strategies combatting cancers tended to focus on ACs such as the UK although there is much potential for investigating this among EDCs and LIDCs. The role of air pollution as a cause of lung cancers was cited by a good number with the example of Indian cities used to support their discussions.

Probably one of the most successful approaches was to evaluate the success of mitigation strategies at different spatial scales, global, national and local. Such a structure tends to lead to 'comprehensive application' and so reach Level 4 in AO2. The extract in Exemplar 7 indicates the high quality analysis that is possible with this degree of planning and execution.

Exemplar 7

disease mitigation. As such, whilst these local strategies seem originally successful, it is important to note their actual effectiveness may be varied as it occurs at such a ~~too~~ low level. Furthermore, whilst local strategies may prove successful in advanced, and economically developed countries which have a range of resources and capital, they are undoubtedly less successful in SDCs and LDCs, where access to and quality of health services are much poorer, and local people may be in rural areas - isolated from the aid of any public strategies. Therefore, whilst these local strategies have proved effective, they are severely limited in the presence of a global pandemic.

Question 15

Topic 3.3 – Exploring Oceans

15* 'Adaptations by island communities to the impacts of rising sea levels can be successful.' How far do you agree with this statement? [33]

The Specification requires those taking this Option to study an island community in either the Indian Ocean, Pacific Ocean or Caribbean Sea. Most candidates tackling this question used either the Maldives or the Marshall Islands. Most responses were clear regarding the impacts of rising sea levels on their chosen island community - loss of land, salt water incursion on low-lying fields and into fresh water aquifers and loss of coral reefs were commonly mentioned. These physical impacts were translated into socio-economic impacts by the more convincing responses with references to loss of incomes (agriculture and tourism) and dislocation of traditional cultures.

Evaluations focused on the physical adaptations represented by measures such as sea walls and architectural adjustments such as raising houses above sea levels reached during seasonal flooding. In general candidates appraised such schemes as essentially short term as they saw the rise in sea level as inevitably continuing for several decades to come. The more authoritative answers used the idea of feedback to claim that changes already begun, such as thermal expansion of sea water and melting of land-based ice would continue even if there were immediate and dramatic reductions in anthropogenic greenhouse gas emissions. It was in the eventual abandonment of islands that some saw as an inevitable 'adaptation'.

Question 16

16* Examine the extent to which oil spills are more damaging to the ocean than the accumulation of plastic? [33]

This was the more popular of the two questions in this Option. It was encouraging when a candidate opened their discussion with a few thoughtful sentences as an introduction, as exemplified in Exemplar 8. The definition of pollution helps set the scene with the third sentence, 'However, the ocean is ...' suggestive of a considered discussion to come.

There were some very authoritative detailed descriptions of the Deepwater Horizon oil spill of 2010 although too few brought the situation in the areas affected up to date with many only using the textbook, published in 2016. Too many relied on an approach that highlighted the vast scale of the impacts in the immediate aftermath of the disaster without an appreciation of the rates of recovery of ecosystems, human communities and economies. It was disappointing that too few of the accounts referred to the loss of life on the oil rig. There were, however, a good number of candidates who made the effective evaluation that some of the mitigation strategies, such as chemical dispersants, were as damaging if not more so to the ocean.

The more discerning candidates wrote persuasively about the larger spatial scale and longer temporal impact of plastics in the ocean. Facts and figures of the gyres in the Pacific with their accumulations of plastics were given by many but it was those who suggested that the persistence of plastics is perhaps the most concerning factor when assessing the relative impacts of oil versus plastics. Rather than offer journalistic style accounts of plastic pollution the more effective responses used their knowledge and understanding of the functioning of marine ecosystems (food chains and webs) to highlight how plastics enter and remain in the environment.

Exemplar 8

Pollution is the addition of a substance / material to an environment by humans that causes negative impacts on that environment. Both oil spills and the build up of plastic are ~~form~~ forms of pollution in the ocean that are damaging. However, the ocean is ~~dam~~ not so much damaged as the organisms/people who ~~uk~~ and rely on it. This essay will examine the extent to which oil spills are more damaging to the ocean than the accumulation of plastic by studying the impacts on both the natural environment and human populations who rely on oceans at a ~~wide~~ variety of scales. This essay will use the examples of the Deepwater horizon spill and the ~~North~~ ^{Great} Pacific Garbage patch as evidence/support for its conclusion(s).

Question 17

Topic 3.4 – Future of Food

17* Assess the view that natural shocks are the biggest threat to global food security.

[33]

Candidates tackling this question kept their focus on natural shocks such as extreme weather events (El Niño, heatwaves, droughts, wildfires, tropical storms) and tectonic hazards (volcanic eruptions and earthquake events including tsunami). Some became distracted by offering detailed accounts of the origins of the natural shock, in particular tectonic events, possibly misapplying their detailed knowledge and understanding from the Hazardous Earth Option.

The more effective responses used their grasp of the global food system to act as a structure for their discussion. Beginning with inputs such as water and soil they pointed out how severe disruption to these inputs reduces food production. For example, excess / deficit of water reduces productivity as does the contamination of soils following inundation by salt water following a tsunami. It was encouraging to read answers in which heavy ash fall following a volcanic eruption was linked with a loss in food production, not just because of the reduction in photosynthesis but also mechanical damage to crops from the weight of the ash. In this context, some candidates offered the evaluative point that, while in the short term, the shock of the ash fall disrupted food supplies, longer term the ash provided nutrients and so boosted production. It was only a small minority of candidates that included consideration of impacts on livestock which is an area with potential in the context of food security. For example the loss of livestock both for food and breeding represents both short and longer term reductions in food security.

For the majority of candidates, their assessments tended to rely on shocks to food production. For 'thorough' and 'comprehensive' applications analysis needed to extend to elements in the food system also susceptible to natural shocks, such as storage of food, transport dislocation and physical damage to infrastructure serving the food system such as water supply and power.

Evaluation tended to consider the differential impacts on ACs, EDCs and LIDCs with appropriate analysis suggesting the capacity to mitigate and recover from a natural shock varies considerably across the development continuum. In this context, the impact of drought on parts of sub-Saharan Africa was often cited. Human shocks were also offered in evaluation such as population pressure leading to overgrazing and over cultivation and political and economic instability.

Question 18

18* To what extent can long-term food security be achieved through local and national initiatives? [33]

Those tackling this question tended to be secure in their understanding of food security. There was a good range of local and national initiatives mentioned and it was often in the level of detail included about these initiatives that discrimination among candidates emerged.

National scale approaches tended to focus on larger scale technological programmes. In this context aspects of the 'Green Revolution' such as the introduction of high yielding varieties of crops such as rice and wheat, genetically modified (GM) crops and major irrigation projects were cited. Many candidates successfully suggested that the ability to build capacity in the food system very often required national and even international perspectives. Factors such as monitoring of food supply throughout the growing season and on through harvest was seen as requiring access to sophisticated data collection and analysis such as via satellite observations. Major irrigation projects need regional / national scale planning and their implementation demand the range and quantity of resourcing only available at these scales. More could have been made of the political influences that too often result in the aims and ambitions of such projects being thwarted. Ambitious projects such as the Great Green Wall in the Sahel and China's similarly named project (also known as the Three-North Shelter Forest Program) were used by some to advance the importance of national schemes.

Effective evaluation came from considerations of local scale initiatives such as organiponicos in Cuba, sack farming in Kenya and rainwater harvesting including stone walls along field boundaries for example in the Sahel.

Candidates could have enhanced their responses by considering factors such as the role of waste reduction, infrastructure development (power and transport for example) and efforts to stop conflict which prevents food production as important to improving food security.

Question 19

Topic 3.5 – Hazardous Earth

19* 'Location is a significant factor in determining the severity of the impacts of an active volcano'. Discuss. [33]

The full range in terms of quality of response was seen for this question, the slightly less popular one of the pair in the Option. The more convincing responses looked at a range of impacts, environmental, social, economic, political and picked up on the 'severity' of those impacts in regards to location.

Most candidates chose to look at 'location' in terms of the relative development of the country where the volcano was. Comparisons were made between Japan and Indonesia, the latter often incorrectly referred to as a LIDC. The ability of ACs to resource aspects of hazard management such as comprehensive monitoring that was both reliable and accurate and their capacity to deal with aspects such as search and rescue as well as recovery were well covered. Examiners were encouraged to read thoughtful analysis that acknowledged the capacities of countries other than ACs to deal with the threats they face from volcanic activity. In this context, the ability of Indonesia featured in many responses.

Level of development was also picked up in the context of the pressure people in some locations are under to make a living out of farming the relatively fertile slopes of volcanoes in the tropics. However, few made the relevant comment about the occupation of volcano slopes in ACs such as Italy and Japan so tying this in with perceptions of risk and the authorities' abilities to manage impacts.

Less convincing responses wrote in too generalised terms with little or no specific place detail to back up their assertions. The extract from a candidate response in Exemplar 9 typifies such an approach.

It was encouraging to read in some essays that eruptions can have positive impacts which tend to be relatively local to the volcano. The well known point about the fertility of volcanic soils was read frequently, fewer mentioned the potential for obtaining minerals such as sulphur while others suggested the economic value of tourism as a benefit.

Location was also interpreted in terms of type of plate boundary which was related to type of volcanic eruption usually experienced. Candidates were generally secure in their knowledge and understanding of the relationship between magma / lava chemistry and type of eruption with an encouraging proportion using the Volcanic Explosivity Index (VEI) to compare and contrast the impacts of different volcanoes.

A valuable evaluative point was made by many of the more convincing discussions concerning the locational impacts of ash. The example most frequently quoted in support of the assertion was that of the 2010 eruption of Eyjafjallajökull in Iceland. 'Comprehensive' application of this eruption came from those who pointed out that location was significant as the ash entered the jet stream and was therefore distributed across much of Western Europe. This happens to be one of the busiest air spaces in the world and so the impacts were felt around the globe. They made the point that had such an eruption occurred in other locations, its impacts were likely to be much reduced.

Exemplar 9

Another significant factor, which determines the severity of the impacts of an active volcano is the economic levels of development of a country. If a country is an AC, the impacts of the volcano may be more severe because due to the development of the country, however as if an eruption occurs in an AC the country will be able to recover quicker than an LEDC because it is able to inject more money for the recovery.

Question 20

20* How far do you agree that an advanced level of economic development is essential for successful mitigation of volcanic hazards? [33]

This was the more popular of the two questions in the Option but not by a large margin.

Candidates generally agreed with the proposition in the question quoting the ability of countries such as Japan, the USA and Italy to successfully mitigate volcanic hazards. The resourcing available to these countries was seen in their abilities to monitor closely volcanoes, to issue warnings in time for evacuation of the 'at risk' zones and in some cases to attempt to modify the actual eruption. In regard to this latter point, Italy's record at stopping or diverting lava flows from Etna and Iceland's relative success in dealing with the lava flow at Heimaey were often quoted. Only rarely was the point made that this latter example was somewhat unique as the lava flow reached to the sea which made possible the spraying of the lava front with sea water. It was also rarely pointed out that significant destruction of houses and infrastructure still occurred. While it is the case that Iceland is an AC, the 2010 eruption of Eyjafjallajökull was not a significant threat to the Icelandic population. Hardly any candidates referred to Iceland's low population density (3.3 per km²) as being a factor. Likewise when discussing eruptions on the island of Hawaii, very few acknowledged the absence of people living in areas at risk from lava flows.

The contrast between ACs and less well-resourced countries tended to use Indonesia and the Democratic Republic of Congo (DRC) as examples. Indonesia was too often allocated to the LIDC group, when it is an EDC. There were some effective accounts of the eruption of Mount Nyiragongo and its severe impacts on the regions and its people. A valuable evaluative point emerged in many discussions that the area affected by the eruption in the DRC was politically unstable and that effective governance was important for the management of volcanic eruptions. It was encouraging when a discussion moved away from the simplistic assumption that ACs were able to mitigate volcanic hazards while other countries could not. In this the advances made by a country such as Indonesia in its monitoring, preparation and action in the event of an eruption were suitably appraised mainly by the more considered discussions.

Much effective evaluation came from those who considered the types of eruption, with the fundamental contrast between effusive and explosive mentioned often as was the magnitude of an eruption as represented by the Volcanic Explosivity Index (VEI). Some discussions became a little taken up with the impacts that the eruption of a super-volcano such as Yellowstone might bring. Such speculation is interesting but some candidates spent too long on this.

As well as the nature of the eruption, unusual hazard events were made use of by some as the extract from a candidate response in Exemplar 10 highlights.

Exemplar 10

Another argument is that the type of hazard terminates the potential to completely resist mitigation efforts in countries of all economic development. For example, after an eruption underneath a crater lake (Lake Nyos) in the Cameroun, poisonous gases and CO₂ were released in massive quantities due causing the death of 1746 people and 3000 livestock animals due to suffocation. There is arguably no effective way to mitigate against a hazard such as this due to the threat being a silent and invisible killer. Therefore, certain types of volcanic hazard are incredibly

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