GCE

Geography

H481/03: Geographical debates

Advanced GCE

Mark Scheme for June 2019

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations

Annotation	Meaning
	Highlight
	Off page comment
^	Omission mark
?	Unclear or Indicates material for which there is no credit
R	Rubric error placed at start of response not being counted
L1	Level 1
L2	Level 2
L3	Level 3
L4	Level 4
S	Synoptic link
DEV	Development of a point
IRRL	Significant amount of material which doesn't answer the question
SEEN	Used to denote that points had been seen and noted but mostly where credit was given
NE	No place specific detail
	Highlighting an issue e.g. irrelevant paragraph. Use in conjunction with another stamp e.g. IRRL or EVAL
BP	Blank page
EVAL	Evaluation

Subject Specific Marking Instructions

INTRODUCTION
Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper and its rubrics
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

USING THE MARK SCHEME

Please study this Mark Scheme carefully. The Mark Scheme is an integral part of the process that begins with the setting of the question paper and ends with the awarding of grades. Question papers and Mark Schemes are developed in association with each other so that issues of differentiation and positive achievement can be addressed from the very start.

This Mark Scheme is a working document; it is not exhaustive; it does not provide ‘correct’ answers. The Mark Scheme can only provide ‘best guesses’ about how the question will work out, and it is subject to revision after we have looked at a wide range of scripts.

Please read carefully all the scripts in your allocation and make every effort to look positively for achievement throughout the ability range. Always be prepared to use the full range of marks.

LEVELS OF RESPONSE QUESTIONS:

The indicative content indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance.

Using 'best-fit', decide first which set of level descriptors best describes the overall quality of the answer. Once the level is located, adjust the mark concentrating on features of the answer which make it stronger or weaker following the guidelines for refinement.

Highest mark: If clear evidence of all the qualities in the level descriptors is shown, the HIGHEST Mark should be awarded.

Lowest mark: If the answer shows the candidate to be borderline (i.e. they have achieved all the qualities of the levels below and show limited evidence of meeting the criteria of the level in question) the LOWEST mark should be awarded.

Middle mark: This mark should be used for candidates who are secure in the level. They are not 'borderline' but they have only achieved some of the qualities in the level descriptors.

Be prepared to use the full range of marks. Do not reserve (e.g.) highest level marks 'in case' something turns up of a quality you have not yet seen. If an answer gives clear evidence of the qualities described in the level descriptors, reward appropriately.

Quality of extended response will be assessed in questions marked with an (*). Quality of extended response is not attributed to any single assessment objective but instead is assessed against the entire response for the question.

	AO1	AO2	AO3	Quality of extended response
Comprehensive	A wide range of detailed and accurate knowledge that demonstrates fully developed understanding that shows full relevance to the demands of the question. Precision in the use of question terminology.	Knowledge and understanding shown is consistently applied to the context of the question, in order to form a: Clear, developed and convincing analysis that is fully accurate. Clear, developed and convincing interpretation that is fully accurate. Detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based.	Quantitative, qualitative and/or fieldwork skills are used in a consistently appropriate and effective way and with a high degree of competence and precision.	There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.
Thorough	A range of detailed and accurate knowledge that demonstrates well developed understanding that is relevant to the demands of the question. Generally precise in the use of question terminology.	Knowledge and understanding shown is mainly applied to the context of the question, in order to form a: Clear and developed analysis that shows accuracy. Clear and developed interpretation that shows accuracy. Detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence.	Quantitative, qualitative and/or fieldwork skills are used in a suitable way and with a good level of competence and precision.	There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.

	AO1	AO2	AO3	Quality of extended response
Reasonable	Some sound knowledge that demonstrates partially developed understanding that is relevant to the demands to the question. Awareness of the meaning of the terms in the question.	Knowledge and understanding shown is partially applied to the context of the question, in order to form a: Sound analysis that shows some accuracy. Sound interpretation that shows some accuracy. Sound evaluation that offers generalised judgments and conclusions, with limited use of evidence.	Quantitative, qualitative and/or fieldwork skills are used in a mostly suitable way with a sound level of competence but may lack precision.	There information has some relevance and is presented with limited structure. The information is supported by limited evidence.
Basic	Limited knowledge that is relevant to the topic or question with little or no development. Confusion and inability to deconstruct terminology as used in the question.	Knowledge and understanding shows limited application to the context of the question in order to form a: Simple analysis that shows limited accuracy. Simple interpretation that shows limited accuracy. Un-supported evaluation that offers simple conclusions.	Quantitative, qualitative and/or fieldwork skills are used inappropriately with limited competence and precision.	The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.

Question			Answer	Mark	Guidance

1	(a)		**Identify three limitations of Fig. 1 as a source of information about greenhouse and icehouse conditions.**
			
			The table shows geological periods and ice ages. Possible limitations include:
			
			• No time scale for either Periods or Ice Ages
			  ○ The estimated length of each Period / Ice Age is not given
			  ○ Periods / Ice Ages appear to be the same length - misleading
			• Only selected Ice Ages included
			• Greenhouse periods not indicated – assumed by default – not ice age
			• Details of icehouse or greenhouse not given – no indication of spatial extent or severity
			• Periods and Ice Ages relate to N.America (Huronian) and S.Africa (Karoo) – Europe not represented
				3
				AO3 x3
					AO3 – 3 marks
					3x1 (✓) for limitations of the data identified through critical questioning of the resource.

1	(b)		**Explain methods used to reconstruct past climate.** **Level 3 (5-6 marks)** Demonstrates **thorough** knowledge and understanding of methods used to reconstruct past climate (AO1). This will be shown by including **well-developed** ideas about the methods used to reconstruct past climate. **Level 2 (3-4 marks)** Demonstrates **reasonable** knowledge and understanding of methods used to reconstruct past climate (AO1).	6 AO1 x6	**Indicative content** **AO1 – 6 marks** Two methods well explained can reach L3. More methods but in less detail can reach L3. Knowledge and understanding of methods used to reconstruct past climate could potentially include: • Sea floor sediments – foraminifera builds up on the sea-floor within deposited sediments, the chemical composition of their shells indicates the temperature of the ocean when they were formed • Lake sediments – pollen deposited in sediments indicates vegetation type and paleoclimatic

			This will be shown by including **developed** ideas about the methods used to reconstruct past climate. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of methods used to reconstruct past climate (AO1). There may be **simple** ideas about the methods used to reconstruct past climate. **0 marks** No response or no response worthy of credit.		conditions; shells of diatoms reveal lake temperatures when they were formed; varves illustrate the conditions at the time of deposition e.g. dark layers are fine sediment in winter months whereas the lighter layers are coarse sediment (presence of meltwater) in spring/summer months • Ice cores – contain small bubbles of air which records gaseous composition of the atmosphere which give information on climatic conditions at the time the ice was formed • Tree rings – dendrochronology measures the width of annules each year (affected by moisture and / or temperature); the larger the sample of trees the greater the reliability, however some species more reliable than others e.g. oak compared with alder or pine which can miss years or have two growth rings in one year • Fossils – coral reefs are very sensitive to temperature, sunlight and water depth so fossil corals indicate the conditions when laid down in the past; some species e.g. herbivorous dinosaurs only survived in sub-tropical habits so their fossils indicate existence of those conditions • Spatial extent of glaciers / ice sheets in the past • Historical records e.g. crop prices; written documents e.g. diaries + paintings

Question			Answer	Mark	Guidance
2	(a)		**Identify three limitations of <u>Fig. 2</u> as a source of information about direct strategies to mitigate against an epidemic of a contagious disease.** The photograph shows a signboard outside an African village. Possible limitations include: • No information about public health (direct) measures, vaccination programmes, hazards suits, • Potential bias, based on who took the photo, and for what purpose e.g. might not be representative of the location; not a local language used – was the board put there by the photographer? Was it photoshopped? • Lack of information about when the photo was taken e.g. at the height of epidemic or afterwards • Literacy levels – can the sign be read • Information about a very small rural locality; nothing about strategies in urban or contrasting areas • 'African' – very diverse continent so not representative – stereo-typing	**3** **AO3 x3**	**AO3 – 3 marks** 3x1 (✓) for limitations of the data identified through critical questioning of the resource.
2	(b)		**Explain the role of an international organisation in providing global strategies to combat disease.** **Level 3 (5-6 marks)** Demonstrates **thorough** knowledge and understanding of the role of an international organisation in combatting disease (AO1). This will be shown by including **well-developed** ideas about the role of an international organisation in providing global strategies to combat disease.	**6** **AO1 x6**	**Indicative content** **AO1 – 6 marks** One role well explained can reach L3. More roles but in less detail can reach L3. Knowledge and understanding of the role of an international organisation in providing international strategies to combat disease could potentially include: • Accept broad definition of 'international organisation' e.g. WHO, UNICEF,USAID, charities such as Red Cross/Red Crescent,

			Level 2 (3-4 marks) Demonstrates **reasonable** knowledge and understanding of the role of an international organisation in combatting disease (AO1). This will be shown by including **developed** ideas about the role of an international organisation in providing global strategies to combat disease. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of the role of an international organisation in combatting disease (AO1). There may be **simple** ideas about the role of an international organisation in providing global strategies to combat disease. **0 marks** No response or no response worthy of credit.		Médecins San Frontières, Water Aid, Christian Aid, Gates Foundation. Also organisations such as GSK, Pfizer or Roche. • Predicting diseases e.g. WHO uses climate data to predict patterns of infectious diseases using early warning systems. Diseases monitored eg Cholera, Malaria, Dengue, Yellow fever, West Nile virus and influenza. • Gathering data e.g. All 194 WHO member states contribute to world health statistics including mortality (non-communicable and communicable diseases), government spending on healthcare, maternal provision, suicide rates etc. Gaps in the data (some countries do not provide the information requested, many deaths unreported). • Research e.g. WHO focuses on four key areas of health; capacity (strengthening health systems), priorities (support for health needs in middle and low income countries), standards (support for the creation of norms and good practice) and translation (creating affordable health technologies and evidence-informed policies). Pharmaceutical companies research into new treatments e.g. ebola vaccine. • Direct response to an epidemic or pandemic e.g. Red Cross in cholera outbreak Haiti 2010 • Promoting long-term development e.g. water quality, vaccination programmes, education

Question			Answer	Mark	Guidance
3	(a)		**Identify three limitations of Fig. 3 as a source of information about radioactive pollution.** The graph shows concentrations of radioactivity in the Northern Baltic Sea. Possible limitations include: • Data collection – reliability and accuracy issues e.g. sampling issues; how far below the surface measurements were taken; whether average, minimum /maximum readings; the exact location(s) where readings taken; change in quality of instruments; source of data • Nothing to indicate the causes of the high radioactivity level in 1986 (Chernobyl disaster), the smaller subsidiary peaks in 1991, 1995, 1998 or 2007, nor information on factors affecting the rate of decline • Information about radioactive pollution should include the impacts of radioactivity on local ecosystems, economic and recreational activities on coastlines bordering the Baltic – no details provided. • Average – could be mean, median or mode • Data ranges from 12 to 294, however the broken scale reduces visual impact of the highest bar • Only focuses on one place – further information about other places and how these figures compare would have been useful.	3 AO3 x3	**AO3 – 3 marks** 3x1 (✓) for limitations of the data identified through critical questioning of the resource.
3	(b)		**Explain horizontal and vertical variations of temperature in the world's oceans.** **Level 3 (5-6 marks)**	6 AO1 x6	**Indicative content** **AO1 – 6 marks** Two factors well explained can reach L3. More factors but in less detail can reach L3. The absence of either

			Demonstrates **thorough** knowledge and understanding of variations of temperature in the world's oceans (AO1). This will be shown by including **well-developed** ideas about horizontal and vertical variations of temperature in the world's oceans. **Level 2 (3-4 marks)** Demonstrates **reasonable** knowledge and understanding of variations of temperature in the world's oceans (AO1). This will be shown by including **developed** ideas about horizontal and vertical variations of temperature in the world's oceans. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of variations of temperature in the world's oceans (AO1). There may be **simple** ideas about horizontal and vertical variations of temperature in the world's oceans. **0 marks** No response or no response worthy of credit.		'horizontal' or 'vertical' restricts the response to bottom of L2. Knowledge and understanding of horizontal and vertical variations temperature could potentially include: • Horizontal surface temperatures vary with latitude and some night/day variations. Temperatures along the equator range from 35 – 16.5°C, temperatures fall to -2°C at the poles • Vertical variations include the thermocline where temperatures drop dramatically in the first kilometre of depth, and beyond that do fall but in very small increments • Ocean currents can be used to explain both horizontal and vertical variations eg warm and cold surface currents, pattern of circulation in the North Atlantic - surface and deep currents. • Solar insolation – latitudinal variation with a gradient high to low insolation from Equator to Poles • Albedo effect where sea ice (either permanent or seasonal) exists • Some locations experience substantial up-welling of cold water to the surface e.g. off coast of Peru • Some locations experience substantial inputs of relatively cold river water e.g. off the mouth of the Amazon

Question			Answer	Mark	Guidance
4	(a)		**Identify three limitations of <u>Fig. 4</u> as a source of information about food security in Somalia.** The choropleth shows classifications of food security in Somalia. Possible limitations include: • Date – year • Time of year e.g. season • Source of data - issue of accuracy / reliability • Subjective terms open to various interpretations; are they based on quantified data? • No information about variations within an area described as being in a particular Phase – an average is given • Boundaries give impression of sudden changes between areas which are not the case in reality • Lack of information re: physical environment e.g. climate; soils • Lack of information re: human environment e.g. pop^{n} distribution; transport infrastructure	**3** **AO3 x3**	**AO3 – 3 marks** 3x1 (✓) for limitations of the data identified through critical questioning of the resource.
4	(b)		**Explain how feeding the world is a complex system.** **Level 3 (5-6 marks)** Demonstrates **thorough** knowledge and understanding of how feeding the world is a complex system (AO1). This will be shown by including **well-developed** ideas about how feeding the world is a complex system. **Level 2 (3-4 marks)** Demonstrates **reasonable** knowledge and understanding of how feeding the world is a complex system (AO1). This will be shown by including **developed** ideas about how feeding the world is a complex system.	**6** **AO1 x6**	**Indicative content** **AO1 – 6 marks** Two components well explained can reach L3. More components but in less detail can reach L3. Knowledge and understanding of how feeding the world is a complex system could potentially include: • Complex system of growing, processing, transporting + disposing of consumer waste • Overall system consists of inputs, stores + processes and outputs. Within each sub-part operational systems exist e.g. within farming or retailing

			Level 1 (1–2 marks) Demonstrates **basic** knowledge and understanding of how feeding the world is a complex system (AO1). There may be **simple** ideas about how feeding the world is a complex system. **0 marks** No response or no response worthy of credit.		• Wide variety of physical inputs that vary spatially and temporally • Wide variety of human inputs that vary spatially and temporally • Wide variety of farming dominates production with food flowing to consumers through a number of complex chains • Processing, transport + retailing increasingly dominated by TNCs • All parts of the system impacted by trends e.g. rise in diary + meat eating in Asia, trends in ACs e.g. moving away from artificial ingredients → rise of organic lines • Consumption in ACs encouraging year round supply of non-seasonal products increasing complexity e.g. food miles • All parts of the system produce waste that can be recycled or not. • Role of government (local, national, trans-national) has substantial impacts on system

Question			Answer	Mark	Guidance
5	(a)		**Identify three limitations of <u>Fig. 5</u> as a source of information about earthquakes occurring in Iran.** The scatter graph shows the earthquakes occurring in Iran. Possible limitations include: • Lack of information about the source of this data e.g. government reports or USGS or similar body issue of accuracy / reliability of data • Nothing about their magnitude • Number of earthquakes only shown every three years so no record of any events between dates • Monitoring of earthquakes can change over time • Y axis in units of 50 therefore only estimate actual number of earthquakes • No locational data within Iran on the earthquakes • No impacts e.g. how severe (mortality; economic cost) • Another type of graph may be more appropriate as there is debate over the relationship between time and frequency of earthquakes	**3** **AO3 x3**	**AO3 – 3 marks** 3x1 (✓) for limitations of the data identified through critical questioning of the resource. If mentioning 'severity', response needs to be clear as to what is meant by the term in order to credit a mark.
5	(b)		**Explain the evidence for sea-floor spreading.** **Level 3 (5-6 marks)** Demonstrates **thorough** knowledge and understanding of the evidence for sea-floor spreading (AO1). This will be shown by including **well-developed** ideas about the evidence for sea-floor spreading. **Level 2 (3-4 marks)** Demonstrates **reasonable** knowledge and understanding of the evidence for sea-floor spreading (AO1).	**6** **AO1 x6**	**Indicative content** **AO1 – 6 marks** Two pieces of evidence (one of which needs to be palaeomagnetism) well explained can reach L3. More than two but in less detail can reach L3. Knowledge and understanding of the evidence for sea-floor spreading could potentially include: • Palaeomagnetism ○ Involves measuring small changes in the magnetism of rocks either side of a mid-ocean ridge

			This will be shown by including **developed** ideas about the evidence for sea-floor spreading. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of the evidence for sea-floor spreading (AO1). There may be **simple** ideas about the evidence for sea-floor spreading. **0 marks** No response or no response worthy of credit.		○ At divergent / constructive plate boundaries lava flows cool and solidify. As this happens the iron particles are locked in alignment to the magnetic pole which changes orientation every 400,000 – 500,000 years – some debate as to timings – accept also 200-250,000. Reversals not predictable and not periodic in nature. ○ Sea-floor spreading as the newer, younger lava erupts it 'pushes' the older solidified rock aside – ridge push process. • At ocean margins subduction of oceanic plate can occur contributing to 'slab pull process' also part of sea-floor spreading. • Age of sea-floor rocks ○ In the 1960s a drilling programme recovered cores in water up to 7,000m deep in the ocean floor. The cores revealed that the thickest and oldest sediments were nearest to continents ○ No oceanic crust was older than 200 million years ○ Evidence of continental drift ○ fossil evidence ○ glacial deposits showing evidence of the former supercontinent ○ shape of continents

SECTION B – SYNOPTIC QUESTIONS

Question			Answer	Mark	Guidance

6			**Examine how impacts of climate change can affect informal representations of place.**
			
			Level 4 (10-12 marks)
			Demonstrates **comprehensive** knowledge and understanding of impacts of climate change and informal representations of place (AO1).
			
			Demonstrates **comprehensive** application of knowledge and understanding to provide clear, developed and convincing analysis that is fully accurate of how impacts of climate change can affect informal representations of place (AO2).
			
			This will be shown by including **well-developed** ideas about impacts of climate change and informal representations of place.
			
			There are clear and explicit attempts to make appropriate synoptic links between content from different parts of the course of study.
			
			Level 3 (7-9 marks)
			Demonstrates **thorough** knowledge and understanding of impacts of climate change and informal representations of place (AO1).
			
			Demonstrates **thorough** application of knowledge and understanding to provide clear and developed analysis that shows accuracy of how impacts of climate change can affect informal representations of place (AO2).
			
			This will be shown by including **well-developed** ideas about **either** impacts of climate change **or** informal representations of place and **developed** ideas for the other focus.
				12
				AO1 x6
				AO2 x6
					Indicative content
					AO1 – 6 marks
					Knowledge and understanding of impacts of climate change and informal representations of place could potentially include:
					• Any impact of climate change is relevant, although candidates will probably focus on impacts e.g. rise in temperatures leading to alteration of flood events both in pattern and intensity, change in precipitation patterns leading to arid conditions, shrinking glaciers, coral bleaching, ecosystem change, new diseases, droughts, desertification etc
					• Informal representations of place can be through a wide variety of media/sources e.g. film, television, music, art, photography, literature, graffiti, blogs, social media
					• Candidates may use examples at a variety of scales from a town through to a place such as the Arctic.
					
					AO2 – 6 marks
					Application of knowledge and understanding to analyse how impacts of climate change can affect informal representations of place could potentially include:
					• Candidates may focus on one place alone, or a variety of places.
					• There is a very wide variety of material candidates might use
					  ○ television e.g. Norwegian political drama *Occupied* where oil interests prevent climate action in Russia; American sci-fi drama *Incorporated* depicts Miami ravaged by climate change
					  ○ film e.g. *Day After Tomorrow* with its images of New York under enormous snow drifts; *Before the Flood/An*

			There are clear attempts to make synoptic links between the content from different parts of the course of study but these are not always appropriate. **Level 2 (4-6 marks)** Demonstrates **reasonable** knowledge and understanding of impacts of climate change and informal representations of place (AO1). Demonstrates **reasonable** application of knowledge and understanding to provide sound analysis that shows some accuracy of how impacts of climate change can affect informal representations of place (AO2). This will be shown by including **developed** ideas about **either** impacts of climate change **or** informal representations of place and **simple** ideas for the other focus. There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant. **Level 1 (1-3 marks)** Demonstrates **basic** knowledge and understanding of impacts of climate change and informal representations of place (AO1). Demonstrates **basic** application of knowledge and understanding to provide simple analysis that shows limited accuracy of how impacts of climate change can affect informal representations of place (AO2). This will be shown by including **simple** ideas about impacts of climate change and informal representations of place.		*Inconvenient Truth/Chasing Ice* documentary film examples are acceptable, *Waterworld* depicting a flooded earth after polar ice caps have melted ○ music e.g. Erik Ian Walker's *Climate* within ClimateMusic Project using music and displays to educate about the earth; UN's *Love Song to Earth*, Joni Michell's *Big Yellow Taxi*, Michael Jackson's *Earth Song*, Daniel Crawford's *Planetary Bands, Warming World* ○ art e.g. Olafur Eliasson's *Your Waste of Time*, John Sabraw's *Toxic Sludge*, Naziha Mestaoui's *One Beat, One Tree*, Paulo Grangeon's *Pandas on Tour* ○ photography – vast range including images taken by candidates and published by news agencies ○ literature e.g. McCarthy's *The Road*, Margaret Atwood's *The Year of the Flood*, Lloyd's *The Carbon Diaries 2015*, McEwan's *Solar*, Kingsolver's *Flight Behaviour* ○ graffiti and blogs – candidate might have carried out some fieldwork in their local vicinity • Candidates may make reference to the media debate on climate change to demonstrate how impacts of climate change can affect informal representations of place e.g. Attenborough. They may discuss how reporting on impacts of climate change by news agencies has affected informal representations of a particular place through this debate. • Climate activism e.g. Extinction Rebellion, Friday lunch time demonstrations (school/college); Greta Thunberg media exposure

			There are limited attempts to make synoptic links between content from different parts of the course of study. **0 marks** No response or no response worthy of credit		

Question			Answer	Mark	Guidance

7			**Assess how patterns of diseases are influenced by changes in ONE landscape system you have studied.**
			
			Level 4 (10-12 marks)
			Demonstrates **comprehensive** knowledge and understanding of patterns of diseases and changes in ONE landscape system (AO1).
			
			Demonstrates **comprehensive** application of knowledge and understanding to provide clear, developed and convincing analysis that is fully accurate of how patterns of diseases are influenced by changes in ONE landscape system (AO2).
			
			This will be shown by including **well-developed** ideas about the relationship between patterns of diseases and changes in ONE landscape system.
			
			There are clear and explicit attempts to make appropriate synoptic links between content from different parts of the course of study.
			
			Level 3 (7-9 marks)
			Demonstrates **thorough** knowledge and understanding of patterns of diseases and changes in ONE landscape system (AO1).
			
			Demonstrates **thorough** application of knowledge and understanding to provide clear and developed analysis that shows accuracy of how patterns of diseases are influenced by changes in ONE landscape system (AO2).
			
			This will be shown by including **well-developed** ideas about **either** patterns of diseases **or** changes in ONE
				12
				AO1 x6
				AO2 x6
					Indicative content
					AO1 – 6 marks
					Knowledge and understanding of patterns of diseases and relevant changes in one landscape system could potentially include:
					• Patterns of diseases – could include global and/or national distributions of particular diseases.
					• Changes in ONE landscape system – specific points will depend on the landscape system studied by candidates; coastal, glaciated or dryland.
					• Could be
					  ○ physical e.g. changes in temperatures affecting glaciers/sea level/dryland precipitation patterns, or natural changes to landforms
					  ○ human either deliberate or unintentional etc. e.g. management/development of coasts leading to erosion/deposition changes; use of glaciated landscapes leading to changes in ice/meltwater balance; water supply/demand and/or tourism leading to changes in dryland landforms; impacts of anthropogenic climate change on landscape systems
					
					AO2 – 6 marks
					Application of knowledge and understanding to analyse how patterns of diseases are influenced by changes in ONE landscape system could potentially include:
					• some points will depend on the landscape system studied by the candidate, coastal, glaciated or dryland – only one is studied
					• Natural barriers will limit the spread of disease or create a boundary to that disease e.g. sea,

			landscape system and **developed** ideas for the other focus. There are clear attempts to make synoptic links between the content from different parts of the course of study but these are not always appropriate. **Level 2 (4-6 marks)** Demonstrates **reasonable** knowledge and understanding of patterns of diseases and changes in ONE landscape system (AO1). Demonstrates **reasonable** application of knowledge and understanding to provide sound analysis that shows some accuracy of how patterns of diseases are influenced by changes in ONE landscape system (AO2). This will be shown by including **developed** ideas about **either** patterns of diseases **or** changes in ONE landscape system and **simple** ideas for the other focus. There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant. **Level 1 (1-3 marks)** Demonstrates **basic** knowledge and understanding of patterns of diseases and changes in ONE landscape system (AO1). Demonstrates **basic** application of knowledge and understanding to provide simple analysis that shows limited accuracy of how patterns of diseases are influenced by changes in ONE landscape system (AO2).		lake, river, glacier, desert. The spread of barriers will limit the spread of disease. • Human activity linked to an increase in development can cause a change in the landscape system that leads to higher rates of diseases e.g. • Coastal – rising sea level + formation of landforms can create pools of stagnant water which could extend the range of vector-borne diseases e.g. the formation of a lagoon behind a bar and West Nile Virus in USA. Increased water temperatures → algal blooms → health risk from toxins in water and organisms that are eaten • Glaciated – increased meltwater and permafrost melting will provide potential breeding grounds for vectors. • Dryland – water supply issues leading to the formation of a dam and large pools of stagnant water extending the range of vector-borne diseases e.g. bilharzia in Egypt. Specific content could include; • Coasts – Bangladesh (Ganges, Brahmaputra delta) rising sea level; increased risk of flooding; vulnerable landforms and vulnerable people; water borne diseases; increased risk of infection. • Glaciated – melting permafrost has the potential to damage water supplies – contamination and subsequent hygiene issues – increased hospitalisation in Alaska e.g. skin problems • Glaciated – migrant workers to explore + drill for oil/gas → lifestyle and culture changes making the indigenous population vulnerable to new diseases • Dryland – expansion of deserts expanding a barrier against the spread of disease.

			This will be shown by including **simple** ideas about patterns of diseases and changes in ONE landscape system. There are limited attempts to make synoptic links between content from different parts of the course of study. **0 marks** No response or no response worthy of credit		• Dryland – human activity leading to water supply issues, this would be more prevalent in LIDCs where water supplies are contaminated leading to crop failure and malnutrition leading to susceptibility of disease, also irrigation mismanagement could lead to larger areas of stagnant water increasing disease vectors e.g. malaria. Candidates opting to make a link with a landscape not from the three designated by the Spec. is maximum of top of L2 for a well-developed explanation.

Question			Answer	Mark	Guidance

8			**Assess how the use of oceans is affected by issues of global governance in relation to EITHER human rights OR territorial integrity.**
			
			Level 4 (10-12 marks)
			Demonstrates **comprehensive** knowledge and understanding of the use of oceans and issues of global governance in relation to either human rights or territorial integrity. (AO1).
			
			Demonstrates **comprehensive** application of knowledge and understanding to provide clear, developed and convincing analysis that is fully accurate of how the use of oceans is influenced by issues of global governance in relation to either human rights or territorial integrity (AO2).
			
			This will be shown by including **well-developed** ideas about the relationship between the use of the ocean and issues of global governance in relation to either human rights or territorial integrity.
			
			There are clear and explicit attempts to make appropriate synoptic links between content from different parts of the course of study.
			
			Level 3 (7-9 marks)
			Demonstrates **thorough** knowledge and understanding of the use of oceans and issues of global governance in relation to either human rights or territorial integrity (AO1).
			
			Demonstrates **thorough** application of knowledge and understanding to provide clear and developed analysis that shows accuracy of how the use of oceans is influenced by issues of global governance in relation to either human rights or territorial integrity (AO2).
				12
				AO1 x6
				AO2 x6
					AO1 – 6 marks
					Knowledge and understanding of the use of oceans and issues of global governance in relation to either human rights or territorial integrity could potentially include:
					• the use of oceans;
					  ○ the use of biological, energy or mineral resources
					  ○ the use of ocean systems as waste disposal sites
					  ○ the use of oceans as spaces where countries challenge each other
					  ○ the use of oceans facilitating 21st century piracy
					  ○ the use of oceans as escape routes for migrants
					
					• Issues of global governance of human rights
					  ○ How human rights are promoted and protected by global governance e.g. treaties, laws, institutions, norms
					  ○ Contributions and interactions of global governance of different organisations (UN/national government/NGO) at a range of scales
					  ○ How global governance of human rights has consequences for citizens and places both positive and negative
					
					• Issues of global governance of territorial integrity
					  ○ How access to resources can cause territorial conflict
					  ○ Role of institutions, treaties, laws and norms in regulating conflict
					  ○ Interventions and interactions of organisations at a range of scales
					  ○ Consequences for local communities (both positive and negative)

			This will be shown by including **well-developed** ideas about **either** the use of the oceans **or** issues of global governance in relation to either human rights or territorial integrity and **developed** ideas for the other focus. There are clear attempts to make synoptic links between the content from different parts of the course of study but these are not always appropriate. **Level 2 (4-6 marks)** Demonstrates **reasonable** knowledge and understanding of the use of oceans and issues of global governance in relation to either human rights or territorial integrity (AO1). Demonstrates **reasonable** application of knowledge and understanding to provide sound analysis that shows some accuracy of how the use of oceans is influenced by issues of global governance in relation to either human rights or territorial integrity (AO2). This will be shown by including **developed** ideas about **either** the use of oceans **or** issues of global governance in relation to either human rights or territorial integrity and **simple** ideas for the other focus. There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant. **Level 1 (1-3 marks)** Demonstrates **basic** knowledge and understanding of the use of oceans and issues of global governance in relation to either human rights or territorial integrity (AO1).		**AO2 – 6 marks** Application of knowledge and understanding to analyse how the use of oceans is influenced by issues of global governance in relation to either human rights or territorial integrity could potentially include: • where human rights and territorial integrity are stable, the use of the oceans is likely to be stable and more sustainably managed e.g. ACs and some EDCs e.g. North Sea • a wide range of examples could be used from the involvement of the UN, national governments or NGOs e.g. refugees crossing the Mediterranean • use of ocean could be positive or negative and relating to any use of the ocean e.g. more unsustainable harvesting of resources where human rights or territorial integrity is currently under dispute e.g. off West coast of Africa • For countries with territorial disputes the ocean may be used more for military aggression e.g. South China Sea

			Demonstrates **basic** application of knowledge and understanding to provide simple analysis that shows limited accuracy of how the use of oceans is influenced by issues of global governance in relation to either human rights or territorial integrity (AO2). This will be shown by including **simple** ideas about the relationship between the use of the ocean and issues of global governance in relation to either human rights or territorial integrity. There are limited attempts to make synoptic links between content from different parts of the course of study. **0 marks** No response or no response worthy of credit		

Question			Answer	Mark	Guidance
9			**Examine how changes in the global food system have been influenced by time-space compression.** **Level 4 (10-12 marks)** Demonstrates **comprehensive** knowledge and understanding of the global food system and time-space compression (AO1). Demonstrates **comprehensive** application of knowledge and understanding to provide clear, developed and convincing analysis that is fully accurate of how changes in the global food system have been influenced by time-space compression (AO2). This will be shown by including **well-developed** ideas about the global food system and time-space compression. There are clear and explicit attempts to make appropriate synoptic links between content from different parts of the course of study. **Level 3 (7-9 marks)** Demonstrates **thorough** knowledge and understanding of the global food system and time-space compression (AO1). Demonstrates **thorough** application of knowledge and understanding to provide clear and developed analysis that shows accuracy of how changes in the global food system have been influenced by time-space compression (AO2). This will be shown by including **well-developed** ideas about **either** the global food system **or** time-space compression and **developed** ideas for the other focus.	**12** **AO1 x6** **AO2 x6**	**Indicative content** **AO1 – 6 marks** Knowledge and understanding of the global food system and time-space compression could potentially include: • Global food system – food production, food industry, food security, food distribution, food shortage and surplus • Time-space compression – the increasing interconnectedness and interdependence of the world socially, economically, politically and culturally. **AO2 – 6 marks** Application of knowledge and understanding to examine how changes in the global food system have been influenced by time-space compression could potentially include: • Food production – role of TNCs e.g. Monsanto/Bayer impacting agriculture → GM crops; use of chemicals; mechanisation • Migrant labour nationally + internationally • Food transport – greatly influenced by changes in technology e.g. refrigeration; air, rail + road freight → increased flows of food over greater distances e.g. salads from Spain into NW Europe. • Food transport – allowed reduction in seasonality e.g. strawberries in December in Europe • Availability of foods affected by events in different locations e.g. ash cloud preventing air trade; adverse weather restricting supply • Changes in land ownership – role of TNCs + governments → land grabbing; Foreign Direct Investment e.g. Walmart bringing agricultural advice to Indian farmers;

			There are clear attempts to make synoptic links between the content from different parts of the course of study but these are not always appropriate. **Level 2 (4-6 marks)** Demonstrates **reasonable** knowledge and understanding of the global food system and time-space compression (AO1). Demonstrates **reasonable** application of knowledge and understanding to provide sound analysis that shows some accuracy of how changes in the global food system have been influenced by time-space compression (AO2). This will be shown by including **developed** ideas about **either** the global food system **or** time-space compression and **simple** ideas for the other focus. There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant. **Level 1 (1-3 marks)** Demonstrates **basic** knowledge and understanding of the global food system and time-space compression (AO1). Demonstrates **basic** application of knowledge and understanding to provide simple analysis that shows limited accuracy of how changes in the global food system have been influenced by time-space compression (AO2). This will be shown by including **simple** ideas about the global food system and time-space compression.		• Influence of trade agreements and trading blocs on both sides • Food retailing increasingly dominated by TNCs • Changing tastes in food due to exposure (travel / media) to different cultures e.g. Asian foods in Europe + N America, western foods in Asia • Changing demands due to increasing prosperity based on global trade e.g. Chinese demand for dairy + meat • Influences vary according to scale of producer / processor / retailer – benefits of time-space compression tend to favour larger scale at expense of smaller units e.g. TNCs v local retailers • Candidates may link the environmental impacts of time-space compression e.g. more air flights generate greenhouse gases – global warming – change in food security in marginal areas such as desert fringes.

			There are limited attempts to make synoptic links between content from different parts of the course of study. **0 marks** No response or no response worthy of credit		

Question			Answer	Mark	Guidance
10			**Examine how impacts of seismic activity are severely worsened by the water cycle.** **Level 4 (10-12 marks)** Demonstrates **comprehensive** knowledge and understanding of impacts of seismic activity and the water cycle (AO1). Demonstrates **comprehensive** application of knowledge and understanding to provide clear, developed and convincing analysis that is fully accurate of how impacts of seismic activity are severely worsened by the water cycle (AO2). This will be shown by including **well-developed** ideas about impacts of seismic activity and the water cycle. There are clear and explicit attempts to make appropriate synoptic links between content from different parts of the course of study. **Level 3 (7-9 marks)** Demonstrates **thorough** knowledge and understanding of impacts of seismic activity and the water cycle (AO1). Demonstrates **thorough** application of knowledge and understanding to provide clear and developed analysis that shows accuracy of how impacts of seismic activity are severely worsened by the water cycle (AO2). This will be shown by including **well-developed** ideas about **either** impacts of seismic activity **or** the water cycle and **developed** ideas for the other focus. There are clear attempts to make synoptic links between the content from different parts of the course of study but these are not always appropriate.	**12** **AO1 x6** **AO2 x6**	**Indicative content** **AO1 – 6 marks** Knowledge and understanding of impacts of seismic activity and the water cycle could potentially include: • Impacts could include environmental, social, economic or political • Water cycle - global scale closed system of atmosphere, oceans and land stores of water and flows between them; smaller scale water cycles also relevant e.g. within a drainage basin • Seismic refers to earthquakes. **AO2 – 6 marks** Application of knowledge and understanding to analyse how impacts of seismic activity are severely worsened by the water cycle could potentially include: • Impacts could be considered at a range of scales, from international to national or local • Disruption to infrastructure e.g. damage to roads/ports/bridges which could be worsened by heavy rainfall increasing the risk of lahars/landslides/mudflows which would further damage infrastructure, slowing recovery • Liquefaction is a significant impact of seismic activity where ground + soil water levels are relatively high • Homelessness/displacement caused by collapse of buildings could be worsened by snowfall or rainfall especially in refugee camps where there would be an increased vulnerability to contracting water-borne disease e.g. cholera or dysentery • Numbers of people killed or missing could be worsened by severe rainfall e.g. seasonal monsoon (Nepal) or tropical storms (Haiti) causing mudslides

			Level 2 (4-6 marks) Demonstrates **reasonable** knowledge and understanding of impacts of seismic activity and the water cycle (AO1). Demonstrates **reasonable** application of knowledge and understanding to provide sound analysis that shows some accuracy of how impacts of seismic activity are severely worsened by the water cycle (AO2). This will be shown by including **developed** ideas about **either** impacts of seismic activity **or** the water cycle and **simple** ideas for the other focus. There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant. **Level 1 (1-3 marks)** Demonstrates **basic** knowledge and understanding of impacts of seismic activity and the water cycle (AO1). Demonstrates **basic** application of knowledge and understanding to provide simple analysis that shows limited accuracy of how impacts of seismic activity are severely worsened by the water cycle (AO2). This will be shown by including **simple** ideas about impacts of seismic activity and the water cycle. There are limited attempts to make synoptic links between content from different parts of the course of study. **0 marks** No response or no response worthy of credit		• Some research suggests heavy rainfall can contribute to causing an earthquake e.g. Haiti and Taiwan – inconclusive. • Earthquake damage would impact stores, divert flows (rivers/streams) contributing to disruption and possible water supply issues e.g. slope failure → 'quake dams → build-up of water→ potential for failure of the 'dam'→ impacts downstream • Tsunami damage valid if linked clearly to the idea of the ocean/sea store flowing onto the land due to seismic activity. If tsunami not linked, credit but limited to L2. • Impacts often felt more severely in LIDCs/EDCs • Positive impacts enhanced or created by the water cycle could be considered in order to judge the overall influence of the water cycle e.g. the large store of the sea allowing ships to bring medical supplies when other transportation options destroyed

SECTION C

Question			Answer	Mark	Guidance
11*			**'Predicting what the future will hold for the carbon cycle is essential when responding to climate change.' Discuss.** **AO1** **Level 4 (7–9 marks)** Demonstrates **comprehensive** knowledge and understanding of the importance of carbon cycle for climate modelling and predicting climate change in the future. **Level 3 (5–6 marks)** Demonstrates **thorough** knowledge and understanding of the importance of carbon cycle for climate modelling and predicting climate change in the future **Level 2 (3–4 marks)** Demonstrates **reasonable** knowledge and understanding of the importance of carbon cycle for climate modelling and predicting climate change in the future. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of the importance of carbon cycle for climate modelling and predicting climate change in the future. **0 marks** No response or no response worthy of credit. **AO2** **Level 4 (19–24 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of the role of prediction for the carbon cycle in responding effectively to climate change. Demonstrates **comprehensive** application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether predicting	**33** **AO1 x9** **AO2 x24**	**Indicative content** **AO1 – 9 marks** Demonstrating knowledge and understanding the importance of carbon cycle for climate modelling and predicting climate change in the future could potentially include: ○ Carbon emissions ○ CO_2 is the second most important greenhouse gas after water vapour ○ Carbon cycle, its climatic impact ○ Positive and negative feedback in the carbon cycle ○ Climate modelling ○ IPCC predictions ○ future scenarios including a range of inter-related factors that are not all directly linked to the carbon cycle **AO2 – 24 marks** Application of knowledge and understanding to analyse and evaluate whether predicting what the future will hold for the carbon cycle is essential when responding to climate change could potentially include: • Discussion of the global carbon cycle, future predictions and response to climate change could be explored at a range of scales ie global, national and local (grassroots initiatives) • Predicting the future may not be as easy as we think ○ Relative importance of all inter-related factors that affect climate change from CO_2 to cloud cover ○ Implications of future scenarios based on the carbon cycle lead to decisions managing response

			what the future will hold for the carbon cycle is essential when responding to climate change. Relevant concepts are authoritatively discussed. **Level 3 (13–18 marks)** Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of the role of prediction for the carbon cycle in responding effectively to climate change. Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions as to whether predicting what the future will hold for the carbon cycle is essential when responding to climate change. Relevant concepts are discussed but this may lack some authority. **Level 2 (7–12 marks)** Demonstrates **reasonable** application of knowledge and understanding to provide a sound analysis that shows some accuracy of the role of prediction for the carbon cycle in responding effectively to climate change. Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether predicting what the future will hold for the carbon cycle is essential when responding to climate change. Concepts are discussed but their use lacks precision. **Level 1 (1–6 marks)**		○ Level of understanding of inter-relating factors varies so reliability of predictions may be debatable • Climate is global • Responses to climate change that focus on the carbon cycle may be international or national including the ideas below; • Reducing energy use which would reduce GHGs. ○ National - UK bringing in regulations on EPCs in 2008, offering incentives for improving EPCs because domestic demand accounts for 1/3 of primary energy consumption ○ EU Renewable Energy Directive forced UK to work towards 15% increase in renewable sources of energy leading to e.g. closure of several coal-fired power stations e.g. Ferrybridge 0215, Eggborough 2016 ○ Australia bound by Copenhagen 2013 to cap-and-trade scheme and targets for increased energy consumption from renewable sources • Restoring carbon in long-term storage e.g. carbon capture and storage is expensive but feasible – it offsets 80% of carbon pollution from power stations, however it is limited to areas with suitable geology e.g. porous rocks beneath impermeable strata and expense e.g. Drax project cut in 2016, pilot project only in Peterhead UK • Protecting tropical forests from deforestation to maintain carbon reservoir – UNREDD programme • Geoengineering techniques e.g. fertilising oceans with iron to stimulate phytoplankton growth & increase photosynthesis (more CO_2 absorbed), enhanced weathering or increasing

			Demonstrates **basic** application of knowledge and understanding to provide a simple analysis that shows limited accuracy of the role of prediction for the carbon cycle in responding effectively to climate change. Demonstrates **basic** application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether predicting what the future will hold for the carbon cycle is essential when responding to climate change. Concepts are not discussed or are so inaccurately. **0 marks** No response or no response worthy of credit. **Quality of extended response** **Level 4** There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Level 3** There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 2** The information has some relevance and is presented with limited structure. The information is supported by limited evidence. **Level 1** The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		CO_2 capture using artificial trees made from a plastic resin

Question			Answer	Mark	Guidance

12*			**To what extent are national and sub-national policies more effective than international responses to climate change?**
			
			AO1
			Level 4 (7–9 marks)
			Demonstrates **comprehensive** knowledge and understanding of international, national and sub-national responses to climate change.
			
			Level 3 (5–6 marks)
			Demonstrates **thorough** knowledge and understanding of international, national and sub-national responses to climate change.
			
			Level 2 (3–4 marks)
			Demonstrates **reasonable** knowledge and understanding of international, national and sub-national responses to climate change.
			
			Level 1 (1–2 marks)
			Demonstrates **basic** knowledge and understanding of international, national and sub-national responses to climate change.
			
			0 marks
			No response or no response worthy of credit.
			
			AO2
			Level 4 (19–24 marks)
			Demonstrates **comprehensive** application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of how national and sub-national policies can successfully respond to climate change.
			
			Demonstrates **comprehensive** application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether national and
				33
				AO1 x9
				AO2 x24
					Indicative content
					AO1 – 9 marks
					Demonstrating knowledge and understanding of international, national and sub-national responses to climate change could potentially include:
					• Role of the IPCC
					  ○ Created by the UN & WMO to provide objective scientific and transparent reports on climate change which are neutral and non-binding
					• International directives
					  ○ The Kyoto Protocol 1997 first legally binding international agreement responding to climate change.
					  ○ Most countries achieved the 5% target set, however 12 failed to achieve their targets.
					• Carbon trading and credits schemes
					  ○ EU ETS is the most successful scheme. It operates over 31 countries and involves 11,000 heavy energy-using installations and airlines. The scheme accounts for 45% of EU GHG emissions
					• National policies
					  These are wide ranging in scope and content. E.g. Denmark
					  ○ committed to 100% renewable energy by 2050 through wind & solar power, carbon taxes, tax relief for hydrogen & electric cars, subsidised public transport, cycling and management of methane in agriculture
					  ○ Adaptation policies have also been created with ‘climate-proof neighbourhoods’, improvements to the Copenhagen’s drainage system, raised dykes & storm barriers

			sub-national policies are more effective in responding to climate change than international responses. Relevant concepts are authoritatively discussed. **Level 3 (13–18 marks)** Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of how national and sub-national policies can successfully respond to climate change. Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions as to whether national and sub-national policies are more effective in responding to climate change than international responses. Relevant concepts are discussed but this may lack some authority. **Level 2 (7–12 marks)** Demonstrates **reasonable** application of knowledge and understanding to provide a sound analysis that shows some accuracy of how national and sub-national policies can successfully respond to climate change. Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether national and sub-national policies are more effective in responding to climate change than international responses. Concepts are discussed but their use lacks precision. **Level 1 (1–6 marks)**		• Subnational policies e.g. California, USA recognised as world leader. State wide legislation in 2006 towards clean energy, cap-and-trade system, promoting renewable energies **AO2 – 24 marks** Application of knowledge and understanding to analyse and evaluate the extent to which national and sub-national policies are more effective in responding to climate change than international responses could potentially include: • Limitations of sub-national policies: smaller political force, smaller population, smaller impact, although potentially fewer political obstacles • Benefits of sub-national policies: policing change often easier, policy appropriate to geography and population in that area so more targeted and more successful, potentially faster process from conception to implementation • Limitations of national policies: contrasts within country may limit success e.g. rural/urban or core/periphery divides, smaller impact than international policies • Benefits of national policies: single government, less complicated political system, faster implementation, policy can be more targeted for geography/culture/development than international options • The UN climate conference in Paris 2015 used the most recent IPCC report to discuss a legally binding universal international agreement which 174 countries had ratified by 2017, and 197 signed. In this instance it is difficult to say which is the most effective; the report or the conference bringing countries together and encouraging ratification – without

			Demonstrates **basic** application of knowledge and understanding to provide a simple analysis that shows limited accuracy of how national and sub-national policies can successfully respond to climate change. Demonstrates **basic** application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether national and sub-national policies are more effective in responding to climate change than international responses. Concepts are not discussed or are so inaccurately. **0 marks** No response or no response worthy of credit. **Quality of extended response** **Level 4** There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Level 3** There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 2** The information has some relevance and is presented with limited structure. The information is supported by limited evidence. **Level 1** The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		the report, would the international directive have become legally binding? Without the ratification by nations there is limited success as was seen with Kyoto Protocol 1997 and the USA, Russia, China, Japan and India who are not party to that agreement. • The Kyoto Protocol was informed by the SAR (Second Assessment Report) 1996 from IPCC, indicating that they are mutually dependent and mutually effective, however there has not been international directives following all of the five reports • IPCC involves range of scientific opinion and strives towards a non-bias and consensus across the scientific community – this in itself could be argued to be the most effective of geopolitical methods as one united voice is a much stronger political force which has led to international directives and subsequent national policy • The Kyoto Protocol was ineffective in a number of ways; firstly EDCs and LIDCs were exempt particularly China & India (prioritised economic development over climate mitigation), secondly one third of ACs failed to reach their targets, thirdly the USA failed to ratify the agreement and as one of the largest contributors this caused a significant amount of controversy • EU has pioneered this with the world's largest trading scheme however many argue the targets are not rigorous and are too easy for nation states to meet. 2020 targets were met by a number of nations in 2011, in comparison some member states have been very slow to implement directives. The UK increased renewable energy output by 90% in 4 years in response to the Renewables Directive

Question			Answer	Mark	Guidance
13*			**To what extent are the socio-economic impacts of a communicable disease more severe than the socio-economic impacts of a non-communicable disease?** **AO1** **Level 4 (7–9 marks)** Demonstrates **comprehensive** knowledge and understanding of the socio-economic impacts of a communicable and a non-communicable disease. **Level 3 (5–6 marks)** Demonstrates **thorough** knowledge and understanding of the socio-economic impacts of a communicable and a non-communicable disease. **Level 2 (3–4 marks)** Demonstrates **reasonable** knowledge and understanding of the socio-economic impacts of a communicable and a non-communicable disease. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of the socio-economic impacts of a communicable and a non-communicable disease. **0 marks** No response or no response worthy of credit. **AO2** **Level 4 (19–24 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of the differences in socio-economic impacts for a communicable and non-communicable disease. Demonstrates **comprehensive** application of knowledge and understanding to provide a detailed and substantiated	**33** **AO1 x9** **AO2 x24**	**Indicative content** **AO1 – 9 marks** Demonstrating knowledge and understanding of the socio-economic impacts of a communicable and a non-communicable disease could potentially include: • Communicable diseases; • Infectious disease that moves from host to host e.g. Ebola, influenza, typhoid, malaria • Non-communicable diseases; • Diseases that cannot be spread e.g. CVD, cancer, rickets, diabetes, stroke • Globally non-communicable diseases account for more deaths (absolute + proportion) e.g. heart disease, stroke, Alzheimer/dementia, lung cancers, diabetes – total c. 23.5million. Communicable diseases e.g. lower respiratory, diarrhoeal diseases, tuberculosis claimed just under 6 million deaths (2016) out of total of 57 million. • Socio-economic impacts – a very wide range → standard of living and or quality of life affected e.g. death, disability, loss of family members, unemployment, time off work / education, loss of personal mobility; costs to governments of loss of income (tax) and expenditure increases on health care **AO2 – 24 marks** Application of knowledge and understanding to analyse and evaluate the extent to which socio-economic impacts of a communicable disease are more severe than socio-economic impacts of a non-communicable disease, could potentially include: • Significant global regional differences in mortality. Africa only WHO region where communicable diseases continue to dominate but with significant rates of decline. Americas,

			evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether socio-economic impacts of a communicable disease are more severe than socio-economic impacts of a non-communicable disease. Relevant concepts are authoritatively discussed. **Level 3 (13–18 marks)** Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of the differences in socio-economic impacts for a communicable and non-communicable disease. Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions as to whether socio-economic impacts of a communicable disease are more severe than socio-economic impacts of a non-communicable disease. Relevant concepts are discussed but this may lack some authority. **Level 2 (7–12 marks)** Demonstrates **reasonable** application of knowledge and understanding to provide a sound analysis that shows some accuracy of the differences in socio-economic impacts for a communicable and non-communicable disease. Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether socio-economic impacts of a communicable disease are more severe than socio-economic impacts of a non-communicable disease. Concepts are discussed but their use lacks precision.		Europe and Western Pacific – cancers single most common cause. • Poverty at all scales (from individual families to governments) has a significant impact on the severity of socio-economic impacts of both types of diseases. However, impacts of cancer in many ACs are reduced with benefits, and support from government agencies, as well as NGOs e.g. Macmillan who are funded primarily by private individuals. • Availability of accessible healthcare contributes to minimising socio-economic impacts e.g. UK – NHS while USA & India pay for healthcare which creates greater disparity between rich and poor in the socio-economic impacts • Downward spiral of physical health in both communicable and non-communicable is linked to economic decline e.g. time off work due to ill health which could lead to loss of employment, certainly loss of profit for company, reducing purchasing power and affecting economic growth of local area. In Poland in 2014 breast cancer alone cost the nation more than €500 million. • Malaria in Ethiopia kills 70,000 people a year (7% of population), whereas cancer in the UK kills 126,000 per year (just 2%), exemplifying the contribution of poverty and wealth.

			Level 1 (1–6 marks) Demonstrates **basic** application of knowledge and understanding to provide a simple analysis that shows limited accuracy of the differences in socio-economic impacts for a communicable and non-communicable disease. Demonstrates **basic** application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether socio-economic impacts of a communicable disease are more severe than socio-economic impacts of a non-communicable disease. Concepts are not discussed or are so inaccurately. **0 marks** No response or no response worthy of credit. **Quality of extended response** **Level 4** There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Level 3** There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 2** The information has some relevance and is presented with limited structure. The information is supported by limited evidence. **Level 1** The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		

Question			Answer	Mark	Guidance
14*			**Assess the success of mitigation strategies to combat global pandemics.** **AO1** **Level 4 (7–9 marks)** Demonstrates **comprehensive** knowledge and understanding of mitigation strategies to combat global pandemics. **Level 3 (5–6 marks)** Demonstrates **thorough** knowledge and understanding of mitigation strategies to combat global pandemics. **Level 2 (3–4 marks)** Demonstrates **reasonable** knowledge and understanding of mitigation strategies to combat global pandemics. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of mitigation strategies to combat global pandemics. **0 marks** No response or no response worthy of credit. **AO2** **Level 4 (19–24 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of different mitigation strategies to combat global pandemics. Demonstrates **comprehensive** application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether mitigation strategies to combat global pandemics are successful. Relevant concepts are authoritatively discussed. **Level 3 (13–18 marks)**	**33** **AO1 x9** **AO2 x24**	**Indicative content** **AO1 – 9 marks** Demonstrating knowledge and understanding of mitigation strategies to combat global pandemics could potentially include: • Define 'pandemic' e.g. a disease that attacks many people at the same time and has spread worldwide. A wide variety of diseases can occur as pandemics. • Mitigation strategies can be at international, national, regional or grassroots level • Global pandemics must have affected a large portion of the world e.g. multiple continents. For example HIV/AIDS (35 million died, nearly 66% prevalence in sub-Saharan Africa), SARS, H1N1 (284,000 deaths across 199 countries in 2009) (influenza), smallpox, ebola. Candidates should include more than one disease – max 5 marks if only one • Mitigation could include strategies that prevent transmission, aid diagnosis or treatment or educate **AO2 – 24 marks** Application of knowledge and understanding to analyse and evaluate the success of mitigation strategies to combat global pandemics, could potentially include: • Success could be measured in a number of different ways e.g. prevalence decreasing, number of deaths falling, social or economic or political impacts reduced, disease may have been successfully eradicated e.g. smallpox through a WHO initiated global vaccination programme in 1966 which significantly contributed to the successful eradiation of smallpox in 1979. • H1N1

			Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of different mitigation strategies to combat global pandemics. Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions as to whether mitigation strategies to combat global pandemics are successful. Relevant concepts are discussed but this may lack some authority. **Level 2 (7–12 marks)** Demonstrates **reasonable** application of knowledge and understanding to provide a sound analysis that shows some accuracy of different mitigation strategies to combat global pandemics. Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether mitigation strategies to combat global pandemics are successful. Concepts are discussed but their use lacks precision. **Level 1 (1–6 marks)** Demonstrates **basic** application of knowledge and understanding to provide a simple analysis that shows limited accuracy of mitigation strategies to combat global pandemics. Demonstrates **basic** application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether mitigation strategies to combat global pandemics are successful. Concepts are not discussed or are so inaccurately.		○ WHO strategies e.g. each nation has own behaviour policy to reduce spread e.g. UK's "catch it, bin it, kill it" slogan, vaccine deployment, WHO's publication of H1N1 response plan to help nations contain the outbreak ○ Use of antiviral drugs as well as supportive therapy e.g. bed rest, plenty of fluids to help aid recovery ○ The National Disaster Management Authority (NDMA) and UN agencies producing papers to give advice to countries ○ National influence on international stage e.g. Canada is attempting to convince all nations to join forces to develop effective influenza vaccine against all mutations, UK in 2018 ran an experiment BBC Pandemic with more than 30,000 volunteers to examine how spread changes to help modify responses to the next pandemic • HIV/AIDS ○ Global strategies; UN MDG 6a aimed to achieve universal treatment for all suffering with HIV/AIDS by 2010, WHO global health strategy for HIV/AIDS including reducing infection, vulnerability and impact through increased use of condoms, positive orientation to education and health, vocational training opportunities ○ National strategies in Botswana (screening units and treatment with support from supra national agencies) ○ male circumcision has reduced infection risks ○ education programmes create a more tolerant attitude which allows more to receive diagnosis and treatment

			0 marks No response or no response worthy of credit. **Quality of extended response** **Level 4** There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Level 3** There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 2** The information has some relevance and is presented with limited structure. The information is supported by limited evidence. **Level 1** The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		○ National screening programmes ○ Wise Up programme that uses theatre with young people to raise awareness • Conclusions are likely to be varied: Although H1N1 was successfully managed, and is no longer a threat, there is a very real threat of the next mutation of influenza. The Spanish Flu of 1918 wiped out 5% of the world's population. This particular strain is no longer a threat, but influenza itself is. Similarly with HIV/AIDS it is continuing to spread across AC, EDC and LIDCs but with a greater incidence rate in LIDCs. Varied success of mitigation strategies linked to a variety of factors (early diagnosis, cultural resistance, availability/cost of drugs etc.).

Question			Answer	Mark	Guidance

15*			**'Adaptations by island communities to the impacts of rising sea levels can be successful.' How far do you agree with this statement?**
			
			AO1
			Level 4 (7–9 marks)
			Demonstrates **comprehensive** knowledge and understanding of impacts of rising sea levels and adaptations by island communities.
			
			Level 3 (5–6 marks)
			Demonstrates **thorough** knowledge and understanding of impacts of rising sea levels and adaptations by island communities.
			
			Level 2 (3–4 marks)
			Demonstrates **reasonable** knowledge and understanding of impacts of rising sea levels and adaptations by island communities.
			
			Level 1 (1–2 marks)
			Demonstrates **basic** knowledge and understanding of impacts of rising sea levels and adaptations by island communities.
			
			0 marks
			No response or no response worthy of credit.
			
			AO2
			Level 4 (19–24 marks)
			Demonstrates **comprehensive** application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of adaptations by island communities to the impacts of rising sea levels.
			
			Demonstrates **comprehensive** application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether adaptations
				33
				AO1 x9
				AO2 x24
					Indicative content
					AO1 – 9 marks
					Demonstrating knowledge and understanding of impacts of and adaptations to changing sea levels in island communities could potentially include:
					• An island community in either the Indian Ocean, Pacific Ocean or Caribbean Sea will have been studied
					• Impacts – include salt water threat to agriculture and fresh water aquifers, coral reef loss, threat to tourism as some coastal areas lost to sea,
					• Adaptations include short and long-term strategies to combat sea level rise: managed retreat with increased dune/lagoon etc. zones, building regulations including new builds further inland, on higher areas to minimise future flooding risk, protect through hard engineering, beach protection to offset increased rates of erosion,
					• Exemplar - case study details from Maldives
					  ○ first to sign Kyoto Protocol, built a 3m high sea wall of concrete tetrapods which surround Male in 1987
					  ○ Reclaimed land e.g. island of Hulhumale which is built 1.8m above sea level. Cost £33 million and attracts 500,000 tourists alone every year
					  ○ Afforestation on beaches to prevent erosion
					  ○ Deal being brokered with Saudi Arabia to hire 23 islands in Faafu Atoll for 99 years. It is expected that the Saudis will develop an oil base, tourist resorts and marine reserves
					  ○ Construction breakwaters off the coast of significant settlements

			to the impacts of rising sea levels by island communities are successful. Relevant concepts are authoritatively discussed. **Level 3 (13–18 marks)** Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of adaptation strategies employed by island communities to combat rising sea levels. Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions as to whether adaptation strategies to rising sea levels by island communities are successful. Relevant concepts are discussed but this may lack some authority. **Level 2 (7–12 marks)** Demonstrates **reasonable** application of knowledge and understanding to provide a sound analysis that shows some accuracy of adaptation strategies employed by island communities to combat rising sea levels. Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether adaptation strategies to rising sea levels by island communities are successful. Concepts are discussed but their use lacks precision. **Level 1 (1–6 marks)** Demonstrates **basic** application of knowledge and understanding to provide a simple analysis that shows limited accuracy of adaptation strategies employed by island communities to combat rising sea levels.		○ Desalinisation plants to provide fresh drinking water **AO2 – 24 marks** Application of knowledge and understanding to analyse and evaluate the extent to which adaptation strategies to rising sea levels by island communities are successful, could potentially include: • Adaptation strategies can be at national or community level, short or long-term, and reflect the severity of impact • Success of adaptations depends on a variety of factors many of which are inter-related e.g. hard engineering can prevent flooding but may need regular maintenance; beach replenishment with sand enhances the beach but can smother coral increasing its rate of decay. • Exemplar - case study details from Maldives ○ Maldives have been active to fight against climate change since 1992 and are very aware of their vulnerability so they are better prepared, however they are exceptionally vulnerable with their peak 2.4m above sea level ○ The Japanese paid for 99% Male's sea wall limiting impact on national budget, but it is now the most unattractive island, significant for a country dependent upon tourism. 1/3 of the population lives in Male and is protected from rising sea levels and flooding, so although successful the wall protects a small percentage of the population ○ Afforestation is changing the nature of the beach and limiting tourism as iconic long sandy beaches are broken up with tree barriers so it has limited success

			Demonstrates **basic** application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether adaptation strategies to rising sea levels by island communities are successful. Concepts are not discussed or are so inaccurately. **0 marks** No response or no response worthy of credit. **Quality of extended response** **Level 4** There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Level 3** There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 2** The information has some relevance and is presented with limited structure. The information is supported by limited evidence. **Level 1** The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		and will not stop flooding or storm waves ○ The hire of Faafu Atoll will involve the relocation of 4,000 people and cost the Saudis 10 billion USD (three times Maldives GDP). The development could save 23 islands, however the Maldives only benefit at the end of the hire with whatever the Saudis leave behind which is a significant gamble. Although the hire will raise capital which can promote further flood defences • Candidates likely to argue that there is some level of success, however if this is balanced with the monetary cost, the small populations at risk and the negative effect of a tourist repelling sea wall as well as the visual impact on the community, they are likely to find projects are ineffective, as well as generally being very limited in protecting islands against the impacts of predicted sea level rise in the long-term.

Question			Answer	Mark	Guidance

16*			**Examine the extent to which oil spills are more damaging to the ocean than the accumulation of plastic?**
			
			AO1
			Level 4 (7–9 marks)
			Demonstrates **comprehensive** knowledge and understanding of the damage to the ocean caused by oil spills and the accumulation of plastic.
			
			Level 3 (5–6 marks)
			Demonstrates **thorough** knowledge and understanding of the damage to the ocean caused by oil spills and the accumulation of plastic.
			
			Level 2 (3–4 marks)
			Demonstrates **reasonable** knowledge and understanding of the damage to the ocean caused by oil spills and the accumulation of plastic.
			
			Level 1 (1–2 marks)
			Demonstrates **basic** knowledge and understanding of the damage to the ocean caused by oil spills and the accumulation of plastic.
			
			0 marks
			No response or no response worthy of credit.
			
			AO2
			Level 4 (19–24 marks)
			Demonstrates **comprehensive** application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of the damage to the ocean caused by oil spills and the accumulation of plastic.
			
			Demonstrates **comprehensive** application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to the extent to which
				33
				AO1 x9
				AO2 x24
					Indicative content
					AO1 – 9 marks
					
					Level 4 requires detail of both oil spills and plastic pollution, Level 3 for an imbalance of the two. The omission of one limits a response to top of L2.
					
					Demonstrating knowledge and understanding of the damage caused by oil spills and accumulation of plastic could potentially include:
					
					• Damage to ecosystem services of oceans e.g. supporting (primary production, eggs + larvae, nutrient cycling); provisioning (fish + shellfish, seaweeds, sediments); regulating (waste breakdown, carbon sequestration); cultural (physical characteristics of places e.g. beaches)
					• Oil spills affect marine ecosystems with the oil itself and the clean-up operation. Spills can arise from exploration (rigs) or transport (pipelines + tankers). Internal and external exposure to oil can smother fish, and stop birds or mammals e.g. otters from regulating their temperature, and is particularly damaging to sedentary ecosystems e.g. corals + mangroves
					  ○ Deepwater Horizon disaster – lead to a massive oil spill - biggest in history at 180,00km^2 of the Gulf and 1,600km of shoreline affected
					  ○ Short term impacts on ecosystem and food chain severe
					• Accumulation of plastic affects the marine ecosystem by disturbing the food chain, polluting sea water with toxins as it degrades, and can suffocate and stunt the growth of marine species

			oil spills are more damaging to the ocean than the accumulation of plastic. Relevant concepts are authoritatively discussed. **Level 3 (13–18 marks)** Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of the damage to the ocean caused by oil spills and the accumulation of plastic. Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions as to the extent to which oil spills are more damaging to the ocean than the accumulation of plastic. Relevant concepts are discussed but this may lack some authority. **Level 2 (7–12 marks)** Demonstrates **reasonable** application of knowledge and understanding to provide a sound analysis that shows some accuracy of the damage to the ocean caused by oil spills and the accumulation of plastic. Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to the extent to which oil spills are more damaging to the ocean than the accumulation of plastic. Concepts are discussed but their use lacks precision. **Level 1 (1–6 marks)** Demonstrates **basic** application of knowledge and understanding to provide a simple analysis that shows limited accuracy of the damage to the ocean caused by oil spills and the accumulation of plastic.		○ Great Pacific Garbage Patch in North Pacific Ocean. First observed in 1997. Plastic deposited in gyre not uniformly, to a depth of several metres in areas ○ Majority of plastic - microplastic which is more dangerous to ocean ecosystems than larger pieces → more easily digested health of birds, mammals and fish. ○ Plastics have a long life e.g. plastic from 1940s found in albatross in 2014 so presence of plastics a very long term issue. **AO2 – 24 marks** Application of knowledge and understanding to analyse and evaluate the extent to which oil spills are more the damaging to the ocean than the accumulation of plastic, could potentially include: • Scale, impact, severity, ease of management could all be used to compare the extent of damage • Both have long-term impacts. Five years on from the Deepwater oil spill and oil is being washed up from mud deposits on beaches, indicating there is still un-degraded oil stored on the sea bed. The plastic problem is a new phenomenon which is likely to worsen unless people's habits are changed • Both may have a significant scale – Pacific garbage patch estimated between 0.4-8% of Pacific Ocean, the oil spill affecting the Gulf of Mexico and 1,600km of shoreline. The Pacific garbage patch is more extensive, and out of sight which makes it harder to mitigate • Both are difficult to mitigate against. Plastics need to be reduced, reused and recycled to prevent the issue from growing, however the current plastic problem is unfeasible to clean

			Demonstrates **basic** application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to the extent to which oil spills are more damaging to the ocean than the accumulation of plastic. Concepts are not discussed or are so inaccurately. **0 marks** No response or no response worthy of credit. **Quality of extended response** **Level 4** There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Level 3** There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 2** The information has some relevance and is presented with limited structure. The information is supported by limited evidence. **Level 1** The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		up. The Deepwater oil leak was stopped after several weeks and a number of mitigation methods employed – all of which had other impacts on the ocean e.g. chemical dispersants themselves pollute oceans • Microplastic is naked to the eye yet is responsible for most of the plastic waste in the North Pacific. It is eaten by turtles, fed to young birds, it is blocking sunlight and disrupting the food webs. • Major oil spills receive widespread and dramatic coverage leading to intensive clean-up operations. Small scale oil spills go un-noticed (except locally close to shore). Plastic recently become a major issue receiving extensive media and political interest.

Question			Answer	Mark	Guidance
17*			**Assess the view that natural shocks are the biggest threat to global food security.** **AO1** **Level 4 (7–9 marks)** Demonstrates **comprehensive** knowledge and understanding of natural shocks that threaten global food security. **Level 3 (5–6 marks)** Demonstrates **thorough** knowledge and understanding of natural shocks that threaten global food security. **Level 2 (3–4 marks)** Demonstrates **reasonable** knowledge and understanding of natural shocks that threaten global food security. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of natural shocks that threaten global food security. **0 marks** No response or no response worthy of credit. **AO2** **Level 4 (19–24 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of factors that affect global food security. Demonstrates **comprehensive** application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether natural shocks are the biggest threat to global food security. Relevant concepts are authoritatively discussed. **Level 3 (13–18 marks)**	**33** **AO1 x9** **AO2 x24**	**Indicative content** **AO1 – 9 marks** Demonstrating knowledge and understanding of natural shocks that threaten food security could potentially include: • Shocks occur when there is a significant and often rapid change from normal conditions destabilising food production e.g. El Nino drought, flooding, heatwaves, wildfires, tectonic hazards • Drought leading to crop failure as water quality and quantity decreases, offset by food aid in the short term, long-term soil erosion and gullying add to food security threat, increased severity with global warming • Flooding more intense and more destructive at coastal regions with increased salinisation of soils in the long-term, as well as disruption to food distribution • Heatwaves more frequent in future increasing water stress; risk of widespread crop failure at crucial point in crop development, or put farmland at risk from wildfires • Tectonic hazards – volcanic ash increases incidence of fluorosis in cattle, crops experience increased sulphur levels, and food distribution is impacted; Earthquakes - widespread damage and disruption **AO2 – 24 marks** Application of knowledge and understanding to analyse and evaluate the influence of different factors which affect food security with natural shocks as the focus, could potentially include: • Shocks: ○ Tectonic shock (earthquake) and threat to food security is a complex and high level threat. 8.8 Mw earthquake in

			Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of factors that influence food security.
			
			Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions as to whether natural shocks are the biggest threat to food security.
			
			Relevant concepts are discussed but this may lack some authority.
			
			Level 2 (7–12 marks)
			Demonstrates **reasonable** application of knowledge and understanding to provide a sound analysis that shows some accuracy of factors which affect food security.
			
			Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether natural shocks are the biggest threat to food security.
			
			Concepts are discussed but their use lacks precision.
			
			Level 1 (1–6 marks)
			Demonstrates **basic** application of knowledge and understanding to provide a simple analysis that shows limited accuracy of factors which affect food security.
			
			Demonstrates **basic** application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether natural shocks are the biggest threat to food security.
			
			Concepts are not discussed or are so inaccurately.
			
			0 marks
					Nepal 2015 caused long and short term impacts which varied in severity – 35 million in need of food aid, farmers missed planting season and unable to harvest staple rice crop, stocks of wheat and maize destroyed, markets didn't function as roads were destroyed.
					• Threats from other sources all have an impact on food security: e.g.
					  ○ physical conditions – contribute to food security, especially with recent stresses in particular areas e.g. Sahel with changing rainfall patterns and increased desertification. India & Bangladesh depends heavily on the monsoon rains which have a severe impact on food security
					  ○ population growth – 1 in 4 are chronically hungry in LIDCs, in sub-Saharan Africa with issues of high fertility and rapid population growth. Even with declining fertility the population will double by 2050, exacerbating food insecurity. For these nations this is a very significant threat
					  ○ land grabbing policies, land ownership – issue for sub-Saharan Africa losing hectares of land for production for ACs e.g. biofuel, flowers, rice etc. For these nations it is a significant issue which displaces farmers, increases food insecurity and is a long-term issue which is more detrimental than maybe a short term shock
					  ○ level of development – farmers in LIDCs much more likely to use traditional methods of farming, and ACs capitalise on technological

			No response or no response worthy of credit. **Quality of extended response** **Level 4** There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Level 3** There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 2** The information has some relevance and is presented with limited structure. The information is supported by limited evidence. **Level 1** The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		advancement in agricultural practices. However, LIDCs appropriate technology is very effective at reducing food insecurity on local scale ○ Water scarcity – agriculture accounts for 70% of water withdrawals, causing groundwater levels to fall, further exacerbating the issue; crop failure - desertification - increased soil erosion • A natural shock such as drought will increase the threat to food security but if the situation can be managed then it reduces the threat e.g. managing water scarcity in Kenya (policies e.g. mulching, drip irrigation and water harvesting) or Australia (capping fluvial extraction, cutting off subsidies for irrigation, water trading). • Level of threat to food security linked to location e.g. Sahel experiences physical shock of drought, however land grabbing as a threat to food security is more significant than drought issues because nations are desperate for help with development in exchange for land given to agribusiness, displacing farmers who have limited legal rights • Global warming in Alaska pose a higher threat to food security than natural shocks e.g. as slushy ice is more and more prominent affecting hunting of seals and whales, forcing polar bears onto land changing their diet from fish to berries, mosses and lichens disrupting the food web; fish species declined as warmer water species have migrated and herding activities widely disrupted as lakes uncrossable.

Question			Answer	Mark	Guidance

18*			**To what extent can long-term food security be achieved through local and national initiatives?**
			
			AO1
			Level 4 (7–9 marks)
			Demonstrates **comprehensive** knowledge and understanding of local and national initiatives and long-term food security.
			
			Level 3 (5–6 marks)
			Demonstrates **thorough** knowledge and understanding of local/national initiatives and long-term food security.
			
			Level 2 (3–4 marks)
			Demonstrates **reasonable** knowledge and understanding of local/national initiatives and long-term food security.
			
			Level 1 (1–2 marks)
			Demonstrates **basic** knowledge and understanding of local/national initiatives and long-term food security.
			
			0 marks
			No response or no response worthy of credit.
			
			AO2
			Level 4 (19–24 marks)
			Demonstrates **comprehensive** application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of the role local and national initiatives can play in providing long-term food security.
			
			Demonstrates **comprehensive** application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to the extent to which long-term food security can be achieved through local and national initiatives.
			
			Relevant concepts are authoritatively discussed.
				33
				AO1 x9
				AO2 x24
					Indicative content
					
					AO1 – 9 marks
					Demonstrating knowledge and understanding of local/national initiatives and long-term food security could potentially include:
					• Long-term food security:
					  ○ Enough food for the national population in the next 20+ years
					  ○ Access to sufficient, safe and nutritious food to lead to an active and healthy lifestyle
					• Local/national initiatives – wide range of possible examples:
					  ○ Small scale co-operatives
					  ○ National involvement in managing water (supply / flood prevention)
					  ○ Local environmental schemes e.g. stone walls, rainwater harvesting
					  ○ Environmental initiatives e.g. encouraging biodiversity → e.g. boost numbers of pollinators either nationally (banning of certain chemicals) locally (wildlife reserves; not cutting road verges)
					  ○ Reduce food waste
					  ○ Urban food production – e.g. urban farms; allotments
					  ○ Feeding urban populations including local traders v. supermarkets
					  ○ Local produce, local miles
					  ○ Initiatives to reduce / stop conflict to allow farming to proceed e.g. DRC, Sudan
					  ○ National schemes developing electricity grids → allows pump irrigation; roads → access to markets; storage facilities → less loss

			Level 3 (13–18 marks)
			Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of the role local and national initiatives can play in providing long-term food security.
			
			Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions as to the extent to which long-term food security can be achieved through local and national initiatives.
			
			Relevant concepts are discussed but this may lack some authority.
			
			Level 2 (7–12 marks)
			Demonstrates **reasonable** application of knowledge and understanding to provide a sound analysis that shows some accuracy of the role local and national initiatives can play in providing long-term food security.
			
			Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to the extent to which long-term food security can be achieved through local and national initiatives.
			
			Concepts are discussed but their use lacks precision.
			
			Level 1 (1–6 marks)
			Demonstrates **basic** application of knowledge and understanding to provide a simple analysis that shows limited accuracy of the role local and national initiatives can play in providing long-term food security.
			
			Demonstrates **basic** application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to the extent to which long-term food security can be achieved through local and national initiatives.
					AO2 – 24 marks
					Application of knowledge and understanding to analyse and evaluate the extent to which long-term food security can be achieved through local and national initiatives, could potentially include:
					• Local and national initiatives can and do deliver food security e.g.
					  ○ Cuba where local initiatives have been successful - 383,000 urban farms (e.g. organoponicos) employing 140,000 workers are meeting 50% of Havana's demand; a growth of small scale co-operatives allowing private individuals to buy equipment as needed rather than being forced to wait on when the government distribution arrived. Particularly important since 1991 when reliance on fertilisers etc. from the USSR ceased.
					  ○ Sahel - crosses many African countries between the Sahara desert and the tree/shrub/grassland savanna. So local/small scale food security initiatives can work but some initiatives have been successful wholly because of international input e.g. re-greening projects such as FAO Acacia project has regenerated areas in Senegal, Chad, Kenya, Burkina Faso, Niger and Sudan
					  ○ Urban food security - Bronx New York 37% population food insecure - fast food outlets/lack of grocery stores - national initiatives e.g. food stamps, to off-set impact of poverty. Contrast with Nairobi, Kenya – self-help sack gardening to provide fresh vegetables; note - Kenya is a major recipient of

			Concepts are not discussed or are so inaccurately.
			
			0 marks
			No response or no response worthy of credit.
			
			Quality of extended response
			
			Level 4
			There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.
			
			Level 3
			There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.
			
			Level 2
			The information has some relevance and is presented with limited structure. The information is supported by limited evidence.
			
			Level 1
			The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.
					food aid (short term food security); allotments
					• International initiatives are still important e.g. development of GM crops (Cuban state support for GM corn), trade and the role of WTO, but benefits of trade in food may not reach local farmers/consumers. Not possible to grow all foods locally + nationally, so world trade important.
					• Ensuring the security in the long-term can be challenging because many factors have to be addressed e.g.
					  ○ population growth e.g. Many Sahel population management efforts are on a national scale, however aid agencies e.g. US AID has played a significant role across the region in helping to raise access to contraception and reduce social stigma surrounding the cultural barriers to using contraception,
					  ○ impacts of climate change e.g. Cuba - adopting drought resistant avocado, orange and guava seeds, and wind resistant sweet potato, squash and yam which can withstand hurricanes

Question			Answer	Mark	Guidance
19*			**'Location is a significant factor in determining the severity of the impacts of an active volcano'. Discuss.** **AO1** **Level 4 (7–9 marks)** Demonstrates **comprehensive** knowledge and understanding of the different types of volcanoes and their impacts. **Level 3 (5–6 marks)** Demonstrates **thorough** knowledge and understanding of the different types of volcanoes and their impacts. **Level 2 (3–4 marks)** Demonstrates **reasonable** knowledge and understanding of the different types of volcanoes and their impacts. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of the different types of volcanoes and their impacts. **0 marks** No response or no response worthy of credit. **AO2** **Level 4 (19–24 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of how the location of an active volcano influences its impacts. Demonstrates **comprehensive** application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether location is a significant factor in determining the severity of the impacts of an active volcano. Relevant concepts are authoritatively discussed.	**33** **AO1 x9** **AO2 x24**	**Indicative content** **AO1 – 9 marks** Demonstrating knowledge and understanding of the location of an active volcano and related impacts in a variety of contexts could potentially include: • Location – diverging boundaries are associated with effusive eruptions, converging with explosive, hot spots with effusive • Convergent plate boundary – explosive eruptions leading to impacts from lava, ash, pyroclastic flows, gas, tsunami • Type of lava – high viscosity and low viscosity linked with silica content • Divergent plate boundary effusive eruptions leading to lava flows and occasional ash create shield volcanoes and basalt plateaux • Magnitude of eruption (VEI) significant – can be related to location (type of eruption) but not always e.g. EIS (2010) Also potential risks from super-volcanoes. • Impacts can be environmental, social, economic or political • Location can be geographical e.g. type of boundary, distance from eruption OR socio-economic e.g. AC, EDC, LIDC **AO2 – 24 marks** Application of knowledge and understanding to analyse and evaluate whether the location of an active volcano is a key factor in determining the severity of its impacts, could potentially include: Location (physical aspects) • Distance decay effect – the further away from the eruption the less the impacts. However, direction of eruption can be significant e.g. Mt St Helens; Montserrat; Etna • Some events lead to global / regional impacts e.g. ash from Pinatubo or EIS; tsunami caused

			Level 3 (13–18 marks) Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of how the location of an active volcano influences its impacts. Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions as to whether location is a significant factor in determining the severity of impacts of an active volcano. Relevant concepts are discussed but this may lack some authority. **Level 2 (7–12 marks)** Demonstrates **reasonable** application of knowledge and understanding to provide a sound analysis that shows some accuracy of how the location of an active volcano influences its impacts. Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether location is a significant factor in determining the severity of impacts of an active volcano. Concepts are discussed but their use lacks precision. **Level 1 (1–6 marks)** Demonstrates **basic** application of knowledge and understanding to provide a simple analysis that shows limited accuracy of how the location of an active volcano influences its impacts. Demonstrates **basic** application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether location is a significant factor in determining the severity of impacts of an active volcano.		by explosive eruptions can be local e.g. Anak Krakatau (2018) or regional e.g. Krakatau (1883) • Volcanic eruptions that combine with high latitude/altitude where snow and ice can cause floods e.g. Iceland; mud flows e.g. Nevado del Ruiz, Colombia; avalanches e.g. Mount Kusatsu-Shirane Japan; more destructive because their location is above the snow line Location (human aspects) • Volcanoes located in countries at different levels of development have different impacts (Indonesia 2010 Merapi 367 died, Philippines Pinatubo1991 800 died, Japan 2014 Mt Ontake 63 died, Italy 2016 Etna 0 died Hawaii Mauna Loa 0 died). Associated with resources available for monitoring, preparation and action during and after an event. Perception of risk – highly monitored = reduced risk perception • Population density – high population density near a volcano increases the impact. Some countries (e.g. Indonesia and Japan) have limited area to accommodate their populations so people have to live near volcanoes. Capital cities of Japan, Philippines and Mexico are very close to volcanoes – urban/rural contrast – rural can be low or high density. • Impacts can be positive. People choose to live/work near volcanoes for high yield farming due to fertile soils e.g. 3 million live around Vesuvius which is highly developed for farming or for opportunities for tourism (e.g. Iceland) or sports. In LIDCs people have little choice but to occupy slopes of volcanoes.

			Concepts are not discussed or are so inaccurately. **0 marks** No response or no response worthy of credit. **Quality of extended response** **Level 4** There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Level 3** There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 2** The information has some relevance and is presented with limited structure. The information is supported by limited evidence. **Level 1** The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		

Question			Answer	Mark	Guidance
20*			**How far do you agree that an advanced level of economic development is essential for successful mitigation of volcanic hazards?** **AO1** **Level 4 (7–9 marks)** Demonstrates **comprehensive** knowledge and understanding of mitigation of volcanic hazards. **Level 3 (5–6 marks)** Demonstrates **thorough** knowledge and understanding of mitigation of volcanic hazards. **Level 2 (3–4 marks)** Demonstrates **reasonable** knowledge and understanding of mitigation of volcanic hazards. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of mitigation of volcanic hazards. **0 marks** No response or no response worthy of credit. **AO2** **Level 4 (19–24 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of the influence of economic development on the mitigation of volcanic hazards. Demonstrates **comprehensive** application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether an advanced level of economic development is essential for successful mitigation of volcanic hazards. Relevant concepts are authoritatively discussed.	**33** **AO1 x9** **AO2 x24**	**Indicative content** **AO1 – 9 marks** Demonstrating knowledge and understanding of mitigation of volcanic hazards in a variety of contexts could potentially include: • Types of eruptions – effusive / explosive lead to different hazards • Disaster risk equation; risk (R) = frequency or magnitude of hazard (H) x level of vulnerability (F) divided by capacity of population to cope and adapt (C) • Modifying event e.g. lava-diversion channels (Etna 1983), cooling lava with water (Heimey 1973) or slowing flows by increasing obstacles and friction (Etna 1992) • Modifying people's vulnerability e.g. education e.g. preparation, drills, evacuation. Community preparedness e.g. building shelters, prediction and warning appropriate to volcanic eruptions, hazard mapping and land-use zoning • Modifying people's loss e.g. emergency aid, disaster response and equipment, insurance, search and rescue, resources for rebuilding public services **AO2 – 24 marks** Application of knowledge and understanding to analyse and evaluate whether an advanced level of economic development is essential for successful mitigation of volcanic hazards, could potentially include: • Frequency of eruptions – volcanoes not erupting in historical times unlikely to be actively monitored especially in EDCs / LIDCS e.g. Chaitén, Chile • Level of economic development linked to available technology and history of volcanic

			Level 3 (13–18 marks) Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of the influence of economic development on the mitigation of volcanic hazards. Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions as to whether an advanced level of economic development is essential for successful mitigation of volcanic hazards. Relevant concepts are discussed but this may lack some authority. **Level 2 (7–12 marks)** Demonstrates **reasonable** application of knowledge and understanding to provide a sound analysis that shows some accuracy of the influence of economic development on the mitigation of volcanic hazards. Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether an advanced level of economic development is essential for successful mitigation of volcanic hazards. Concepts are discussed but their use lacks precision. **Level 1 (1–6 marks)** Demonstrates **basic** application of knowledge and understanding to provide a simple analysis that shows limited accuracy of the influence of economic development on the mitigation of volcanic hazards.		hazard management will affect mitigation of volcanic hazards. • Role of monitoring stations e.g. Italian National Seismic Network (INSN), Indonesia's Volcanology and Geological Hazard Mitigation (CVGHM) warnings to populations. • Land use zoning may be more successful in ACs for a variety of reasons including the cost of moving, education, access to transport, degree of choice e.g. farmers in LIDCs, availability of data • Technology to slow/divert lava flows is not sophisticated however ACs use it more e.g. spraying sea water (Heimey Iceland), concrete blocks (Etna Italy) • Modifying loss in EDC/LIDC can be more problematic; Indonesia has mainly farming communities around Mount Merapi however they have a very well trained militia which helps reduce losses. Italian government has the resources to compensate individuals, businesses and quickly restore infrastructure. • Modifying vulnerability e.g. Indonesian government sent trainers around with pictorial charts to teach villagers living on the sides of the volcano to recognise the signs of an eruption, although had limited success as cultural beliefs hindered the acceptance of danger. • Community preparedness is more effective in ACs where more money is available for building and higher standards of infrastructure. It has taken Montserrat more than 20 years to rebuild permanent structures for the government. • Hazard mapping is not limited to ACs, but also requires resourcing e.g. scientific research. Montserrat now is a well-researched volcanic area with a complex hazard mapping system

			Demonstrates **basic** application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether an advanced level of economic development is essential for successful mitigation of volcanic hazards. Concepts are not discussed or are so inaccurately. **0 marks** No response or no response worthy of credit. **Quality of extended response** **Level 4** There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Level 3** There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 2** The information has some relevance and is presented with limited structure. The information is supported by limited evidence. **Level 1** The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		which changes according to the activity of the volcano; education has ensured the population is able to respond effectively and appropriately • Modifying loss – disaster response teams in ACs tend to be better organised and better equipped although some EDCs e.g. Indonesia have well-trained groups. LIDCs e.g. DRC not well resourced. • Governments in ACs have more resources available to help with rebuilding and restoring infrastructural damage to enable the nation or locality to return to 'normal' life faster e.g. Eyjafjallajökull, Iceland 2010 many inhabitants were using the eruption to diversify their income (e.g. farmers who created temporary museums in barns encouraging volcanic tourism) and were quickly returning to farming, whereas in Montserrat (EDC) after Soufrière Hills eruption 1995-1997, it took residents more than 10 years to move out of temporary housing let alone find work or re-start personal businesses. • Magnitude of eruption may exceed ACs abilities e.g. impacts on global + regional weather • Even ACs can be badly affected e.g. ash cloud over Europe from EIS (2010)

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