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# Examiners' Report
# June 2019

## GCE Geography 9GE0 01

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# Introduction

The June 2019 paper was as with the June 2018 paper generally accessible to candidates across the ability range. As with last year there was evidence of high-quality work that was awarded the highest marks in all of the high mark tariff questions. In terms of the two option questions, question 3 ('Coasts') was again far more popular than question 2 ('Glaciation').

It was pleasing to see that centres and candidates had responded to the comments made in the last examiners report. There was far less evidence of non-completed scripts as well as fewer candidates using extra paper in completing their responses. In particular it was pleasing to see that candidates are now limiting themselves to 2 sides of writing for the Q01(b).

It was also pleasing to see that candidates have been well trained in reading the questions more carefully as there was less evidence of candidates misinterpreting questions. Perhaps the one exception was Q01(b) where a significant number of candidates simply compared the impacts of two tectonic events and then related this to 'good' and 'bad' management. It is difficult for candidates to access the highest marks available unless their answer is tightly focused on the question set and centres should remind their students that they need to spend time both reading the questions as well as planning their answers for the higher tariff mark questions.

There was also less evidence of candidates not knowing the exact meanings of the various command words used in the examination which are explained on page 95 of the specification. It was particularly pleasing that a problematic question from last year, the 3-mark Q04(a), was answered far more successfully with most candidates offering an explanation of the impacts on the changes shown on the carbon cycle as opposed to merely a description of the changes in the production of biofuels.

Centres are also to be congratulated in coaching their candidates into the meanings of words such as 'contribute'. In both Q02(a)/(b) and Q03(a)/(b) the word 'contribute' is clearly inviting the candidate to suggest other processes or factors that have led to the development of the landscapes shown. It was pleasing that many candidates took this on board and developed their answers by discussing sub-aerial processes in Q02(a)/Q03(a) or vegetation succession in Q03(b).

It was also pleasing that there were far fewer self-penalising mistakes made in the 20-mark essay questions. Unlike in June 2018 when there were some concern over the candidates' knowledge and understanding of the difference between mitigation and adaptation, the essays this year did not highlight such gaps in the candidates' knowledge. The only concern was the conflation of river and coastal flooding in Q03(d). Whilst coastalisation was a valid point to make in an essay on the main cause of the rising risk of coastal flooding, a minority of candidates then related this to the increase in impermeable surfaces leading to higher fluvial flood risks.

## *Question 1 (a) (i)*

This was a stepped question that proved effective in discrimination. The vast majority of candidates were able to correctly calculate the mean as being 98.8 (and 99 was allowed when rounding up).

## *Question 1 (a) (ii)*

Many candidates also were able to correctly calculate the median as 11, although a significant minority gave the answer as 10-12.

## *Question 1 (a) (iii)*

Centres are reminded that statistics of central tendency are a key tool in the analysis of geographical data and should be the starting point of the analysis of data collected either on one of the four days of statutory fieldwork or the Independent Investigation.

There is a comprehensive list of the skills at the end of each of the sections of 9GE0/01 and centres are reminded that the AO3 marks can come from any of skills not just the ones listed after the section on Tectonic Processes and Hazards.

## *Question 1 (b)*

This was a question that was accessible for all candidates but many failed to address the key element of the question which was why the management of tectonic hazards varies in its effectiveness. Although a variety of approaches were acceptable, such as comparing the effectiveness of the management of different types of tectonic hazard as well as the effectiveness of different types of management, too many candidates either explained how tectonic hazards could be managed or simply explained why the impacts of two hazard events varied.

It was also disappointing to see that many candidates were relying heavily on only two case studies (Haiti 2010 and Tohoku 2011). Centres are reminded that candidates should be studying a range of volcanic and seismic hazards in a range of tectonic settings.

The best responses however outlined what they understood by the term effective management and often used a framework such as the hazard management cycle to assess why some approaches to managing tectonic hazards were more effective than others.

(b) Assess the reasons why managing the impacts of tectonic hazards varies in its effectiveness.

**(12)**

The effective management of tectonic hazards relies on strong governance, from a large, national scale to local. Yet, the physical factors also play a role in how effective management is, as reducing the impacts may be more difficult with a more intense event.

A country's economy plays a vital role in the effectiveness of tectonic hazard management, as efficient management of the impacts may be hindered by a small economy. The earthquake in Bam, Iran saw 85% of buildings collapse, due to ~~their~~ poorly them being poorly built. Perhaps, with more capital investment, the buildings could have been strengthened, and the impacts would have been reduced. Furthermore, a large economy is key for social development, which is seen in Japan, where tectonic hazard procedures are in the curiculum in schools. ~~This is key for~~ Such Education such as this is key for saving lives, which is one impact of hazards needing to be managed.

Yet, lack of funds is not the factor for ineffective management in all cases. The earthquake in Sichuan saw hundreds of schools collapse, which was since discovered to be linked with corruption in

the government, who diverted funds that were meant to be spent on strengthening school infrastructure.

Finally, management effectiveness can vary due to physical factors. Multiple hazard zones may struggle to manage multiple hazards over a short period of time. An earthquake hit the Philippeans just 8 months before Mt. Pinatubo erupted, putting stress on the already limited governance to try and balance the management of all of these impacts.

Overall, it is clear that a range of human and physical factors influence the effectiveness of the impact of tectonic hazard management, but economic limitations is ~~resistant~~ a key restrictor of effective management.

**(Total for Question 1 = 16 marks)**

**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant knowledge and understanding of why the effectiveness of the management of tectonic hazards varies throughout the answer. The candidate also produces a full and coherent interpretation that is relevant and supported by evidence drawn from Iran, China and the Philippines.The candidate also makes supported judgements about the significance of factors throughout the response leading to a balanced and coherent conclusion. Level 3: 9 marks.

**ResultsPlus**
**Examiner Tip**

Although the response was strongly focused on the question, with a range of reasons and support, it could have been improved if the candidate had outlined how they were to assess effectiveness – lives saved/lost or cost or both.

# *Question 2 (a)*

This question was generally answered well. Most candidates recognised that the photograph showed a corrie/cirque with a characteristic steep back wall and pronounced lip. There were often good explanations of plucking, abrasion and crushing with some noting the possible striations in the foreground. However, to obtain top level marks it was essential to address the key word 'contribute'. Such landscapes have undergone thousands of years of post-glacial modifications and candidates should be aware of the contemporary process that are occurring in such relict landscapes.

**2** Study Figure 2a in the Resource Booklet.

(a) Explain the contribution of glacial erosional processes to the development of this landscape.

**(6)**

Figure 2a in the resource booklet shows a corrie formed in the landscape. Erosional processes are key drivers in terms of corrie formation. One erosional process present is that of plucking, in which meltwater from the glacier infiltrates jointed geology and fractures. When glacial movement occurs, the rock frozen to the glacier is thus displaced and moved away, becoming entrained within the glacier. Plucking often contributes to the backwall formation of a corrie feature as is shown in 2a as meltwater may enter the bergschrund. This gives it a distinctive sharp and jagged appearance.* Furthermore, when this material from abrasion is entrained in the glacial system, it can contribute the erosional process of abrasion. Abrasion means that rock material and debris at the base of the glacier scours the rock beneath as it moves with the ice, causing rock underneath to be scraped away and eroded. This usually contributes to the over deepened hollow in a corrie basin and smoother floor, which is concealed beneath the tarn present here

* This may also be explanatory of the development of what could be an arrete on the right hand side of the picture.

**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant geographical knowledge and understanding of how glacial erosion can contribute to the development of the landscape shown. The candidate applies this knowledge and understanding to find fully relevant connections/relationships between the photograph and the question. Level 3: 5 marks.

**ResultsPlus**
**Examiner Tip**

Although this response was awarded a top band mark, it was not worth the maximum,as it does not fully address the contribution of the processes to the development of the whole landscape, as it was narrowly focussed on the corrie.

## *Question 2 (b)*

Although many candidates identified the landscape as one of either a swarm of drumlins or hummocky moraines, some candidates merely wrote all they knew about glacial depositional features including outwash plains and eskers which could not have conceivably been represented in the photograph. Centres are reminded to practise such questions by giving their candidates images of different landscapes and not always rely on diagrams showing classical landscapes of lateral/medial/terminal moraines.

Study Figure 2b in the Resource Booklet.

(b) Explain the contribution of glacial deposition to the development of this landscape.

(6)

The landscape is composed primarily of glacial till. This occurs when the force between the material a glacier is carrying and the bed is larger than the energy of the moving glacier this forms a till plane composed of ablation till which is caused by glacial melting add alpasing material as well as lodgement till which is material deposited under moving ice. The Glacial deposion material is angular drops material unsated and unsranted which is why the till plane is so uneven. It is angular as material is not eroded by action as in a river bed. Furthermore in a glacial meltwater deposion the deposited would be layered as a result of seasonal flows. In summer there is more melt water so larger material can be deposited compared to in winter where smaller material is deposited however this does not occur in glacial deposites. Lastly a meltwater river drops the largest particles first but does have energy to carry smaller deposites further. This does not occur in glacial deposites and all material is dropped at once. These factors create the chaotic appearance of the landscape

**ResultsPlus**
**Examiner Comments**

This demonstrates geographical knowledge and understanding of how glacial deposition can contribute to the development of the landscape shown but only has some relevant connections/relationships between the photograph and the question. Level 2: 4 marks.

**ResultsPlus**
**Examiner Tip**

The candidate could have improved their answer by linking their knowledge and understanding of glacial depositional processes to the landforms in the photograph – swarms of drumlins or hummocky moraines.

## *Question 2 (c)*

This was found accessible by the vast majority of candidates. A variety of approaches were successful including comparing the needs of active and relict glaciated landscapes as well as those based on explaining the needs of different stakeholders.

(c) Explain why a range of approaches is needed to manage glaciated landscapes.

**(8)**

Glaciated landscapes are fragile environments, both active and relict retain important biodiversity, stores of freshwater and can play significant roles in the water and carbon cycles. The management must be aimed at people on a local, national and global level therefore requiring different approaches for each.

locally it is vital that the importance of preservation is expressed through education and local schemes it is important as locals are primarily affecting the landscape through farming, forestry and tourism. This form of management allows them to value the environment and promote it's protection.

on a national scale the governance of landscapes is vital, through designated areas as national parks or SSI the landscapes are still protected but can be used by the public promoting education and enjoyment.

Globally, international agreements on management of locations such as Antarctica have been essential in management through agreement of all parties the preservation has been effective through IAATO and Arctic treaty. It is not only landscapes to be managed but factors such as climate change which can indirectly impact and therefore if managed have less impacts on glaciated landscapes

**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant geographical knowledge and understanding of why a range of approaches are needed to manage glaciated landscapes. It has a broad range of geographical ideas, which are detailed and fully developed. Level 3: 6 marks.

**ResultsPlus**
**Examiner Tip**

Although the response has a range of ideas such as scale, governance, fragility, agreements and climate change it needed some factual support to obtain higher marks.

## *Question 2 (d)*

This was generally answered well and centres are to be congratulated for their excellent teaching. Many candidates were able to relate changes in mass balances to the rate of glacier movement and then evaluate the impact of such changes against other factors such as the type and size of the glacier as well as topographic and geological factors. It was also pleasing to see that the very best responses considered both internal and external rates of movement.

(d) Evaluate the view that the rate of glacier movement is mainly determined by variations in the mass balance of a glacier. + Type of glacier + Altitude + latitude Topography (20)

The mass balance of the glacier refers to its budget - this is simply the difference in inputs to the glacier and outputs from the glacier. It certainly plays a huge role in determining the rate of glacier movement so much that it is the main determinant of the rate of glacier movement, I think.

Variations in the mass balance determine the rate of glacier movement because simply, if inputs entering the zone of accumulation exceeds outputs exiting the zone of ablation then the glacier will advance downslope but will retreat if outputs > inputs. This has been the trend for the past 19 years since 2000 - 70% of the glaciers worldwide have retreated upslope and lost upto 30% of their original mass. For example, the Mêr de Glace in France lost 5% of its initial mass since 2000. Variations in the mass balance of a glacier are clearly very significant as there haven't been any exceptions where a positive mass balance has lead to negative net movement and vice versa. Therefore, obviously, the greater the mass balance the more extreme the rate of glacier movement will be.

However, another factor that determines the rate of glacier movement is the type of glacier. Glaciers can either be warm based glaciers (found in high altitudes of tundra regions) or cold-based glaciers (found in both high and low altitudes of high latitude places, for example; Antarctica.) They can also be a polythermal glacier which is a mixture of both.

The type of glacier greatly affects the rate of glacier movement. Warm-based glaciers such as those in the Rockys tend to move at faster rates than ~~the~~ cold-based glaciers because the mass balance is more dynamic. Changes are more extreme. The fact that it's due to the nature of the mass balance shows how significant it is, in determining the rate of glacier movement. However, although the type of glacier ~~greatly~~ greatly influences glacier movement rate, there is an evaluation point to be made. Not all glaciers follow this view. Some glaciers such as the Variedal Glacier move at rates ranging from 0.6m/day → 60m/day. These glaciers are known as surge glaciers - small changes in the dynamics of a glacier reflect with huge extremes of glacier movement. Therefore, in this case, a significant determinant of the rate of glacier movement is the nature of the glacier. However, I still think that the glacial mass balance is more significant so far.

A third factor which determines the rate of glacier movement is the topography of the land. Due to the natural force of gravity a glacier which occupies a steep slope with a high gradient will move at a quicker rate due to gravity ~~playing a greater role~~ forcing the glacier downslope. Likewise, a glacier on a steady, flat slope such as those travelling through a valley will move at a more steady rate due to gravity playing a less pivotal role. Therefore, in theory, the topography and relief of the land ~~is~~ importantly determine the rate of glacier movement but in reality there are many glaciers found on steep slopes with a slow movement rate (mainly due to other reasons. For example, the Wilkes Glacier in Antarctica is located on a steep slope however its movement rate is slow - mostly due to the fact that it is a cold-based glacier and ultimately its mass balance is not

favourable for fast movement.

Overall, based on my evidence, there are multiple factors which determine the rate of glacier movement however these either are insignificant such as the nature of a glacier because it is a rare occurence or originally root from the dynamics of a glacier and therefore its mass balance. ~~Therefore in conclusion~~ I think that the arguments for glacier type and mass significant but the main determinant of ~~these~~ the type of glacier is its mass balance so this favours my orginal view. Also, my final point on topography wasn't as significant ~~because~~ as because in reality there are many glaciers on steep slopes which are slow so it is inaccurate - also the cause of this tends to be due its mass balance so again, my initial argument is favoured by. Therefore, overall, I agree with the view that the rate of glacier movement is mainly determined by variations in the mass balance of a glacier.

**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant geographical knowledge and understanding of the influences on the rate of glacier movement. The candidate applies this knowledge and understanding to produce a full and coherent interpretation that is supported by evidence and comes to a rational, substantiated conclusion. Level 3: 17 marks.

**ResultsPlus**
**Examiner Tip**

This was a well-supported response with details on the rate of movement for a range of ideas that comes to a clear judgement. The answer could have been improved if the candidate had considered internal and external rates of flow.

## *Question 3 (a)*

This question was generally answered well. Most candidates recognised that the photograph showed a broadly vertical cliff with a pronounced wave cut notch and well developed wave-cut or marine platform. There were often good explanations of hydraulic action, abrasion and corrosion. It was also pleasing to see that a large number of candidates also responded to the key word 'contribute' and explained how such landscapes are also the result of lithology, geological structure as well as mass movement and weathering.

**3** Study Figure 3a in the Resource Booklet.

(a) Explain the contribution of marine erosional processes to the development of this landscape.

**(6)**

Figure 3a shows a Wave cut platform and a Wave cut notch. These are formed by erosional processes. Hydraulic action of the waves will exploit weaknesses in the rock at the base of the cliff, such as cracks and joints. These Corrosion and attrition may also account for some of this erosion. Rock such as limestone may also react with the slightly acidic water and erode the rock. The base of the cliff will erode into a Wave cut notch and keep retreating. Subaeriel processes such as weathering alongside gravity will cause the hard rock above the notch to collapse. The collapsed rock will be broken apart by attrition (rocks hit into each other by wave energy) and transported away from the cliff through longshore drift. The remaining rock at the bottom, below where the original Wave cut notch, is the Wave cut platform shown in figure 3a.

**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant geographical knowledge and understanding of the contribution of erosional processes to the landscape shown. The response applies knowledge and understanding to geographical information logically to find fully relevant connections/ relationships between the photograph and the question. Level 3: 5 marks.

**ResultsPlus**
**Examiner Tip**

This response correctly identified the processes of hydraulic action as well as corrosion. It also examined how sub-aerial processes could also have played a role in the development of the landscape. It could have examined the processes occurring on the top of the cliff where there is a distinct change in cliff profile.

## *Question 3 (b)*

This question was not answered as well as Q03(a). Although many candidates identified that the landscape contained a beach and probable sand dunes there were not many responses who could explain the likely causes of the formation of the beach or the dune system. A sizeable minority explained transportational processes in detail which were self-penalising.

Study Figure 3b in the Resource Booklet.

(b) Explain the contribution of coastal deposition to the development of this landscape.

**(6)**

Coastal deposition occurs when material is eroded by waves and transport before being released when the waves lose energy. This has caused a beach to form in the foreground, where rocks have been broken down due to attrition and are deposited. The waves seem to be low energy so there may be more constructive waves, causing deposition. The sandbank has formed in the foreground on the right due to wind blowing sand. The deposition of sand provided material to be blown and produce the sand dune. The deposition of sand on the beach provided an environment for pioneer species to grow - such as marram grass. Plant succession has then taken places where pioneer species make the environment less hostile and more favourable for other species to grow (eg. by adding humus). This has contributed to plant growth all the way into the background

**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant geographical knowledge and understanding of how deposition may have contributed to the development of this landscape. It applies knowledge and understanding to geographical information logically to find fully relevant connections/ relationships between the photograph and the question. Level 3: 6 marks.

**ResultsPlus**
**Examiner Tip**

This answer had a range of ideas which were accurate and relevant including beach formation as well as details on wave type as well as succession with a focus on the development of the landscape.

## *Question 3 (c)*

This question mirrored Q02(c) and was also equally accessible to the vast majority of candidates. There were typically two approaches – one structured their answer on the type of coastal management used (Do Nothing, Hold the line etc) and explained using examples of why different approaches were used. Others structured their answers around the factors that led to different management approaches being used (land value, environmental sensitivity, rate of recession). Both approaches allowed candidates access to all levels of the mark scheme.

(c) Explain why a range of approaches is needed to manage coastal landscapes.

(8)

Coastal landscapes can experience a variety of processes that affect its shape. One outcome is the recession of a coastline. where methods such as hard or soft engineering can take place to prevent this. Hard engineering uses more physical and expensive methods to maintain a coastline. Graynes will trap sediment and prevent it from moving along a coast whereas rip rap will breake up wave energy and reduce erosion. This would vary depending on the amount of funding and the extent of the recession or rate. // Soft engineering uses more natural methods to prevent coastal erosion such as beach replenishment or managed retreat. This would be affective if there were nature reserves or natural environments that needed protecting. The method used along a coast would depend on the land value (e.g. tourist industry) and whether the cost of protecting the coast will balance the outcome - cost benefit analysis. Some sediment cells require multiple methods along it as a resolution in one section of the coast may affect another area further along.
- Some coasts are receding faster than others.

**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant geographical knowledge and understanding of why a range of approaches is needed to manage coastal landscapes. Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. Level 3: 6 marks.

**ResultsPlus**
**Examiner Tip**

A range of ideas are considered such as extent of recession, environmental sensitivity and land value.

## *Question 3 (d)*

This question was generally answered well. Most candidates displayed good knowledge and understanding of the causes of coastal flooding and the best answers addressed the key word: 'risk'. This allowed candidates to evaluate whether rising sea levels were indeed the main factor in the increasing risks of coastal flooding. A few candidates, however, did not read the question carefully enough and were diverted into accounts of river flooding. These accounts were therefore self-penalising.

(d) Evaluate the view that coastal flood risks are increasing mainly because of rising sea levels.

Plan:

| Agree | Disagree |
|---|---|
| • Rising sea levels threatening low lying areas e.g. Kiribati | • ground subsidence due to overextraction ↳ Bangladesh → overall + troughs |
| • Rising sea levels kill plants via salinisation which reduces interception, worsening overall flooding in the area e.g. Bangladesh → | • deforestation further upstream (Himalayas) = saturated ground = no capacity = floods |
| • RSL ~~rise~~ | • Risk itself amplified by urbanisation along coasts → no risk if no people. |

(20)

Answer:

There are several factors that are responsible for increasing the risk of coastal flooding, including rising sea levels. Sea levels can rise due to eustatic change, where the level of water ~~rises~~ rises in respect to the land, such as through ice sheets melting, increasing freshmelt water flowing into the North Atlantic or isostatic change, as the land decreases in height compared to the sea level, such as is occuring in South England, where rising land in Scotland due to decreasing ice pressure as post-glacial adjustment causes the entire ~~the~~ island to rebalance.

One way in which rising sea levels, namely eustatic changes, impact the risk of coastal flooding is if the sea level is changing in respect to already very low lying land. In the Pacific, the sea levels rising pose a great risk of flooding and potentially submergence to the islands of Kiribati. ~~The~~ Kiribati is very low lying, at only 0.5 metres above sea level in many places. As sea levels are predicted to rise by up to a metre by 2100, as stated by the Intergovernmental Panel on Climate Change, the islands could be flooded by 2050, or ~~as~~ as have severe flooding by 2040.

However, low lying land can increase flood risk without sea level rise. Much of Bangladesh, on the delta of three major rivers, suffer from ground subsidence, and this issue is ~~esp~~ worse in the 'troughs' across the country. As the ground subsides, due to various reasons including saturation of the top soil layer, the height of the land in respect to the sea decreases, allowing coastal floods to surge

further inland, and consequently, worsening the risk. In comparison to the issue of sea level rise however, the coastal flooding risk is likely ~~exacer~~ exacerbated more by overall rising sea level than land subsidence in select regions.

Sea levels rising can also cause vegetation to die, consequently increasing flood risk. As saline water encroaches on the land, it can infiltrate soil, and contaminate the freshwater sources. This can poison vegetation that is not adapted to salty conditions, leading to a higher risk of ~~flooding~~ coastal flooding as there are fewer natural barriers to incoming storm surges. However, in this case, there are factors that may impact the flood risk more than sea level rises. In some areas of Sri Lanka, mangroves were cleared to allow for shrimp farming, and these areas were worse effected by the 2004 Indian ocean tsunami than areas where mangroves remained, with 30 fatalities compared to none in some villages. Additionally, in Bangladesh, the deforestation by Himalayan peasants upstream on some of the rivers that lead to the country reduces interception after heavy monsoon rainfall, increasing the speed of run off into the rivers, and therefore greatly increasing the risk of flooding downstream in Bangladesh, as the ground becomes highly saturated as ~~does~~ the rivers flood the deltas, particularly extensively in Bangladesh as over 80% of the nation is floodplain. This in turn exacerbates coastal flooding risk as the ground is already saturated if coastal flooding occurs, meaning it takes longer to drain. In comparison to the natural removal of vegetation through saline contamination, the anthropogenic impacts are much worse than these caused by rising sea levels.

Overall, ~~it is~~ the increasing risk of coastal flooding is caused by a range of factors, but it is ~~more~~ easier to argue that anthropogenic factors have had a greater influence on the risk levels of coastal floods than the sea level change itself. Firstly, whilst changes in sea level pose a risk to low lying land such as Kiribati and Bangladesh, it is the presence of urbanisation that actually makes flooding a risk, as if the land was still untouched floodplain, the floods, such as occur annually to 18% of Bangladesh, would not be dangerous, as the natural ~~an~~ flora and fauna would likely be able to adapt to regular flooding, whilst ~~less~~ humans are less adaptable. Secondly, as already concluded, the impact of sea levels rising and damaging vegetation is minimal in comparison to the artificial removal of vegetation, both downstream by the coast and upstream, such as in the Himalayas.

**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant geographical knowledge and understanding of the importance of rising sea levels in causing the increase in coastal flood risks. The candidate applies this knowledge and understanding to produce a full and coherent interpretation that is supported by evidence and comes to a rational, substantiated conclusion. Level 3: 18 marks.

**ResultsPlus**
**Examiner Tip**

This answer tackles both rising sea levels as well as other factors such as vegetation removal. In particular there is a very strong conclusion where the candidate evaluates the information provided and comes to a justified answer.

## *Question 4 (a)*

This was generally a question that was accessible to all candidates. Centres are reminded, however, that the use of the resource in such questions is essential if full marks are to be gained.

The question allowed a variety of interpretations. Some candidates suggested that this increase in biofuels would increase the carbon in the atmosphere as it would lead to deforestation. These candidates argued that as the deforestation meant that the rainforest would sequester more carbon than the biofuels the removal of this carbon sink would inevitably increase the amount of carbon in the atmosphere. Other candidates argued that as biofuels were carbon neutral the increased use of biofuels instead of fossil fuels would reduce the emissions to the atmosphere. Both ideas were accepted.

**4** (a) Study Figure 4a in the Resource Booklet.

Explain **one** impact of the changes in biofuel production in Brazil on the carbon cycle.

**(3)**

The increase in production of biofuels results in the deforestation of large areas of land. As a result less $CO_2$ is taken up by photosynthesis and stored in organic compounds. More remains in the atmosphere aswell as added to due to the burning of forests. In turn this accelerates the green house effect causing global warming.

**ResultsPlus**
**Examiner Comments**

The candidate receives 1 mark for stating that there is an increase in biofuel production and then a further 2 for explaining that this will increase the amount of carbon in the atmosphere as a result of less photosynthesis.

**ResultsPlus**
**Examiner Tip**

Candidates are reminded that the use of data from such resources is strongly recommended.

## *Question 4 (b)*

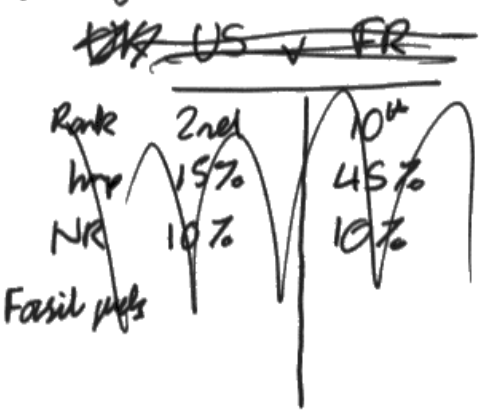
Although the vast majority of candidates found this an accessible question, some candidates mistook energy mix for energy consumption and as a result found it difficult to gain much credit.

The best candidates compared the energy mix of a range of countries at different levels of development and gave good explanations based on the ability of richer countries to be able to use a wider variety of primary and secondary energy sources. Many used the Kuznets curve model to show how as a country's economy develops the energy mix would change.

(b) Explain why the level of economic development affects the energy mix of countries.

(6)

It can affect energy mix because is a country has low levels of economic development, it may be in the process of industrialisation. This can affect energy mix as industrialising countries will have a higher consumption of coal. This is exemplified by China, whose main employment sector is manufacturing, correlating with their high coal consumption.//Countries with low levels of economic development may also not be able to afford using renewable energy. Renewable energy has high costs, in relation to exploration of technology and maintainance of infrastructure. This is exemplified by the erection of the Hornsea project in the UK, which costs the government £10 billion to produce, per wind paver.// A further reason could be that poor levels of economic development, result in some countries being forced to use their domestic physical resources, as they are unable to afford the high foreign import prices. This is exemplified by the the wealthy USA, only having to rely on 15% of their energy from foreign sources, whereas Cambodia rely on 54% of their energy from oversees.




**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant geographical knowledge and understanding of why the level of economic development affects the energy mix of countries. The candidate's understanding addresses a broad range of geographical ideas which are detailed and fully developed. Level 3: 5 marks.

**ResultsPlus**
**Examiner Tip**

The answer could have been improved by using a different example for the candidate´s last point. Although the candidate is correct that countries with a low level of development often have to rely on domestic energy sources the examples they use are clearly incorrect.

## *Question 4 (c)*

This was a question that appeared to challenge some of the candidates. Despite being a part of the specification (6.9a Future emissions… are uncertain owing to… feedback mechanisms… carbon release from peatlands and permafrost and tipping points) some candidates answered this by either writing about how permafrost or peatlands were formed or how carbon might be released from such stores. This did not allow these candidates to gain much credit for their responses.

Other candidates, however, gave excellent responses that combined a secure understanding of the feedback mechanisms caused by carbon releases from permafrost and peatlands with the uncertainties on how much carbon could or will be released in the future. Centres are reminded that these 8-mark questions will always focus on discrete parts of the specification as opposed to broad generalisations which often have the unintended effect of encouraging candidates to overwrite and so put in jeopardy their ability to complete the examination.

f.f over abstraction / increase. climate change ↳ carbon release

(c) Explain why there are uncertainties about future levels of carbon release from peatlands and permafrost.

(8)

Peatlands and permafrost both present vast stores of carbon that help reduce the stresses of atmosphere carbon ~~accelerating~~ the ~~inputs~~ causes of climate change. However, human and physical causes are causing changes within these stores. Peatlands have relatively recently been discovered as sources of carbon and oil for energy purposes, and as a result are being exploited and destroyed for human energy consumption. Not only are peat bogs long-term stores ~~of carbon~~ that trap millions of years old carbon, but are also very nutrient rich areas that aid in wildlife and plant growth that helps to ~~regulate~~ regulates carbon in the atmosphere. The processing of the fuels from peatlands also raise concerns about waste ~~etc~~ material and emmissions which lead to further carbon release. However, peatlands are considered non-renewable due to the length of their restoration, so it is uncertain how much more peatland destruction is exploitable. Ironically, the carbon release from permafrost is mainly caused by a rising global temperature from climate change caused by a build up of atmosphere carbon. Permafrost releases carbon that was stored in hard soil ~~on that~~ was permanently frozen through its thawing, releasing carbon into the air. It is uncertain whether the carbon release from permafrost is somewhat manageable or controllable as the land left after permafrost thawing is virtually unusable and doesn't have the right conditions to grow organisms (low soil mineral level and cold temperature).

ResultsPlus
Examiner Comments

This demonstrates some relevant geographical knowledge and understanding of the uncertainties about future levels of carbon release from permafrost and peatlands. The response addresses a range of geographical ideas, which have some details. Level 2: 5 marks.

ResultsPlus
Examiner Tip

Although the candidate addresses both peatlands and permafrost which was a key way in which to access top band marks, in this case it was kept to level 2 due to a lack of factual detail to develop their points.

## *Question 4 (d)*

This was a question that surprisingly a substantial number of candidates found challenging. The concept of water stress is not a new concept to this specification and had been examined in the previous series of examinations for the preceding specification. Despite this the answers showed that a number of candidates were insecure in their understanding of the key concept of water stress and the possible physical and human causes of future patterns of water stress.Furthermore, a number of candidates were insecure in their understanding of the location of the equator and the tropics.

Despite this there were some excellent responses which assessed the role of broad patterns of climate as well as climate change, increased El Nino events and over abstraction.

(d) Study Figure 4b in the Resource Booklet.

Assess the role of physical factors in influencing the pattern of future water stress.

(12)

Water stress is not having enough water to satisfy demands and can be caused by physical factors and human factors. The future pattern of water stress in Figure 4b shows the extremely high levels in ~~the~~ North Africa and the Middle East, with high levels in the US, Australia and much of Asia. Physical factors such as climate, weather and geographic location play a role in this pattern but human factors such as population density, demand for economic development and industry also play an important role.

The map shows most areas with extremely high and high water stress predictions are naturally arid areas that can be prone to drought. For areas such as the Middle East, including Yemen and Saudi Arabia, its geographic location means it's a naturally arid, hot area with little rainfall so as global temperatures increase, evaporation will also increase, with decreasing precipitation so groundwater aquifers will struggle to replenish themselves, showing how physical factors will influence its water stress. Furthermore, the increase in ENSO cycles would play a role. El Niño events will cause more droughts in Australia and South east Asia, threatening their water supply, corresponding to the figure.

On the other hand, human factors play a role in this pattern. Many countries ~~with~~ with high prediction of water stress may not be naturally arid, but have a high demand for water. In China

and India, the demand for water is large due to the fact they are a developing nation needing water for industry and many actively to grow their economy. Furthermore, their populations are growing rapidly, increasing demand even more, which causes water stress. Furthermore, their water supplies are threatened by pollution from waste water. In Australia, over abstraction is also a factor in its water stress. Water is needed by many sectors such as agriculture, mining and domestic use so sources are drained. This contributes to water stress levels as well as droughts and physical factors.

Overall, physical factors & climate and geographic location show naturally arid areas are at risk but human factors of level of demand due to population density, economic development and over abstraction also contribute, often with physical factors, to increase water stress in many countries.

**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant geographical knowledge and understanding throughout the future pattern of water stress. It applies knowledge and understanding to geographical information/ideas logically, making relevant connections/relationships to produce a full and coherent interpretation that is relevant and supported by evidence which is drawn together coherently in order to make rational judgements. Level 3: 12 marks.

**ResultsPlus**
**Examiner Tip**

This is an excellent assessment and not simply an explanation which looks at both physical and human factors. The response acknowledges the future (2040 map) with reference to increase in ENSO cycles.

## *Question 4 (e)*

This was a question that was answered well by the majority of the candidates. Examples used included the large scale water management in China, SW USA as well as desalination in Israel. Some argued that more sustainable approaches such as NEWater in Singapore could solve many of the problems that 'traditional' large scale water management schemes caused. This was acceptable as long as it was an evaluation of preceding examples of other large scale water management projects.

(e) Evaluate the view that large-scale water management projects often create more problems than they solve for people and the environment.

(20)

Large scale water management projects are often created to relieve water stress or water scarcity. However, these infrastructures are often created at the expense of the environment, for a variety of reasons, and may only function as a short term fix. Their cost-effectiveness at reducing water shortages may not be as effective due to their massive cost, and questionable alleviation of problems.

Reservoirs are created to increase access that locals may have to water supply. This is beneficial as it solves the short term water shortages, and can also increase bio-diversity in an area. However, one must recognise the negative impacts of reservoirs on a larger scale. Reservoir construction alters natural fluxes and processes in the water cycle. This can have more profound impacts on an entire drainage basin such as, more rapid rates of evaporation. An example of an ineffective reservoir would be in Derbyshire, where six hectares of temperate forest was destroyed to facilitate the building of a reservoir that ended up not being used. This shows the problems that large scale water projects create for people and the environment.

On the contrary, large scale projects have the ability to be exceedingly beneficial to humans and productivity. This is exemplified by the construction of the South → North water transfer project in China. This project has enabled communities with drought and water shortages to have

access to clean water. This in turn has reduced the number of deaths due to water-borne diseases by 50% in it's starting years. Better sanitation can lead to healthier people and a more productive workforce, sharing the positive resonating effects of large scale water management projects. This also helps to reduce inequalities within a nation.

However, one must recognise the severe threats to the environment that the erection of this infrastructure can cause, and the dangers created by them. The building of the Three Gorges Dam in China is said to have been the catalyst to a series of small earthquakes, due to water weight being heavier than air. This could have devestating affects on communities and infrastructure, which play an a very significant part in being detrimental to people, by building these projects, and the destruction of the environment

Another significant factor which can these projects can cause, is a strain on international political relationships. This is exemplified by the construction of the Ethiopia Renaissance Dam, on which used water from the contentious Nile source. This sourced is shared by 11 countries, and Egypt reacted pejoratively to its construction as Ethiopia appeared to be taking an unfair share of water. Water is crucial for economic and human-social development, such as industry, wellbeing and farming and is therefore highly sought after by all 11 countries. This shows that the projects can have a resonating, negative effect on people, and international

relations, across a whole continent, a very wide-spread, large scale impact.

To conclude, many positives are brought by LS projects such as an increase in human well-being and the opportunity to industrialise. They can also resolve water stress and scarcity problems, demonstrating the significance of the projects, in providing nations with the highly sought after resource. However, the negative impacts of their construction such as a loss of biodiversity, exacerbating natural hazards and straining international relationships outweigh their cost-benefit ratio, proving that as they are more significant, proving that the projects create more problems than they solve.

**ResultsPlus**
**Examiner Comments**

This demonstrates accurate and relevant geographical knowledge and understanding of the extentof rising sea levels in causing the increase in coastal flood risks. The candidate applies this knowledge and understanding to produce a full and coherent interpretation that is supported by evidence and comes to a rational, substantiated conclusion. Level 3: 17 marks.

**ResultsPlus**
**Examiner Tip**

This answer tackles both rising sea levels as well as other factors such as vegetation removal. In particular there is a very strong conclusion where the candidate evaluates the information provided and comes to a justified answer.

# Paper Summary

Based on their performance on this paper, candidates are offered the following advice:

- Ensure you understand the requirements of the differences in the command words particularly the differences between 'explain' and 'assess'. In both 12-mark questions a substantial number of candidates *explained* how management could reduce the impacts of tectonic hazards rather than *assessed* why some management approaches were more effective than others.

- Ensure that you have a glossary of key terms of the specification – a substantial number of candidates were not secure on the meaning of the word water stress.

- Ensure that you read the 8-mark explain AO1 knowledge questions carefully looking for key words such as 'and' which means that for top band marks both elements in the question need to be addressed.

- Be able to locate key countries and line of latitude on a world map.

- Ensure that in the 20-mark evaluate questions both sides of the argument are treated equally and that it is not an explanation of why one side of the argument is correct (ie the essay is balanced and has a coherent argument).

# Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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