

Edexcel GCSE Geography A Scheme of Work

Component 1, Topic 2: Weather hazards and climate change

Introduction

Edexcel GCSE Geography A Geographical Themes and Challenges offers a thematic approach to studying geography and the content is split by physical and human geography. As with all GCSEs, the guided learning hours total 120 hours over two years. This document provides a sample scheme of work for teaching Component 1, Topic 2 that can be adapted by centres to fit their timetabling and staffing arrangements. It is meant as an example approach only and is not intended to be prescriptive. This scheme of work follows the order of the content in the Geography A specification. This document can be edited and updated over time to develop a resource bank.

The scheme of work contains suggestions for resources that you can use to support your teaching. These are suggestions only of material you may find useful and you are encouraged to use a wide range of resources that suit the needs of your students.

Overview of Component 1

- Component 1 is worth 37.5% of the GCSE.
- All students are required to study 3 topics.
- Topic 1: The changing landscapes of the UK.
- Topic 2: Weather hazards and climate change.
- Topic 3: Ecosystems, biodiversity and management.
- You need to allow roughly 45 hours to teach Component 1 and roughly 15 hours to teach each topic.

Component 1 will be assessed in Paper 1, which is worth 37.5% of the GCSE assessment and is 1 hour 30 minutes in duration. The paper is marked out of 94. The sample assessment materials can be used for question practice to enable students to build up the confidence and skills as part of their revision and exam practice.

Health and safety

The practical work and fieldwork suggested within the scheme of work are those which we believe are not banned or restricted in any way and are still currently used in most schools and colleges. We advise teachers and technicians to discuss the merits of the suggested practical work and fieldwork when deciding which to carry out and how they will be carried out. You may have ideas for practical work and fieldwork which we have not suggested but would work just as well. As with all practical work and fieldwork, a risk assessment is expected as part of good health and safety practice in all centres. Reference to health and safety in the field is made in the specification.

Scheme of work for Topic 2: Weather hazards and climate change

Lessons	Learning objectives	Content (vocabulary, concepts, processes, ideas)	Place exemplification	Integrated skills	Teaching activities and resources
1 lesson (1 hour)	<p>Key idea 2.1: The atmosphere operates as a global system transferring heat and energy.</p> <p>Suggested learning objectives: To understand the difference between weather and climate.</p> <p>To understand that in each hemisphere there are three cells (Hadley cell, Ferrel cell and Polar cell) in which air circulates through the entire depth of the troposphere. Understanding the tricellular model of atmospheric circulation.</p> <p>To learn that the troposphere (10-15km high) is the part of the atmosphere where</p>	<p>2.1a The features of the global atmospheric circulation.</p> <p>Key words Troposphere ITCZ Jet stream Trade winds Hadley, Ferrel, Polar cells</p>	Global		<p>Starter</p> <ul style="list-style-type: none"> Define weather and climate and distinguish the difference between the two. Use these links from the Met Office website to help: http://www.metoffice.gov.uk/climate-guide/climate http://www.metoffice.gov.uk/learning/weather-for-kids/understanding-weather Outline the key aspects of weather. Build up a pattern of the different climates, possibly by plotting on a world map the different climatic zones. http://www.metoffice.gov.uk/climate-guide/climate/zones <p>Main activity</p> <ul style="list-style-type: none"> Display and discuss the tricellular model like the one found on the Met Office website: http://www.metoffice.gov.uk/learning/learn-about-the-weather/how-weather-works/global-circulation-patterns Start with a clip or satellite image showing atmospheric circulation. There are some useful clips on the BBC's Class Clips. Give students a blank outline of the spherical world and get them to draw and label the six cells, and the direction of heat. The global circulation can be described as the world-wide system of winds, which is necessary to transport heat from tropical to polar latitudes. Students could write a paragraph describing how heat energy is transferred. Students should mark the latitudes where there is a boundary between the cells. Each type of cell could then be looked at in more depth. For example, in the Polar cells, which extend from between 60 and 70 degrees north and south to

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	<p>most of the weather takes place.</p>				<p>the poles, air sinks over the highest latitudes and flows out towards the lower latitudes at the surface.</p> <p>Plenary</p> <ul style="list-style-type: none"> Students circle the room sharing their key words with their peers. After five minutes students go back to their seats and write down as many key words as they can remember.
<p>1 lesson (1 hour)</p>	<p>Key idea 2.1: The atmosphere operates as a global system transferring heat and energy.</p> <p>Suggested learning objectives: To investigate the global pattern of ocean currents and how these are linked.</p> <p>To name the main ocean currents, such as the Gulf Stream and North Atlantic Drift. Currents like the North Atlantic Drift bring much of the rainfall to the UK.</p> <p>To recognise the global pattern of ocean currents</p>	<p>2.1b How circulation cells and ocean currents transfer and redistribute heat energy across the Earth.</p> <p>Key words Gulf stream North Atlantic Drift Ocean currents Prevailing winds</p>	<p>Global</p>		<p>Starter</p> <ul style="list-style-type: none"> Review clip: use the video (How does the Climate System work?) on this link http://www.metoffice.gov.uk/climate-guide/climate/what-affects-climate Recap key words and understanding from last lesson. Review tricellular model. <p>Main activity</p> <ul style="list-style-type: none"> On a blank outline map of the world students could draw on the different ocean currents focusing on direction and ocean temperature. Clearly label the main currents such a Gulf Stream and North Atlantic Drift. Use these two resources or similar images to introduce. http://www.physicalgeography.net/fundamentals/8g_1.html - ocean current map https://www.aip.org/history/climate/xOceanCirc.htm - ocean current map Focus on two important currents. 1) The Gulf Stream and 2) The North Atlantic Drift. Consider what part these play on the weather of the UK. How do these link to air masses? Explain how these ocean currents influence the climate of the UK. Compare the UK climate with a climate at the same latitude in North America. Describe the differences.

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	and understand how these are linked to the passage of prevailing winds looked at in the first lesson.				<p>Plenary</p> <ul style="list-style-type: none"> • Hangman – in pairs, choose some key words from this lesson.
1 lesson (1 hour)	<p>Key idea 2.2: The global climate was different in the past and continues to change due to natural causes.</p> <p>Suggested learning objectives: To understand that throughout the Quaternary period there have been major natural changes in the Earth's climate. Climate cycles have moved through colder glacial periods and warmer interglacial periods.</p>	<p>2.2a: How climate has changed in the past over different time scales: glacial and interglacial periods during the Quaternary period.</p> <p>Key words Quaternary period Climate change Interglacial period Glacial period Climate cycle</p>	Global		<p>Starter</p> <ul style="list-style-type: none"> • Begin with some basic enquiry questions such as <ol style="list-style-type: none"> 1. What is climate change? 2. What does it mean? 3. How is our climate changing? 4. What do we mean by the Quaternary period? This website provides answers to the questions: http://www.metoffice.gov.uk/climate-guide/climate-change <p>Main activity</p> <ul style="list-style-type: none"> • Describe temperature change on graphs showing past climate changes at different timescales such as the one here: http://www.coolgeography.co.uk/A-level/AQA/Year%2012/Cold%20environs/Distribution/glacial%202.png or here - http://www3.epa.gov/climatechange/kids/basics/past.html • There are some useful videos on Class Clips. <p>Define glacial and interglacial, and identify these on the graphs. Analyse the graphs. What are the trends, patterns and anomalies? Students could demonstrate their learning through exam-style questions. For example, mark on the graph where a recent rapid rise in temperature has occurred and a period when the temperature was lowest. Or, describe the changes in average global temperatures shown.</p>

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					<p>Plenary</p> <ul style="list-style-type: none"> What's the question? Give students the answer to a question from the lesson. Students then need to create the question. 			
<p>1 lesson (1 hour)</p>	<p>Key idea 2.2: The global climate was different in the past and continues to change due to natural causes.</p> <p>Suggested learning objectives: To understand the natural causes of past climates.</p> <p>To understand the role of orbital changes (long timescales).</p> <p>To understand the role of sunspots in short/medium timescales. Recognise that volcanic activity can cause cooling for short periods.</p>	<p>2.2b: Causes (Milankovitch cycles, solar variation, volcanism) and evidence (ice cores, pollen records, tree rings, historical sources) for natural change.</p> <p>Key words Milankovitch cycles (Astronomical forcing) Sun spots Dendrochronology (tree ring dating)</p>	<p>Global</p>		<p>Starter</p> <ul style="list-style-type: none"> What are the misconceptions of climate change? Is it caused just by humans? Ask students what their perception of the term climate change means. Record their answers on the board and deal with any misconceptions. Refer back to the graphs and trends last lesson. This is a useful website: http://meridian.aag.org/climate/index.cfm?pairing_id=9#pairing_id=9 or use a few images or cartoon to spark discussions. <p>Main activity</p> <ul style="list-style-type: none"> Show some Class Clips or YouTube clips to help explain the natural causes of climate change. Produce a diagram to show how the Earth's orbit and axis effects climate change. Produce a summary table for natural causes using the headings: cause / timescale / processes / warming or cooling. Discuss how volcanoes can cause climate change. Use this link from the USGS website: http://volcanoes.usgs.gov/hazards/gas/climate.php Brainstorm how we could prove that the climate has changed. Discuss what the evidence is for climate change. How do we know these graphs are accurate? Discuss some of the evidence in these clips, e.g. instrument readings, glacier retreat, ice core analysis, tree rings, pollen records etc. Categorise them into short-, medium- and long-term evidence. <table border="1" data-bbox="1377 1342 2056 1374"> <tr> <td>Short term</td> <td>Medium term</td> <td>Long Term</td> </tr> </table>	Short term	Medium term	Long Term
Short term	Medium term	Long Term						

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					<ul style="list-style-type: none"> Carousel activity. Provide students with a series of fact cards on the different types of evidence for climate change. Students then use a summary table to work around the different stations to read and summarise the evidence. The students must categorise each piece of evidence into: <p>Plenary</p> <ul style="list-style-type: none"> Students could feed back to their partners what they have learnt in the lesson.
1 lesson (1 hour)	<p>Key idea 2.3: Global climate is now changing as a result of human activity.</p> <p>Suggested learning objectives: To understand that human activities produce greenhouse gases.</p> <p>To analyse the growth of greenhouse gases and what contributes to it.</p> <p>Be able to explain the enhanced greenhouse effect (as well as the natural greenhouse effect).</p>	<p>2.3a: How human activities (industry, transport, energy, farming) produce greenhouse gases (carbon dioxide, methane) that cause the enhanced greenhouse effect.</p> <p>Key words Anthropogenic – Greenhouse gases Greenhouse effect Enhanced Greenhouse effect</p>	Global		<p>Starter</p> <ul style="list-style-type: none"> Discuss the Keeling curve graph and the Hockey Stick graph. Copies of these images can be found on various websites. What do they show? Why do they show an increase in Co2 and an increase in temperature? What might have caused this? What is the relationship between the Keeling curve and the Hockey Stick graph? <p>Main activity</p> <ul style="list-style-type: none"> Draw a diagram to show how the natural greenhouse effect works. Annotate it to show how the enhanced greenhouse effect works. Interpret topological maps to describe CO₂ emissions by country; suitable topological maps can be found on the Worldmapper website: www.worldmapper.org Suggest reasons for the country proportions. Work in pairs to compare findings with other maps and present findings to the class. Produce a table of greenhouse gases (name, sources, formula, and contribution to warming). Draw a line graph of growth in greenhouse gases and growth in global warming gases. Describe and explain the graph. <p>Plenary</p>

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					<ul style="list-style-type: none"> Class debate based on last the two lessons. Split into groups and each group considers one of the following questions. Do you think there is enough evidence to support global warming? To what extent are we accountable for the recent enhanced greenhouse effect? Or is it part of a natural cycle?
1 lesson (1 hour)	<p>Key idea 2.3: Global climate is now changing as a result of human activity.</p> <p>Suggested learning objectives: To investigate the positive and negative impacts of climate change.</p>	<p>2.3b: Negative effects that climate change is having on the environment and people (changing patterns of crop yield, rising sea levels and retreating glaciers).</p> <p>Key words Eustatic sea level change Thermal expansion Glacial retreat Crop yields</p>	Global		<p>Starter Have a look at this site to get an overview of some of the impacts. http://www.metoffice.gov.uk/climate-guide/climate-change/impacts</p> <p>Main activity (option 1 computer room)</p> <ul style="list-style-type: none"> Using this website, divide the class into groups. Each group researches a negative impact of climate change on either people or the environment. For example, food security, sea level rise, retreating glaciers, water shortages, more extreme weather hazards. The groups present their finding to the rest of the class and then write a summary on each impact. <p>Main activity (option 2 classroom)</p> <ul style="list-style-type: none"> Teacher to make up several fact cards outlining the impacts of climate change. Students to review and summarise each of the impacts and feedback what they have found to the rest of the class. <p>Plenary</p> <ul style="list-style-type: none"> A brief evaluation of the impacts, which are positive and negative. Rank the impacts in order of severity. Worst to least impact.
1 lesson (1 hour)	<p>Key idea 2.4: The UK has a distinct climate which has</p>	<p>2.4a: Climate of the UK today and changes over the last 1000 years.</p>	UK	Use and interpretation of line graphs and bar	<p>Starter</p> <ul style="list-style-type: none"> Enquiry question: What is the UK's climate like? Build up a picture from the responses. You could use this link from the Met Office website:

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	<p>changed over time.</p> <p>Suggested learning objectives: To understand what the UK's climate has been like over the past 1000 years.</p> <p>To recognise how it has changed and gone through cycles over time.</p> <p>To learn how to construct and analyse climate graphs.</p>	<p>Key words Climate cycles Climate graph</p>		charts showing climate change.	<p>http://www.metoffice.gov.uk/public/weather/climate</p> <ul style="list-style-type: none"> Describe temperature change on graphs showing past climate changes on different timescales. <p>Main activity You could use this link from the Met Office website: http://www.metoffice.gov.uk/food-insecurity-index/</p> <ul style="list-style-type: none"> Use a series of maps showing long-term climatic averages over the UK, including max and min temperatures, sunshine hours, days of rain, total precipitation, number of days with snow, etc. Students work in groups and focus on different months or climatic variables. The site also has information about weather extremes, regional climates within the UK and explanations of variation. An exam-style question could be used to develop some skills. Using one of the graphs from the Met Office website, describe how the climate of the UK has changed. <p>Plenary</p> <ul style="list-style-type: none"> Draw your learning. Students illustrate what they have learnt from the lesson and use a maximum of 30 words to describe each picture.
1 lesson (1 hour)	<p>Key idea 2.4: The UK has a distinct climate which has changed over time.</p> <p>Suggested learning objectives: To understand the factors affecting the UK's climate,</p>	<p>2.4b: Spatial variations in temperature, prevailing wind and rainfall within the UK.</p> <p>Key words Spatial variations Prevailing winds Precipitation</p>	UK	Students can interpret and draw climate graphs for different areas of the UK and draw comparisons.	<p>Starter You could use this link from the Met Office website http://www.metoffice.gov.uk/climate/uk/summaries</p> <ul style="list-style-type: none"> Use some of the maps on the website to prompt discussion about variations in the UK weather. <p>Main activity</p> <ul style="list-style-type: none"> Use data to plot and then annotate a climate graph for a UK location. Draw maps comparing and contrasting temperature, wind and rainfall for the UK. Draw a sketch map of the British Isles and divide it into four climate areas. Annotate the map with key

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	and how temperature, rainfall and prevailing winds vary spatially.				<p>information about the climate. Include maximum temperature, minimum temperature, range of temperatures, total precipitation.</p> <ul style="list-style-type: none"> • Explain the differences in patterns. • Outline the five main factors; describe the temperature and rainfall patterns in the UK <p>Plenary</p> <ul style="list-style-type: none"> • In 50 words describe how temperature, rainfall and wind varies across the UK.
1 lesson (1 hour)	<p>Key idea 2.4: The UK has a distinct climate which has changed over time.</p> <p>Suggested learning objectives: To understand why the UK's weather and climate is changeable. To learn the different air masses affecting the UK and how its geographical position in the northwest Atlantic influences its weather and climate.</p>	<p>2.4c: The significance of the UK's geographic location in relation to its climate.</p> <p>Key words Air masses Polar maritime Tropical maritime Polar continental Arctic maritime Topical continental</p>	UK		<p>Starter</p> <ul style="list-style-type: none"> • Give students five minutes to write down all the things that they think may affect the climate of the UK. Work in pairs or groups. Then summarise on the board as a tally chart or spider map. <p>Main activity</p> <ul style="list-style-type: none"> • Produce a simple map of air masses and their characteristics. • Consider the impact on the UK climate of latitudinal shifts in air masses (i.e. less frequent polar air). There are various Class Clips or YouTube clips illustrating how air masses develop and move. • Describe how the air masses affect the type of weather we get in the UK. • Refer back to lesson two. Discuss how ocean currents play their part in the UK's weather. • Also consider the effects of latitude, position in the North Atlantic, prevailing winds. • Examine the UK Climate Impacts Programme website for projections: http://ukclimateprojections.metoffice.gov.uk/ • Discuss what the future holds. <p>Plenary</p>

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					<ul style="list-style-type: none"> One-minute challenge. In pairs students share what they have learnt about the significance of the UK's location in relation to its climate.
Tropical cyclones					
1 lesson (1 hour) Covers Key ideas 2.5a and 2.5b	<p>Key idea 2.5: Tropical cyclones are extreme weather events that develop under specific conditions and certain locations.</p> <p>Suggested learning objectives: To understand the characteristics of cyclones from the idea that they are intense low pressure systems, largely restricted to ocean areas 30 degrees north and south of the equator but not on the equator. To recognise the importance of water temperature on cyclone formation.</p>	<p>2.5a: How the global circulation of the atmosphere leads to tropical cyclones (hurricanes and typhoons) in source areas and the sequence of their formation.</p> <p>Key words Coriolis force Low pressure system Tropics Equator Track</p>	Philippines USA		<p>Starter</p> <ul style="list-style-type: none"> Useful document on tropical cyclones can be found on www.noaa.gov this is the link: http://www.srh.noaa.gov/jetstream/downloads/tropicalcyclones.pdf <p>Start with this clip from the Met Office website: http://www.metoffice.gov.uk/barometer/videos/2012-07/hurricanes</p> <ul style="list-style-type: none"> Where do tropical cyclones get their names? Not essential to the spec but a nice way to introduce them. Is your name on the list? http://www.nhc.noaa.gov/aboutnames.shtml <p>Main activity 1 This website is a good place to start: http://www.metoffice.gov.uk/weather/tropicalcyclone/facts#what</p> <ul style="list-style-type: none"> What conditions are necessary to create a tropical storm? Go through the key ingredients including the idea of the Coriolis force and critical water temperatures. The Met Office website and YouTube have various clips explaining the Coriolis force. Draw a labelled cross-section diagram to show the anatomy of a tropical cyclone. What are the main parts of a tropical cyclone? Images like this diagram: (http://weatherworkedout.weebly.com/uploads/2/2/3/5/22359606/622339660.gif?1376037245) can be found on the internet to help explain the importance of the global atmospheric circulation in cyclone formation.

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	<p>Key idea 2.5: Tropical cyclones are extreme weather events that develop under specific conditions and certain locations.</p> <p>Suggested learning objectives: To recognise that cyclones bring heavy rain, strong winds and storm surges to coastal regions. Winds blow anticlockwise in the northern hemisphere; they can be over 100km in diameter with and eye up to 60 km in diameter.</p> <p>To learn the times of the year when cyclones form.</p>	<p>2.5b: Characteristics, frequency and geographical distribution of tropical cyclones and how these change over time.</p> <p>Key words Frequency Distribution Eye wall Diameter</p>	<p>Tropics Philippines</p>	<p>Use of GIS to track the movement of tropical cyclones</p>	<p>Starter</p> <ul style="list-style-type: none"> Show a map of the distribution of where tropical cyclones occur. This map can be found on the Met Office website: http://www.metoffice.gov.uk/weather/tropicalcyclone/facts#what Enquiry question: Where do tropical cyclones occur? Write a short paragraph to describe the distribution. Students must include these words: tropics, Equator, band, land, sea, Pacific, Atlantic, Indian Ocean. <p>Main activity 2</p> <ul style="list-style-type: none"> Using a blank outline map of the world plot on the areas where cyclones form and develop. Now explain the distribution. Why don't they occur on the equator? Link back to understanding of Coriolis force and the global atmospheric circulation. When are the tropical cyclone seasons? Give students an annual one-sheet calendar. Mark on the calendar the different season for the different regions. Why do hurricanes eventually lose speed and energy? <p>If teaching during tropical cyclone season, actively track and map a cyclone live using GIS – Storm Tracker: http://www.metoffice.gov.uk/public/weather/storm-tracker/#?tab=map</p> <ul style="list-style-type: none"> Map the track to establish how the characteristics change over time, i.e. size, wind speed, direction etc. <p>Plenary</p> <ul style="list-style-type: none"> Spot the deliberate mistake. Show statements about the formation of tropical cyclones. Students to spot the mistakes.

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					<ul style="list-style-type: none"> Discussion: is there a link between climate change (global warming) and the increase in frequency and severity of tropical storms? Why might we be getting stronger cyclones more often? Link back to what students have learnt in the lesson.
<p>2 lessons (2 hours)</p> <p>1 lesson on each located example</p>	<p>Key idea 2.6: There are various impacts of and responses to natural hazards caused by tropical cyclones depending on a country's level of development.</p> <p>Suggested learning objectives: To understand that the social, economic and environmental impacts of cyclones can vary depending on a country's level of development.</p> <p>To recognise that this may also influence the type and level of response.</p>	<p>2.6a: Reasons why tropical cyclones are natural weather hazards (high winds, intense rainfall, storm surges, coastal flooding and landslides).</p> <p>2.6b: Different social, economic and environmental impacts that tropical cyclones can have on a named developed and emerging or developing country.</p> <p>2.6c: Different responses to tropical cyclones of individuals, organisations and governments in a named developed and or named emerging or developing country.</p> <p>Key words Saffir-Simpson Scale Frequency Magnitude Storm surge Track</p>	<p>Philippines USA</p>	<p>Use of weather and storm surge data to calculate Saffir-Simpson magnitude</p> <p>Use of social media source, satellite images and socio-economic data to assess impact.</p>	<p>Starter</p> <ul style="list-style-type: none"> Issue students with a set of jumbled information cards – high winds, rainfall, floods, storm surges, damage to property, evacuation of people, pressure on emergency services, landslides, looting, loss of business, disruption to transport, loss of communication links, salinisation, coastal erosion, etc. Students to separate cards into Primary and Secondary effects of hurricanes. <p>Main activities</p> <ul style="list-style-type: none"> Discuss with students that some hurricanes are stronger than others. Go to the following site to learn about hurricane intensities and how they are categorized according to wind speed: http://www.nhc.noaa.gov/aboutsshws.html How is the strength of a hurricane measured? Discuss the Saffir-Simpson scale: http://www.nhc.noaa.gov/aboutsshws.php <p>1. Hurricane Sandy (US: developed country)</p> <ul style="list-style-type: none"> Excellent BBC documentary on YouTube. First 15 minutes on the causes, middle section on effects and last 15 minutes on responses. <i>Sandy – Anatomy of a Superstorm 2012</i> Provide students with a map of the US eastern seaboard. Students to plot the track of Hurricane Sandy. This is a good timeline of the events from the NOAA website:

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		Social, economic and environmental impacts.			<p>http://www.nasa.gov/mission_pages/hurricanes/archives/2012/h2012_Sandy.html</p> <ul style="list-style-type: none"> • Look at the documentary or timeline. Students to categorise impacts into social, economic and environmental. • Responses to a tropical storm. Students to put together an information leaflet aimed at school children. How to prepare for a tropical storm. What to do before during and after the storm. <p>2. Typhoon Haiyan (Philippines: emerging or developing)</p> <ul style="list-style-type: none"> • A good starting point is to find some facts and figures on Typhoon Haiyan. There are many websites with useful information: • Excellent documentary on YouTube by SKY news: <i>Typhoon Haiyan Eye Of The Storm</i> • Plot on a map the track of Typhoon Haiyan. • Watch the documentary. • This is a useful infographic: http://img.static.reliefweb.int/sites/reliefweb.int/files/styles/attachment-small/public/resources-pdf-previews/166678-HAIYAN-INFO-19NOV.v2.png?itok=S-GaSs4j • Students can categorise the primary and secondary effects and social, economic and environmental impacts. A structured table can be provided to assist the students with this. • What are the similarities and differences with Hurricane Sandy? Students to produce a table summarising these. • Students to create a newspaper-style report based on independent research. Try and include eyewitness accounts or statements, or, for a greater challenge, use a case study fact file which has been produced as a homework exercise prior to the lesson.

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					<ul style="list-style-type: none"> Produce a poster or pamphlet to warn residents of the arrival of an impending tropical cyclone. Disaster prevention includes having the supplies on hand to weather a storm or evacuation. Make sure your Disaster Supply Kit includes all the essential items. Put together a disaster plan for a family living in the Philippines. <p>Plenary</p> <ul style="list-style-type: none"> Class presentations. One minute each summarising impacts and responses.
Drought					
1 lesson (1 hour) Covers Key ideas 2.7a and 2.7b and 2.7c	<p>Key idea 2.7: The causes of drought are complex with some locations more vulnerable than others.</p> <p>Suggested learning objectives: To recognise the characteristics of arid environments and establish the difference between arid and drought.</p>	<p>2.7a: Characteristics of arid environments compared to the extreme weather conditions associated with drought.</p> <p>Key words</p> <p>Aridity Drought vulnerability</p>	South Africa California	Use and interpretation of graphs showing medium term rainfall trends.	<p>Starter</p> <ul style="list-style-type: none"> One minute to list as many arid (dry) countries as students can. Feedback (environments are classed as arid if they receive less than 250mm of rain fall annually). Issue students with some images of arid environments. In pairs discuss the characteristics and feed back to the class. <p>Main activity 1</p> <ul style="list-style-type: none"> Students work in groups on different arid locations to produce a presentation or poster on the characteristics such as little rainfall, large temperature variations, little vegetation, poor soils, etc. Show some images of the vegetation. Describe what it is like. Draw one or two examples of plants and animals and annotate the diagrams to show adaptations. Draw a climate graph for an arid region to show the variations in temperature and rainfall throughout the year.

Lessons	Learning objectives	Content (vocabulary, concepts, processes, ideas)	Place exemplification	Integrated skills	Teaching activities and resources
					<ul style="list-style-type: none"> On an outline map of the world plot the arid regions. This Poster is from the Met Office website: http://www.metoffice.gov.uk/media/pdf/q/5/Climate_poster_PDF.pdf Describe the distribution of the world's arid regions. Is there a pattern of where they are found? Around the tropics of Cancer and Capricorn, in the middle of continents, close to mountain ranges, near cold ocean currents. Briefly explain the reasons for this.
	<p>Key idea 2.7: The causes of drought are complex with some locations more vulnerable than others.</p> <p>Suggested learning objectives: To understand the different causes of drought and the physical and human impacts.</p>	<p>2.7b: Different causes of the weather hazard of drought: meteorological, hydrological, and human (agricultural, dam building, deforestation).</p> <p>2.7c: Why the global circulation makes some locations more vulnerable to drought as a natural hazard than others and how this changes over time.</p> <p>Key words Meteorological drought Hydrological drought Global circulation Natural hazard Over-abstraction Vulnerability El Nino</p>	<p>South Africa California</p>	<p>Use and interpretation of graphs showing medium term rainfall trends.</p>	<p>Starter</p> <ul style="list-style-type: none"> Define drought and investigate how the definition varies from place to place. This link is from the National Drought Mitigation Centre: http://drought.unl.edu/DroughtforKids/WhatisDrought/CausesofDrought.aspx <p>Main activity 2</p> <ul style="list-style-type: none"> Meteorological drought – the shortfall of precipitation and how long the dry period lasts for. The causes of meteorological drought can be due to both human and physical factors such as the natural variation in atmospheric conditions, El Nino events, changing land use e.g. deforestation and climate change. Hydrological drought – comes from decreasing river and reservoir levels, possibly due to dam building. It could also be as a result of agriculture such as poor farming practices and the over-abstraction of water for irrigation. Students should view some news footage clips showing drought and then decide which clip is an example of meteorological drought and which is hydrological. Give reasons why for each. Give students a set of cards with all the different causes of drought. Students to categorise them into Meteorological or Hydrological drought.

Lessons	Learning objectives	Content (vocabulary, concepts, processes, ideas)	Place exemplification	Integrated skills	Teaching activities and resources
					<ul style="list-style-type: none"> Students to understand how ENSO (El Nino Southern Oscillation) can make some locations such as Australia more vulnerable to drought than others. Give students a diagram of the ENSO stages. Students to annotate diagram to help explain how global circulation makes some locations more vulnerable to drought. <p>Plenary</p> <ul style="list-style-type: none"> Students could be shown some images of the impacts of ENSO, e.g. drought in Australia, and be asked to suggest what might have caused them. They could then be shown the clip again and the class could discuss how the images fit with the sequence in the animation. Or – students can practise adding their own commentary in front of the rest of the class. There are some Class Clips accessible on the internet. Students to write down three new things they have learned this lesson and feedback.
<p>2 lessons (2 hours)</p> <p>1 lesson on each located example</p>	<p>Key idea 2.8: The impacts of and responses to, drought vary depending on a country's level of development.</p> <p>Suggested learning objectives: To understand that the social, economic and environmental impacts of drought can vary</p>	<p>2.8a: Reasons why droughts are hazardous.</p> <p>2.8b: How the impacts of drought on people and ecosystems can vary for a named developed and emerging or developing country.</p> <p>2.8c: Different responses to drought from individuals, organisations and governments in a named developed and an</p>	<p>South Africa California</p>	<p>Use and interpretation of socio-economic data.</p>	<p>Starter</p> <ul style="list-style-type: none"> Read the newspaper article: identify how the drought is impacting on people and the environment. http://www.theguardian.com/global-development/2015/nov/17/farmers-bear-brunt-of-south-africas-severe-drought-all-we-can-do-is-pray <p>Main activities</p> <p>1. South Africa drought 2015 (emerging)</p> <ul style="list-style-type: none"> Map the areas affected by drought in South Africa News footage can be found on the internet about the impacts of the drought on farming. http://ewn.co.za/2015/11/09/SA-farmers-losing-millions-a-day-amid-drought Students to research the 2015 drought in South Africa.

Lessons	Learning objectives	Content (vocabulary, concepts, processes, ideas)	Place exemplification	Integrated skills	Teaching activities and resources
	depending on a countries level of development. This may also influence the type and level of response.	emerging of developing country. Key words Meteorological drought Hydrological drought Global circulation Natural hazard Over-abstraction Vulnerability El Nino			<ul style="list-style-type: none"> Produce a fact sheet on the causes, impacts on people and ecosystems and the different responses to the drought from individuals, organisations and the government. <p>2. USA California (developed)</p> <ul style="list-style-type: none"> A good starting point would be from various news websites on the internet showing reports of the droughts in California. Some additional resources: http://www.politico.com/magazine/story/2014/02/can-anybody-save-california-103544_Page2.html#.VmKpEI_XL8x http://www.cadrought.com/ Students to put together a five-minute PowerPoint presentation on the drought in California. They must include: a map, some weather data, impacts on people and ecosystems, and how individuals, organisations and the government have responded. <p>Plenary</p> <ul style="list-style-type: none"> Students to make a table comparing and contrasting the droughts in South Africa and California.

Independent learning/homework

Task 1	<i>Presentation</i>	<p>Create a five-minute PowerPoint presentation about the causes of climate change. Work in pairs and use the facts, figures, graphs, diagrams and photos in graphics from various websites to explain the following:</p> <ol style="list-style-type: none"> What is the greenhouse effect? (Mention that it is an important natural phenomenon and without it, the Earth would be too cold to support human life.) How has the greenhouse effect changed over time? (Mention that levels of greenhouses gases in the atmosphere have increased, trapping in more heat and leading to global warming). How are people contributing to it?
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		4 What are people doing to increase the amount of greenhouse gases in the atmosphere? (For example, burning more fossil fuels such as coal or gas which emit CO ₂).
Task 2	<i>News report</i>	Imagine that you are a reporter; one of the first on the scene after a Category 5 tropical storm hit the Philippines. You need to put a news report together from all the witness statements and photographs you took.
Task 3	<i>Research</i>	Research using the internet and then summarise the final agreements for the COP 21 Climate Summit.
Task 4	<i>Story boards</i>	Provide students with a fact sheet on the causes of the enhanced greenhouse effect. Students to present story boards to summarise the main causes.
Task 5	<i>Revision</i>	Produce a glossary revision sheet with definitions of all the key words from this topic.
Task 6	<i>Tropical Cyclones Top 5</i>	Students review their learning of cyclones by identifying five aspects they are confident about and five aspects they need to revise further.
Task 7	<i>Research</i>	Compare and contrast the characteristics of a cyclone from a developed country and one from an emerging or developing country.
Task 8	<i>Research</i>	Research and summarise the finding of the latest IPCC report: http://www.ipcc.ch/
Task 9	<i>Peer quiz</i>	Students create a ten-question quiz on the causes and consequences of climate change or the formation of cyclones or drought.

End-of-topic assessment

Appropriate exam questions for an end-of-topic assessment can be found in the SAMs on pages 15-19 (page numbering taken from the SAMs document).