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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. A selection of candidate answers is also provided. 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 and the mark scheme can be downloaded from OCR.

Paper 3 series overview

There was much evidence amongst the candidates responding to this component, Geographical Debates, of effective learning. Many candidates had clearly engaged with purpose to extend their knowledge and understanding of spatial patterns and processes that underpin the issues raised in the five optional topics.

Those that were less convincing in their responses didn't respond to the actual wording of the question or offered rather superficial discussions. The latter answers usually did not show sufficient appreciation of the degree to which it is often the *interaction* of factors that lie at the heart of an issue such as the risks of disease, the sustainable use of resources or the impacts of tectonic activity.

A trend that continues is a reduction in the number of candidates who employ diagrams to convey knowledge and understanding. The use of this technique is to be encouraged as it can focus a candidate more sharply on key elements of something, such as the impact of an earth hazard and then recovery of an area, the Park model for example.

Assessors are increasingly concerned by the number of scripts they encounter where handwriting presents a significant obstacle to reading the response. Not only can individual words and phrases be illegible but also the flow of an argument can be difficult to follow.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• applied their knowledge and understanding selectively to answer the question explicitly • offered appropriate real-world exemplification • case study material was used selectively to directly target the question • offered supporting quantification such as numbers of doctors per 1000 people.	• tended to write in ways that paid insufficient attention to the actual wording of the question • omitted real world exemplification • tended to use a question as a chance to 'write all I can remember' about a case study. • did not back up statements with quantification.

Section A overview

Candidates are faced with two sub-parts in each Option in Section A. Sub-part (a) had an AO3, geographical skills focus asking for appreciation of the limitations of a resource. Sub-part (b) asked for an explanation of some element in the option.

Most candidates were able to identify at least two if not three limitations. The most effective approach and one that aids a candidate, is the use of three bullet points so that there is no muddling of the respective limitations. In terms of approach the more secure route is to assess both the reliability and accuracy of the resource, something candidates should be familiar with from their own NEA.

In the second sub-parts, it is the clarity of explanation that determines the mark's level. A candidate that has secure knowledge and understanding of for example, the operation of the World Trade Organisation (WTO) or hot spots is well placed to answer *concisely* and *precisely*. The correct use of technical terms such as albedo or effusive is a significant advantage when responding to sub-part (b) questions.

Question 1 (a)

Topic 3.1 – Climate Change

1

(a) Identify **three** limitations of **Fig. 1** as a source of information about carbon trading schemes. **[3]**

Limitations of the world map showing countries that are engaging in carbon trading and the location of particular schemes were correctly identified by the majority of candidates. Common amongst suggestions were the absence of dates, actual locations of the additional schemes, lack of information regarding the types of carbon emitters involved and the degree of success of a scheme.

Question 1 (b)

(b) Explain how homes may be adapted to reduce risks from increased temperatures. **[6]**

Most candidates identified air conditioning as a key adaptation followed by the painting of roofs white. Some responses mentioning insulation were convincing when they related this to reducing heat gain from outside of a home. Comments about shading over windows and reducing south-facing windows in the northern hemisphere were also seen.

Question 2 (a)

Topic 3.2 – Disease Dilemmas

2

(a) Identify **three** limitations of **Fig. 2** as a source of information about infectious and deadly diseases. **[3]**

Most candidates identified three appropriate limitations of the graph presenting information on infectious and deadly diseases. These included the absence of a source thereby casting doubt as to the reliability and accuracy of the data, the absence of detail regarding the x axis scale such as what the difference between 'quite', 'very', 'highly' and 'extremely' might be and the absence of information such as, is the graph based on global experience and over what time period?

Question 2 (b)

(b) Explain how the geographical area covered by **one** natural hazard has influenced the risk of outbreak of **one** named disease. **[6]**

Success in responding to this question came when there was a sharp focus on the link between the 'geographical area' and the risk and outbreak of disease. The most convincing responses included both physical and human aspects of a geographical area. For Bangladesh helpful comments were made about the deltaic and low-lying nature of much of the country, its susceptibility to floods caused by both excess water flowing down rivers and coming from the atmospheric hazard of a tropical storm or cyclone. In the context of Haiti the hazard was that of seismic activity. For both of these examples, the more authoritative answers included comments about their respective climates allowing the flourishing of disease as well as material highlighting their socio-economic struggle to have sufficient resources available to combat disease outbreaks.

Question 3 (a)

Topic 3.3 – Exploring Oceans

3

(a) Identify **three** limitations of **Fig. 3** as a source of information about the food web in an inter-tidal zone. **[3]**

The limitation most often identified of the food web diagram was the absence of any locational information and thus was this diagram a generic one or applicable to particular location(s). The absence of references to primary producers was also commonly cited as was the lack of information about seasonal and tidal variations affecting the food web.

Question 3 (b)

(b) Explain how oceans spread pollution around the globe. **[6]**

The majority of candidates identified the role of large scale ocean currents in distributing pollution although only a small minority of responses were authoritative in their naming of currents. The role of gyres was included by most with the example of the Great Pacific Garbage Patch frequently quoted. A few candidates were keen to relate the story of the loss of thousands of small plastic ducks from a container ship and their subsequent arrival on diverse shores which exemplified the role of ocean currents. This episode had value in answering the question but rather too often, its extended narration lost sight of the actual question.

Question 4 (a)

Topic 3.4 – Future of Food

4

(a) Identify **three** limitations of **Fig. 4** as a source of information about trends in global food security from 2005 to 2020. **[3]**

Limitations of the text resource tended to be the absence of a source and therefore the reliability was to be queried, the lack of information as to what data had been used and that the claim of nine years representing a 'long decline' was hard to substantiate. Additionally, a good number highlighted that the 'unprecedented setback' of 2020 was not exemplified. A significant number of candidates felt that although the text was headed 'global' one limitation was the complete absence of any reference to actual places.

Question 4 (b)

(b) Explain the role of the World Trade Organisation (WTO) in influencing global food security. **[6]**

By and large the role of the World Trade Organisation (WTO) was not securely known or understood. Confusion arose between the WTO and organisations such as the FAO and Free Trade. Many candidates were under the impression that the WTO has as its primary role the improvement in food security. The specification is explicit in its requirement that within the context of food as a geopolitical commodity, the role of the WTO is to be studied. The minority of candidates that did possess that knowledge and understanding were able to point out the intent of the WTO to act as a forum for governments negotiating trade deals. These responses also drew attention to the key aspect of the WTO as an organisation promoting free trade and seeking to abolish and or minimise tariffs on trade as the following section from a candidate's answer highlights.

Exemplar 1

support a healthy lifestyle. The World Trade Organisation is an international organisation with 194 member states which aims to make global trade more ~~fair~~ free. This means it tries to reduce the influence of trade blocs by limiting the quotas / tariffs they can employ. This allows other countries to compete on a more even playing field to sell their goods to other areas. Therefore the WTO ✓ improves food security as it allows smoother movement of goods around the world at lower prices. This

Question 5 (a)

Topic 3.5 – Hazardous Earth

5

(a) Identify **three** limitations of **Fig. 5** as a source of information about destructive plate boundaries.

[3]

The limitations of the cross-section diagram were appropriately identified by nearly all candidates answering this question. Common points included; this was one type of destructive boundary, or that many labels were missing that could have added useful information (e.g. identification of Benioff zone, lithosphere, asthenosphere, earthquake foci, ocean trench) or that a 3-D block diagram is perhaps more representative of what takes place at such plate margins.

Question 5 (b)

(b) Explain how volcanic eruptions at hot spots result in distinctive landforms. **[6]**

The vast majority of responses identified hot spots as being an intra-plate feature, with most referring to an oceanic location. It was encouraging to read responses mentioning the existence of hot spots in continental contexts such as East Africa. While all candidates wrote about the role of rising magma and subsequent eruption at the surface to form volcanoes, it was only a minority who referred to the chemistry of that lava as influencing the shape of the distinctive landform, the shield volcano. The basic and less viscous lava's ability to flow readily allows it to erupt effusively in the main and then to spread over an extensive area. Fewer than anticipated mentioned the vast scale (vertical or horizontal) of the shield volcanoes making up the Hawaiian Islands for example.

A feature of the more comprehensive responses was mention of the distinctive landforms existing on islands that had been transported away from the hot spot, such as the weathered and eroded features on an island such as Kauai in the Hawaiian chain.

Misconception

A common confusion was noticed between the Hawaiian chain of islands and island arcs. The former are generally acknowledged to be the result of a gradual movement of the Pacific plate across the hot spot, with older islands no longer receiving inputs of fresh lava. However, the term 'island arcs' is specific to the arcuate plan view of islands formed along a subduction zone such as the Aleutian islands in the north-west Pacific.

Section B overview

Responses in this Section need to focus on the links between an aspect of one of the five options in Geographical Debates and an element taken from one of the compulsory parts of the specification in either Component 01 (Physical Systems) or Component 02 (Human Interactions). Because of the need to bring together these elements and as responses here take an extended prose form, candidates are well advised to plan their approach before starting their discussion.

Assessment for learning

Because the nature of geography is inherently synoptic and that links between the three components and topics and key ideas within each Component will be occurring throughout the two-year course, it is valuable to point these out to candidates as they emerge. Waiting until all or at least substantial parts of the course have been completed to identify links tends not to promote 'thinking like a geographer'. Encouraging candidates to be alert to possible links from the start of their A level studies is likely to be most beneficial to their ability to examine, assess, analyse and evaluate.

Question 6

Topic 3.1 – Climate Change

6 Examine how the debates of climate change have been influenced by global management strategies to protect the carbon and water cycles. **[12]**

Global management strategies to protect the carbon and water cycles are a significant key idea in the Physical Systems component as part of the Earth's Life Support Systems topic. Candidates displayed some effective knowledge and understanding of these such as wetland restoration and water management, afforestation (in particular the REDD scheme), changes in agricultural practices and international agreements. Where the strategy was described in detail the discussion tended to be all the more convincing. International agreements such as Kyoto and Paris were frequently mentioned but few discussions included more recent gatherings such as COP26 (Glasgow) or COP28 (Dubai). The success or otherwise of various management strategies tended to be a feature of the top quartile of responses. These discussions were then able to suggest how the debates surrounding climate change have been influenced either positively or negatively. There was effective analysis in some responses that identified particular contrasts between countries such as the different perspectives held by, for example, India, China, the USA and European states.

Question 7

Topic 3.2 – Disease Dilemmas

7 Examine how patterns of diseases are affected by social inequality. **[12]**

Candidates often made good use of a scale perspective in their responses to this question. Some identified inequalities at the global scale, referring to contrasts in living conditions between ACs, EDCs and LIDCs. It was encouraging that many of these responses made references to real world exemplification from the Changing Spaces; making places component such as Jembatan Besi, Jakarta and Northwood, Irvine. When adopting a national scale approach, candidates tended to highlight regional contrasts within the UK, such as variations in rates of cancers. Many responses would have been more convincing had they included some statistical support for the disease pattern. Less frequently seen but none the less effective were those responses that examined intra-urban disease patterns. Here again, where there was some statistical evidence, higher quality discussions tended to emerge.

Question 8

Topic 3.3 – Exploring Oceans

8 Examine how the globalisation of oceans influences issues relating to **either** human rights **or** territorial integrity. **[12]**

Oceans as spaces increasingly crossed by goods and people was a theme that the majority of candidates knew something about. Discrimination here often came in the form of detailed exemplification. For example, in the context of territorial integrity, some candidates were able to describe and analyse the specifics of the challenges and resistance various nations are making in the South China Sea. Only a few discussions referred to the ongoing situation in and around the Black Sea following the Russian invasion of Ukraine including Crimea. An encouraging minority looked at the Arctic Ocean as an area of growing threat to territorial integrity with the impacts of climate change on the extent and thickness of Arctic sea ice.

In terms of human rights, candidates offered thoughtful discussions on oceans as offering routes of escape for those facing persecution or loss of land either through land-grabbing or environmental change. The trafficking of people was a theme that a good number pursued in their responses with the Mediterranean and Channel sea areas most frequently mentioned.

It was encouraging to read a few responses in which positive influences were highlighted. The ability to use oceans to transport large quantities of aid to reduce the loss of human rights often in the context of a natural hazard such as aid to Haiti, Sierra Leone or various Caribbean islands. In terms of territorial integrity, candidates mentioned the agreements that exist such as around the Antarctic (CCAMLR) and the establishment of exclusive economic zones (EEZs) via the law of the Sea agreements, albeit that many of these operate imperfectly.

Question 9

Topic 3.4 – Future of Food

9 Examine how global food production is influenced by patterns of **either** trade **or** migration. **[12]**

The choice in this question between trade and migration reflects the alternative topics within the Global Connections section of the Human Interactions component. Many candidates were confident in linking global food production with their choice of option, trade or migration. For the former most picked up on the issue of 'land grabbing' associated with the actions of governments and agri-businesses. Candidates examined how the acquisition of land in areas such as the Democratic Republic of the Congo, Cameroon or South Sudan resulted in the growth in international trade in food stuffs and biofuels at the expense of domestic food production. Other themes included the rise in international trade in both food and industrial crops due to the increased availability of ocean transport based on rising economies of scale of ships.

Those writing about the influence of migration tended to highlight the movement of working age groups internationally to find employment in agriculture although statistical support for their argument tended to be very limited. The example of migration from Laos to Thailand was noted in a significant number of responses although these tended not to mention the contrasting demographic situation of the two countries. Laos has a surplus of young people whereas Thailand is moving into a context of lowering fertility and a shortage of young workers. The seasonal migration of people associated with crop harvesting was mentioned by only a few candidates.

Question 10

Topic 3.5 – Hazardous Earth

10 Examine how earthquakes could influence human activity in **one** landscape system you have studied. **[12]**

Overall, the links between human activity in the chosen landscape system and earthquake activity were not handled with authority. There were a minority who had command of their subject material and examined how the results of earthquakes could affect elements of human activity such as the built environment (port installations, power stations, housing, dams). Exemplification was effectively deployed in the context of the Grande Dixence Scheme or the Great East Japan Earthquake: Tōhoku of 2011 by a small minority. Others suggested that coastal locations could see substantial movements of sediment following a tsunami that would affect locations as diverse as Sandbanks, Dorset and Mangawhai and Pakiri Beaches, North Island, New Zealand.

The use of Nepal had much potential in the context of a glaciated landscape system. Those who made the most of this potential emphasised the effects of seismic activity on the generation of avalanches, landslides and ground shaking to impact human activities.

Key point	What the phrase '…in ONE landscape system you have studied.' refers to.

Although this terminology has been used several times in exam papers over the life of the current specification, there are still considerable numbers of candidates who do not follow what the phrase refers to. The link being sought here is between earthquakes and human activity in **one of** coastal, glaciated or dryland landscapes. These are the three landscape systems identified in Topic 1.1 in Component 1 Physical Systems, **one of which** candidates must have studied.

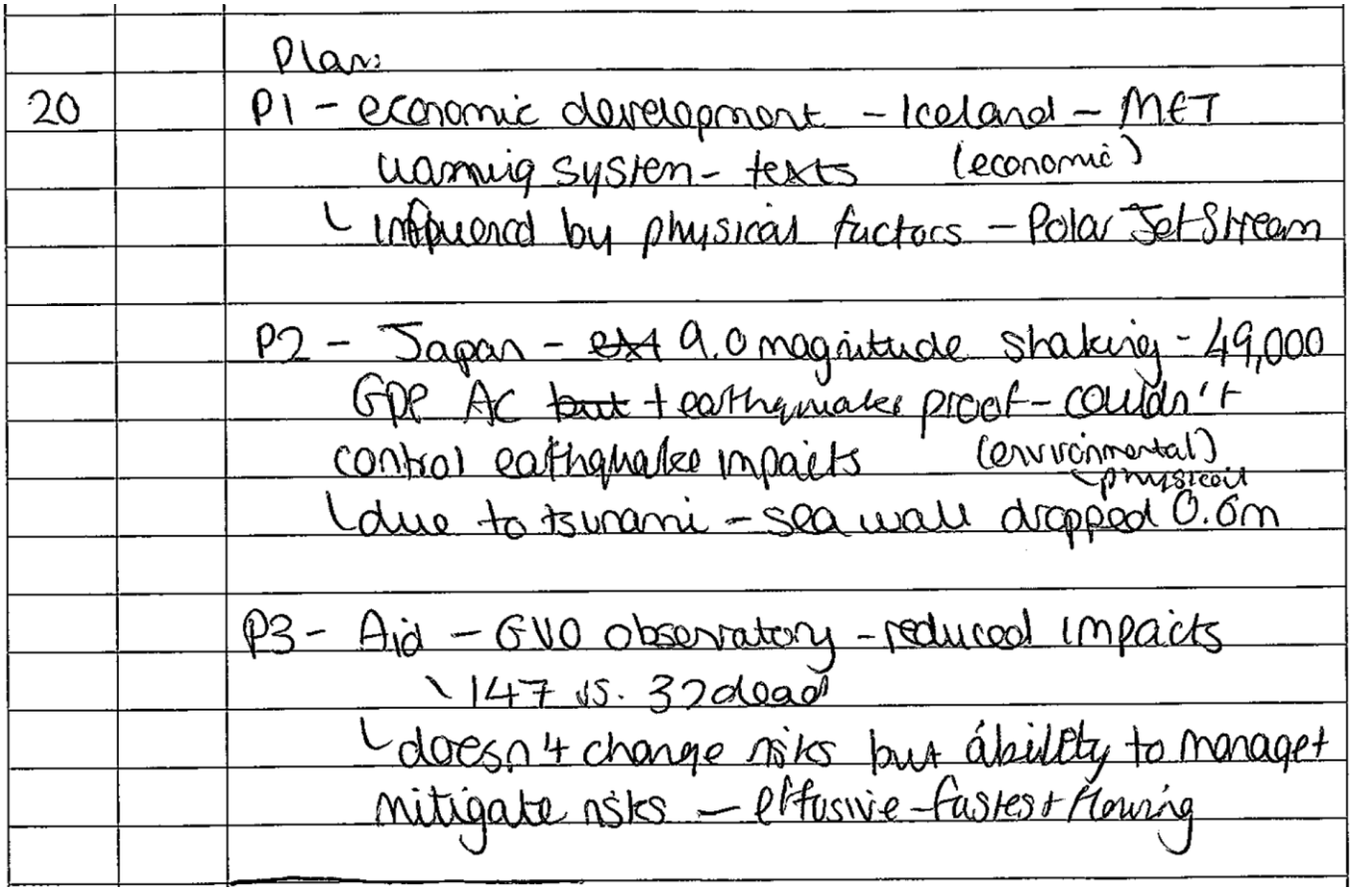
Section C overview

Assessors read many responses from across all five options that were simply 'excellent'. Candidates wrote with fluency, authority and conviction to provide comprehensive application of their secure knowledge and understanding so that a detailed and substantiated evaluation of the matter under discussion was evident. This can only have been the result of much very effective teaching and learning and a positive and energetic engagement with the course.

There were essays which were not of the standard but nevertheless offered some thorough or reasonable knowledge and understanding and application to the question set. It is encouraging to read responses that indicate a move on from GCSE and a developing appreciation of the geography of the topics covered.

It was good to see many scripts with a plan at the start of an essay response as exemplified below. However simple, such a device can really aid a candidate to gather their thoughts, organise them into a logical structure and act as an aide memoire during the writing of a response so that nothing is omitted.

Exemplar 2



Assessment for learning

It is common to read in responses in Section C assertions such as the following, '…one of the highest/lowest rates in the world…' '… a huge number of people…' '…due to the amount of rain X receives…' '…cancer rates are higher in the North rather than in the South…'

While such statements carry an argument so far, they would be much more persuasive if they had some evidence to support the claim such as numerical or statistical data.

Question 11*

Topic 3.1 – Climate Change

11* 'ACs and EDCs contribute to similar anthropogenic GHG emissions over different time periods.' Evaluate the extent to which you agree with this statement. **[33]**

The changes in balance of anthropogenic GHG emissions by different country groupings was generally well known. Candidates associated the growth of industrialised economies such as Europe and North America with rising levels of CO_2 emissions between the mid-19th century and the 1960s. Most responses were also able to relate how the rise of countries such as China and India as manufacturing economies has led to changes in the balance of GHG emissions.

However, the majority of discussions tended to rely on total CO_2 emissions and did not pick up on the more subtle analysis when considering emissions *per capita*. The essentially uneven spatial pattern of GHG emissions was not included with any degree of authority by most. Points such as that nearly 80% of all emissions come from the top ten CO_2 emitting nations was rarely mentioned. Largely absent was a recognition that GHGs include more than just CO_2 and that inclusion of CH_4 for example, results in an appreciation of the role of countries such as Indonesia and Brazil (deforestation) and potentially Canada and Russia (perma-frost melting) in climate change.

The use of the UK and China as exemplifying the question's assertion was successful for many candidates. The more thoughtful responses included in their evaluations the point that the UK has seen a significant reduction in its domestically generated CO_2 emissions through its offshoring of much manufacturing. These emissions are now occurring elsewhere in the world, such as China where many goods are manufactured and then exported to the UK. Therefore, the UK, along with other AC economies remain responsible for considerable CO_2 emissions.

Question 12*

12* Evaluate the relative strengths of different types of physical evidence that suggest the world has become warmer. **[33]**

The key aspect when answering this question was the extent to which the response considered the *causes* of the warming that the world is experiencing. Discussions that recognised the question's focus on '…relative strengths of different types of physical evidence…' tended to be successful. The physical evidence often quoted was rising sea level, melting of ice sheets and glaciers and increases in temperatures. The more comprehensive responses were often indicated by inclusion of sources of evidence such as rising levels of water vapour in the atmosphere, declining areal extent, thickness of sea ice and changes in the timings of seasons.

Most candidates were confident in their presentation of the types of evidence. The more effective discussions were distinguished by an analysis and evaluation of these sources of evidence. Comments about the widespread photographic evidence of glacier retreat or repeatedly record high temperatures enabled a response to be convincing. In the context of rising temperatures, effective evaluation could emerge from considering air and sea temperatures. Additionally, each decade that passes sees substantial and very significant technological advances in the reliable and accurate recording of temperatures.

Similarly, effective evaluation emerged if a discussion included the point that evidence for rising sea level is clear but that the rise is as yet mostly felt by low-lying island or coastal communities. There were some interesting appraisals of the reduction in snow cover in relation to the curtailing of ski seasons in the Alps and Rockies. It was also encouraging to read comments about the increasing number of extreme weather events as possible evidence, but that correlation does not equate to causation.

Question 13*

Topic 3.2 – Disease Dilemmas

13* Evaluate the extent to which cultural factors increase the risk of non-communicable disease. **[33]**

This question was the more popular of the two in the Disease Dilemmas option. Candidates were secure in their understanding of what constitutes a non-communicable disease as well as cultural factors. It was, however, pleasing to read comments by some candidates of their appreciation that cultural factors do not exist in isolation from others such as social and economic. (See Exemplar 3 below) That cultural factors are 'influences' on behaviours, perceptions, values and beliefs is an effective way into their role in disease risk.

Most responses agreed that cultural factors can increase the risk of non-communicable disease. The role of diets and lifestyles were prominent in the vast majority of essays. Much was made of an increase in economic status leading to higher consumption of 'fast food' and 'ready prepared' food which tends to contain higher proportions of ingredients such as sugars, fats and salt. This was seen as increasing risks from diseases such as diabetes and various forms of cardio-vascular disease. Lifestyle cultural factors were cited by many in the context of smoking, alcohol consumption and artificial tanning. The spatial context for most discussions was the UK and or the USA as seen in the extract below, exemplar 3.

A good number of responses developed their discussion by a consideration of differences in regional cultural influences, tanning and smoking in the UK. These discussions had potential but required the inclusion of some supporting evidence to be fully convincing, such as regional health statistics. Simply quoting '… the North...' or '…Glasgow…' was not a comprehensive perspective.

Assessors were encouraged to read of evaluations that recognised the link between deprivation and increased likelihood of contracting non-communicable disease. In this context, the example of air pollution in India associated with the use of biofuel or kerosene in homes was quoted. In the same country, the role of air pollution, especially particulates, as disproportionately affecting the poorest communities was raised.

Thoughtful analysis and evaluation emerged amongst some responses when the candidate recognised that some cultural factors reduce the risks of contracting non-communicable disease. Again, lifestyle factors often linked with economic ones were assessed to be important. Factors such as high-quality diets including organic foods, availability of access to high quality environments such as proximity to open space and lack of over-crowding in terms of housing were cited.

An example of clear analysis and evaluation is given below.

Exemplar 3

populations culture changes. Lifestyle choices greatly influence the risk of NCDs, for example smoking, which is encouraged in some cultures as a social activity, greatly increases the risk of developing lung cancer. As seen in the UK, where of the 120,000 diagnosed with coeur annually, 1/5 cases are caused by smoking. Furthermore, peoples diet greatly influences their health, where in many ACs the easy access to goods high in saturated fats and sugars greatly increases their risk of developing CVD often from obesity and overnutrition and type-2 diabetes. As demonstrated in the high number of cases of people with ~~that~~ CVD and T-2 diabetes in North America. But this cultural factor is heavily dependent on economic factors: if a country wasn't so economically developed, then somans access to fast food and highly processed food would be lower, thus reducing their risk of developing these NCDs. Additionally,

Question 14*

14* 'Mitigation strategies to combat global pandemics will always be compromised by physical barriers.'
Discuss. **[33]**

A small minority of candidates chose this question in the option. They tended to focus on the recent example of Covid-19 with varying degrees of success. Other pandemics as defined by the Centre for Disease Control include, Zika, Ebola, swine 'flu, SARS-Cov and Mers-Cov and HIV/Aids.

The more convincing discussions considered that physical barriers can compromise mitigation strategies acting to slow down the arrival of medical assistance. Physical barriers such as mountain ranges, deserts and geo hazards such as floods and tectonic events were quoted as compromising mitigation. Effective use was made of the impacts of the Gorkha earthquake in Nepal in 2015 when many villages were isolated for lengthy periods of time due to landslides and flooding. Medical aid was consequently delayed in reaching these remote communities.

In terms of Covid-19 the advantage of geographical isolation due to physical barriers was identified as being valuable in preventing the spread of the virus. Examples quoted were New Zealand and Cuba, both of which were able to use their island geography to restrict access from outside of people potentially carrying the virus. Some candidates highlighted how the impact of Ebola has not always spread with the devastating effect that some outbreaks have. It has been the case that some isolated communities either did not suffer from the virus, or that others did but that the virus was contained within that remote setting.

Question 15*

Topic 3.3 – Exploring Oceans

15* 'The impacts of climate change on oceans create greater threats for tropical island communities than Arctic indigenous peoples.'
To what extent do you agree? **[33]**

The impacts of climate change on oceans that most candidates focused on were the rise in sea level and the loss of high latitude ice. In the context of the former, essays tended to deploy the example of the Maldive Islands in the Indian Ocean although there were examples from the Pacific mentioned such as Tuvalu and Kiribati. The threats identified were commonly reduction in land area, loss of food production, and incursion of salt water into aquifers. In terms of the Arctic the principal threats identified were loss of traditional food sources due to reductions in sea ice area and thickness, increasing risk from wildfires and diminishing grazing for reindeer (domesticated caribou).

The evaluation of the respective threats tended to see both locations as being at significant risk. Most candidates tended, in the end, to think that the tropical island communities were probably at greatest risk based on the perspective that their island homes may be completely drowned due to rising sea level. While serious threats to the Arctic communities were also acknowledged, such as loss of traditional ways of life, candidates suggested that these peoples would retreat away from coastlines rather than lose their homeland completely.

The issue of increasing attention being paid to a thawing Arctic by a combination of ocean transport routes, prospecting for minerals and increased military activity was mentioned by a good number of candidates. Here, as in other questions, the quality and quantity of place detail often helped support an argument and make it more convincing.

In the context of the tropical island communities, few candidates mentioned the threats emerging as a consequence of either the mass bleaching of coral communities or the acidification of oceans with the impact this has on ecosystems. In neither case was there much evidence of candidates recognising the threat to food production in terms of fish stocks nor in terms of protection from wave energy from healthy coral reefs.

Question 16*

16* 'The use of ocean resources will never be sustainable.'
How far do you agree? **[33]**

There were some encouraging discussions focused on the issue of the sustainable use of ocean resources. These tended to acknowledge that harm could be done to ocean resources but that it was possible to adopt an approach that was sustainable. The majority of responses to this question used the examples of underwater oil and gas reserves and biological resources, namely krill and whales. In terms of the former, candidates recognised that their extraction could not be sustainable as eventually the supply runs out. However, the main focus of discussions was on the release of oil in particular, either through slow seepage from seabed pipelines or catastrophic failure as exemplified in the Deepwater Horizon disaster of 2010, both of which occurred in the Gulf of Mexico.

In the context of biological ocean resources attention was focused on the issue of krill harvesting in the waters surrounding the Antarctic. The historic pattern of krill fishing was generally well known and measures such as the establishment of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) quoted as an attempt to secure sustainability for the krill population. Some informed discussion took place in some essays concerning the history of whale hunting and recent developments to help populations recover.

One aspect that deserved more attention and, in many ways, lies at the heart of the debate regarding sustainability, is the issue of policing the oceans. Even areas relatively close to land can be problematic to monitor never mind the high seas. This perspective would have helped many responses improve their level of evaluation.

Question 17*

Topic 3.4 – Future of Food

17* 'Physical threats to food security in dryland areas are greater than human threats.'
Discuss. **[33]**

There were few responses to this question. Those that did discuss the physical threats tended to be secure in their knowledge and understanding of the causes and consequences of these such as changing farming practices, increasing demand for firewood and climate change. A few candidates restricted their answers to a catalogue of the threats but did not offer explicit analysis and / or evaluation. Others, however, recognised that it is hard, if not impossible, to separate the physical from the human causes of threats to dryland areas. While they recognised that climate variability has always been a feature of dryland areas, the increasing impacts of anthropogenic climate change are becoming all the more apparent. Aspects such as exposure to high winds and infertile soils can also be linked to human influences such as through over-cultivation and over-grazing.

Most responses set their discussion in the context of countries such as Mali, Niger or Chad. There were opportunities to evaluate the role of human threats in the Sahel such as the geo-political tensions that afflict much of the region. These tensions which also translate into armed conflict result in dislocation of populations with the consequence that food insecurity becomes a real threat.

Question 18*

18* 'The issues created by globalisation of the food industry are greater than the opportunities.' To what extent do you agree with this statement? **[33]**

Candidates were convincing in their understanding of the term 'globalisation' with the most authoritative responses able to give examples related to this option. In this context the growing integration and interdependence of the food industry was exemplified by references to TNCs such as agro-chemical operations (Monsanto), farm equipment manufacturers (JCB and John Deere) and agricultural trading and processing companies (Cargill and Heinz.) Candidates' day to day experiences of the globalisation of the food industry would include major food retailers such as Walmart, Tesco and Sainsbury who operate globally to source food products, an observation very few candidates made.

Issues created by globalisation were generally better known and understood than the opportunities. Often mentioned issues were food miles and the rise of TNC fast food retailers (KFC and McDonalds for example) which was linked to the rise in obesity levels in both ACs and some EDCs. One more complex issue which was dealt with successfully by a small minority of candidates was that of food price shocks. Within a globalised food system, catastrophic change in one location can bring about serious impacts in food security in faraway places. The example that tended to be cited was the Russian invasion of Ukraine with the subsequent inflation in the global prices of foods such as sunflower oil and cereals.

In the majority of responses, opportunities required rather more attention. The sharing of technology and innovation that improved food production was not as well-known as it might be. One example is the increasing use of mobile applications that allows farmers in relatively remote regions to access advice from botanists and vets about their crops and livestock. With countries in EDCs and some LIDCs moving straight into mobile technology this opportunity has much potential.

Question 19*

Topic 3.5 – Hazardous Earth

19* 'The impacts of tectonic activity on a country are mainly environmental.' Discuss. **[33]**

This was the more popular of the two questions in this option although not by a substantial margin. The question allowed material to be drawn from either seismic events or volcanic activity and the majority of candidates took advantage of this. It was encouraging to read answers that evaluated which of the two types of tectonic activity might create the greater impacts on an area.

Candidates usually began with a consideration of environmental impacts. The quality of this discussion tended to be governed largely by the quality of detail included in the response. For volcanic activity, environmental impacts could include types of tephra (ash, volcanic bombs, pumice for example), lava flows (the more authoritative responses distinguishing between basic and acid lava), pyroclastic flows and lahars. Less commonly read were accounts of the impacts of hazards such as toxic gases (Lake Nyos being the example usually quoted) and flooding as in jökulhaups in Iceland. In terms of seismic activity, candidates tended to focus on ground shaking, liquefaction and tsunamis. In the context of the latter, assessors were encouraged to read those analyses that recognised that not all underwater earthquakes generate a tsunami. These responses displayed thorough to comprehensive knowledge and understanding of the need for an underwater earthquake to displace water above the seabed for a tsunami to form.

Many candidates analaysed environmental impacts in terms of magnitude of event although there was evidence of muddled knowledge and understanding of how this is quantified. A possible indicator of a higher-level response was whether the discussion included a consideration of scale of impact. A valid evaluative point was made by some that seismic activity tends to impact at a local to regional scale. While it is true that similar spatial impacts are the product of volcanic activity, many eruptions have widespread impacts including global. Rarely does an earthquake's impact extend across a wide area, the 2004 Indian Ocean and 2011 Tōhoku tsunamis being notable exceptions.

Candidates then turned to analysing impacts other than environmental, with most offering a combination of factors categorised as economic, social or political. Much very effective analysis and evaluation was read, especially if it considered significant factors such as the timing of an event, in terms of time of year and time of day. For example, the eruption of Nevado del Ruiiz, Colombia in 1985 generated a mudflow that struck the town of Armero during the night when most of the town's inhabitants were asleep.

An indication of a comprehensive approach was the inclusion of an appreciation that some environmental impacts might have positive effects. Frequently mentioned in this context was the potential for volcanic material to be weathered into fertile soils. A few candidates made the very valid point that geothermal energy and or tourism can be encouraged by volcanic activity, the example of Iceland being quoted in this context.

Question 20*

20* 'Human factors contribute more than physical factors to the risks posed by severe tectonic hazards.'
How far do you agree? **[33]**

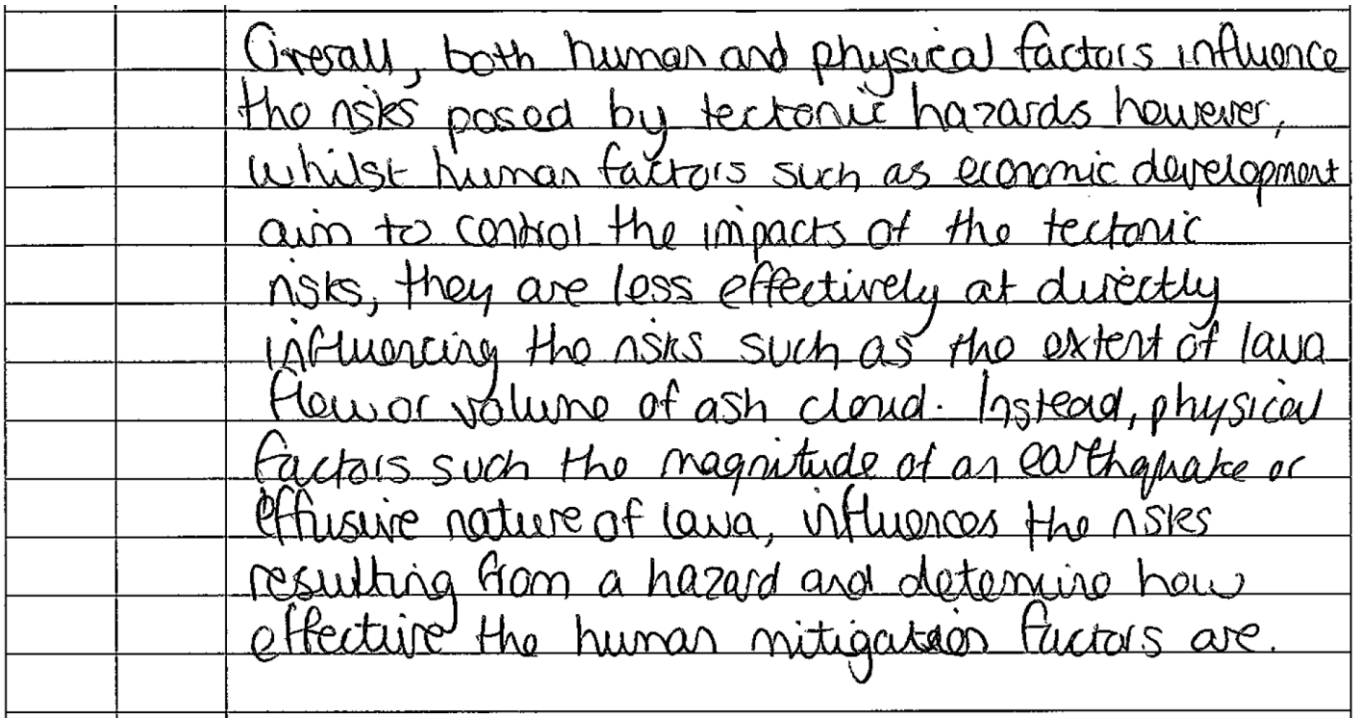
Although less popular than the other question in this option, it generated a wide range in quality of responses. As with Q19, material could be drawn from either seismic events or volcanic activity with a good number of candidates taking advantage of this.

Responses reflected the structure evident in the question, namely comparing a range of human and physical factors for different tectonic hazards. The physical factors commonly discussed were the magnitude of an event, its nature (type of lava, liquefaction, tsunami) and degree of predictability (seismic events very limited, most volcanic eruptions more possible). One factor that the more thoughtful discussions included was that of wind direction. This was exemplified in the context of the eruption of Eyjafjallajökull in 2010 with the disruption in air traffic across Europe and beyond due the distribution vertically and horizontally of the ash cloud. This example and that of the 2011 Tōhoku earthquake and subsequent tsunami were used to good effect by many to make the point that even the best prepared and technologically advanced societies can be overwhelmed by high magnitude events.

Human factors tended to focus on contrasts across the development continuum, examples frequently quoted in this context were Japan for a range of tectonic hazards, Iceland, Indonesia and the DRC for volcanic eruption and Nepal and Haiti for seismic hazards. Comments about degrees of vulnerability and resilience were helpful in this context. It was encouraging to read analysis of the influence of the political situation in locations affected by tectonic hazards as having a bearing on all aspects of hazard management, pre-disaster, the event itself and subsequent relief, rehabilitation and reconstruction.

An example of a thoughtful evaluation is given below in exemplar 4.

Exemplar 4


Overall, both human and physical factors influence the risks posed by tectonic hazards however, whilst human factors such as economic development aim to control the impacts of the tectonic risks, they are less effectively at directly influencing the risks such as the extent of lava flow or volume of ash cloud. Instead, physical factors such the magnitude of an earthquake or effusive nature of lava, influences the risks resulting from a hazard and determine how effective the human mitigation factors are.

Assessment for learning

The use of case studies is a prominent element in the Hazardous Earth option. Given the breadth of approaches that can be taken when teaching, learning and assessing the topics in this option, a wide range of real-world exemplification is valuable. Examples which date from some time ago are equally valid in this context, sometimes more so due to the particular circumstances of an event. The eruptions of the Soufrière Hills, Montserrat (1995 – 2013), Mount Pinatubo, Philippines (1991) and Nevado del Ruiz, Colombia (1985) and seismic activity off Peru's coast (1970) causing substantial avalanches and rockfall from Huascaran that hit the town of Yungay continue to be examples worthy of study today.

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