

# YEAR 10 GEOGRAPHY – CYCLE 2 – CLIMATE CHANGE

BOX 1: KEYWORDS	
climate change	<b>long-term change in climate patterns</b> e.g. <b>temperature</b> and <b>precipitation</b>
Quaternary period	period of <b>geological time</b> from <b>2.6 million years ago</b> to the <b>present day</b>
mitigation	<b>reducing the causes of climate change</b> (which also reduces the effects)
adaptation	<b>reducing the effects of climate change</b> (without reducing the causes)
glacial	a <b>period of time</b> with <b>cooler global temperatures</b> e.g. an ice age
interglacial	a <b>period of time</b> with <b>warmer global temperatures</b>
ice core	<b>ice tube</b> drilled out of ground → <b>gases from ancient atmosphere</b> frozen into ice → can <b>measure carbon dioxide</b> and <b>methane</b> levels from <b>past</b>
fossil fuels	<b>coal, oil and gas</b> → <b>formed</b> in the past from the <b>fossils of living organisms</b>
greenhouse gases	<ul style="list-style-type: none"> <li><b>methane</b> → released from <b>cattle</b> (from <b>digestive system</b> of cow)</li> <li><b>carbon dioxide</b> → from <b>burning fossil fuels</b> e.g. to create <b>electricity</b></li> </ul>

BOX 2: THE GREENHOUSE EFFECT	
greenhouse effect	<b>incoming solar radiation</b> → some <b>outgoing radiation</b> reflected back to <b>space</b> → some <b>outgoing radiation</b> absorbed by <b>greenhouse gases</b> → <b>warms planet</b> → <b>maintains temperature</b> for life to survive ☺
enhanced greenhouse effect	<b>incoming solar radiation</b> → <b>less</b> outgoing radiation reflected back to <b>space</b> → as <b>more</b> is absorbed by <b>more</b> greenhouse gases → <b>warms planet more</b> → <b>temperature rises</b> → <b>negative effects</b> ☹

BOX 3: EVIDENCE FOR CLIMATE CHANGE	
past	<ol style="list-style-type: none"> <li><b>ice cores</b> → show there have been <b>glacial</b> and <b>interglacial periods</b> in the <b>past</b> (show temperatures have increased and decreased)</li> <li><b>ocean fossils</b> → give <b>evidence</b> about <b>ancient ocean temperatures</b> (show temperatures have increased and decreased over time)</li> <li><b>art</b> → from <b>1684</b> shows <b>ice skating</b> on <b>River Thames</b> (artwork and diaries show temperatures have changed throughout history)</li> </ol>
present	<ul style="list-style-type: none"> <li><b>Earth's average temperature</b> has <b>increased 1° C</b> over last <b>100 years</b></li> <li><b>sea levels</b> have <b>risen by 19 cm</b> since <b>1900</b></li> <li><b>ocean temperatures</b> are the <b>warmest</b> they have been since <b>1850</b></li> <li><b>glaciers</b> and <b>ice sheets</b> are <b>melting</b></li> <li>since <b>2002</b> → <b>134 billion tonnes</b> of <b>ice lost</b> from <b>Antarctica</b> per year</li> </ul>

BOX 4: NATURAL FACTORS THAT CAUSE CLIMATE CHANGE	
1. volcanic activity	<b>volcanic ash</b> and <b>sulphur dioxide</b> can <b>reflect sunlight</b> → <b>reduces temperatures</b> → <b>Mount Tambora eruption</b> (1815) caused average <b>global temperatures</b> to fall by <b>0.4° C</b> to <b>0.7° C</b> → <b>'The year without a summer'</b>
2. orbital changes	<b>orbit of the Earth</b> changes → called <b>Milankovitch cycles</b> → <b>3 orbital cycles</b> change the <b>Earth's climate</b> and <b>seasons</b> over <b>thousands of years</b> : <ol style="list-style-type: none"> <li><b>eccentricity</b> → orbit becomes more <b>elliptical</b> in <b>100,000</b> year cycles</li> <li><b>axial tilt</b> → Earth's axis <b>angle</b> changes in <b>41,000</b> year cycles</li> <li><b>precession</b> → the Earth <b>wobbles</b> on its axis in <b>26,000</b> year cycles</li> </ol>

3. solar output (sunspots)	<ul style="list-style-type: none"> <li><b>more dark spots</b> on sun → emitting <b>more energy</b> → <b>Earth warmer</b></li> <li><b>fewer dark spots</b> on sun → emitting <b>less energy</b> → <b>Earth cooler</b></li> <li><b>sunspot cycle</b> → <b>sunspots increase</b> and <b>decrease</b> every <b>11 years</b></li> </ul>
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BOX 5: HUMAN FACTORS THAT CAUSE CLIMATE CHANGE	
fossil fuels	<ul style="list-style-type: none"> <li><b>burning fossil fuels</b> releases <b>carbon dioxide</b> → <b>temperatures rise</b></li> <li><b>over 50%</b> of <b>greenhouse gas emissions</b> are from burning fossil fuels</li> </ul>
agriculture	<ul style="list-style-type: none"> <li><b>rice farming</b> releases <b>methane</b> → <b>temperatures rise</b></li> <li><b>cattle farming</b> releases <b>methane</b> → <b>temperatures rise</b></li> <li><b>20%</b> of <b>greenhouse gas emissions</b> are from agriculture</li> </ul>
deforestation	<ul style="list-style-type: none"> <li><b>trees cut down</b> → <b>fewer trees</b> to <b>absorb carbon dioxide</b> during <b>photosynthesis</b> → <b>more carbon dioxide</b> stays in <b>atmosphere</b> → <b>enhanced greenhouse effect</b> → <b>temperatures rise</b></li> <li><b>trees burnt</b> → to <b>clear area of land</b> → the <b>carbon dioxide</b> stored <b>inside tree</b> is <b>released</b> into <b>atmosphere</b> → <b>temperatures rise</b></li> </ul>

BOX 6: EFFECTS OF CLIMATE CHANGE	
predicted effects	<ul style="list-style-type: none"> <li><b>ocean acidification</b> → <b>coral reef bleaching</b> → <b>biodiversity loss</b></li> <li><b>warmer</b> → more <b>wildfires</b> → <b>deaths</b> and <b>destruction</b></li> <li><b>more intense tropical storms</b> → <b>infrastructure damage</b></li> <li><b>increased ice melt</b> → <b>sea level rise</b> → <b>coastal erosion</b> → <b>homes lost</b></li> <li><b>droughts</b> → <b>lower crop yields</b> → <b>less food</b> → <b>famine</b></li> <li><b>unreliable rainfall</b> → <b>desertification</b> → <b>mass migration</b></li> <li><b>warmer</b> → <b>wider distribution</b> of <b>tropical diseases</b> e.g. <b>malaria</b></li> </ul>

BOX 7: CLIMATE CHANGE MITIGATION	
alternative energy	use <b>renewable energy</b> e.g. <b>solar</b> → <b>less greenhouse gases</b> in atmosphere
carbon capture	<b>stores carbon dioxide</b> in <b>rocks</b> → <b>less greenhouse gases</b> in atmosphere
planting trees	<b>trees</b> to <b>absorb carbon dioxide</b> → <b>less greenhouse gases</b> in atmosphere
international agreements	<b>Paris Agreement 2015</b> → <b>international agreement</b> to <b>stop global temperature increase</b> rising above <b>2° C</b>

BOX 8: CLIMATE CHANGE ADAPTATION	
changing/adapting agricultural systems	as the <b>climate changes</b> → <b>difficult to grow crops</b> → may need to <b>grow crops differently</b> ( <b>new locations</b> , <b>different seasons</b> , <b>more irrigation</b> ) → e.g. in <b>Peru</b> project to <b>grow potatoes</b> at <b>higher altitudes</b> where it is <b>cooler</b>
managing water supply	<ol style="list-style-type: none"> <li><b>reduce demand</b> → e.g. <b>shorter showers</b>, <b>rainwater</b> to <b>flush toilets</b></li> <li><b>increase supply</b> → <b>new reservoirs</b>, <b>desalination</b>, <b>water transfers</b></li> </ol>
reducing risk from rising sea levels	may need to <b>build more coastal defences</b> to <b>protect from flooding</b> e.g. <b>Thames Barrier</b> protects <b>London</b> from <b>coastal flooding</b>

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