

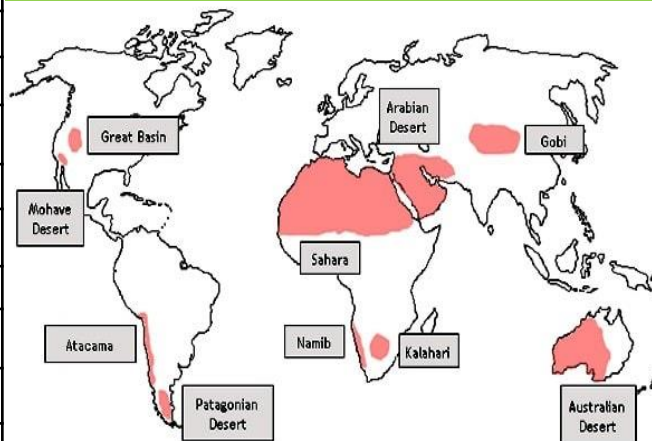


Ecosystem - Key terms	
Key term	Definition
Ecosystem	A community of plants and animals that interact with one another and their physical environment.
Abiotic	Relating to non living things.
Biotic	Relating to living things.
Producer	An organism or plant that is able to absorb energy from the sun through photosynthesis.
Primary consumer	Creature that eats plant matter. Also known as a herbivore.
Secondary consumer	Creature that eats other animals. Also known as a carnivore.
Decomposer	An organism that breaks down dead plant and animal matter.
Food chain	The connections between different organisms that rely on one another as their food source. 
Food web	A complex hierarchy of plants and animals relying on each other for food. 
Biome	A large global ecosystem with flora and fauna adapting to their environment.



## Year 9: Term 2 - Promoting Justice and Peace - Opposing ecosystems of USA – Hot Environments

### Hot deserts - Location




Hot deserts	NOT hot deserts
	
<p>To be defined as a Hot Desert, there must be:</p> <ul style="list-style-type: none"> <li>-Less than 250mm of rain a year.</li> <li>- Diurnal temperatures ranging from 50°C during the day to 0°C at night.</li> </ul>	

### Desert - Challenges


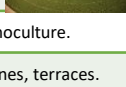
- Extreme Temperatures - Temperatures are over 40 degrees during the day and drop below freezing at night.
- Inaccessibility – The Sahara is huge making travel difficult and expensive.
- Water Supply - low rainfall makes water for drinking, washing and agriculture difficult to supply.

### Desertification - Causes

Desertification is where land is gradually turned into desert, usually on the edge of a desert. It is caused by overgrazing by cattle or trees being cut down for firewood. Population growth is a key factor. Climate change will lead to more droughts that kill vegetation and cause the problem to spread. In the area to the south of the **Sahara**, known as the **Sahel** heavy rainstorms can wash away the exposed soil in a couple of hours.

Desert - Opportunities	Specific Detail
Mineral resources - mineral resources from the earth can be used by industry or sold for export.	Morocco is the world's largest exporter of phosphate which is used in fertilisers and batteries. The money gained can be used to develop the country.
Oil and gas - oil is trapped in huge aquifers deep underground. It is an extremely valuable resource.	Algeria is a leading exporter of oil and gets 60% of its income from the oil and gas industry. It has many huge oilfields e.g. Hassi Messaoud. The industry provides jobs for 40,000 people.
Solar energy - with 12 hours of cloudless sunshine every day, deserts are ideal locations for this form of electricity generation.	Tunisia is planning a huge development that will supply enough electricity to meet the needs of 2 million homes in Western Europe. Solar power does not contribute to global warming.
Tourism – deserts are remote, romantic and exotic locations for tourists. 	You can go camel trekking in Morocco. Cities like Marrakech are popular with many tourists visiting the famous souk (market). Increasing opportunities for sand-boarding and dune buggies exist.
Farming - only possible where there is access to water through irrigation.	Egypt doubled the amount of land where crops were grown by building the Aswan Dam to control the flow of the Nile and irrigate the surrounding desert.

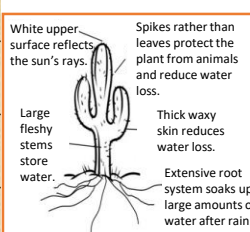
### Desertification - Solutions

- Irrigation - Water from aquifers used to grow crops / vegetation. 
- National Parks - Conserve areas at risk, protect wildlife.
- Afforestation - Green wall being planted across the Sahel. 
- Crop rotation - Keeps nutrients in the soil by avoiding monoculture.
- Appropriate Technology - Use of suitable crops, magic stones, terraces.

Trophic Level	Source of Energy	Examples
<b>Producers</b>	Solar energy	Green plants, photosynthetic protists and bacteria
<b>Herbivores</b>	Producers	Grasshoppers, water fleas, antelope, termites
<b>Primary Carnivores</b>	Herbivores	Wolves, spiders, some snakes, warblers
<b>Secondary Carnivores</b>	Primary carnivores	Killer whales, tuna, falcons
<b>Omnivores</b>	Several trophic levels	Humans, rats, opossums, bears, racoons, crabs
<b>Detritivores and Decomposers</b>	Wastes and dead bodies of other organisms	Fungi, many bacteria, earthworms, vultures

### USA - Western Desert - California, Nevada, Utah, Arizona, New Mexico

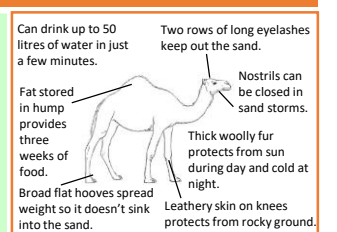
<b>Opportunities</b> <ul style="list-style-type: none"> <li>•Farming using water from aquifers.</li> <li>•Mineral extraction e.g. copper, uranium, lead.</li> <li>•Energy. The Sonoran Solar Project will produce enough energy for 100,000 homes.</li> <li>•Tourism includes the Grand Canyon (4.5 million / year) and Las Vegas (37 million visits / year).</li> </ul>	<b>Challenges</b> <ul style="list-style-type: none"> <li>•Temperatures reach up to 50°C.</li> <li>•Lack of roads meant limited access until late 1800s.</li> <li>•Water is limited and has to be transported from the Colorado River.</li> <li>•Over-extraction leads to conflict.</li> </ul>
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### Desert Animals

The limited number of producers means the number of consumers is also low.

Animals need to be able to tolerate the range of temperatures in the desert. Many do this by staying underground during the day. They also need to find ways to cope with the limited availability of water. Some gain enough water from their food. Others extract water from air.



**KI : Cold environments (polar and tundra) have a range of characteristics**

Key terms	Definitions
Biodiversity	The variety of life in the world or a particular habitat
Permafrost	Permanently frozen ground
Polar	The regions of the earth surrounding the North and South Poles
Tundra	The flat, treeless Arctic regions of Europe, Asia and North America where the ground is permanently frozen

**CHARACTERISTICS OF POLAR AND TUNDRA AREAS**

POLAR ENVIRONMENTS	TUNDRA ENVIRONMENTS
<ul style="list-style-type: none"> <li>Very cold; Below 0°C; winter between -40 and -90°C</li> <li>Less than 100mm per year of rain</li> <li>66°N and S (Greenland, N Canada, Siberia and Antarctica)</li> <li>Covered in ice</li> <li>Few plants</li> <li>Few indigenous people and scientists</li> <li>Polar bears, whales, seals and penguins</li> </ul>	<ul style="list-style-type: none"> <li>Cold; -30° - 10°C; cold summers, very cold winters</li> <li>Less than 380mm of rain per year</li> <li>High latitudes (Russia and Canada)</li> <li>Layer of permanently frozen soil (permafrost)</li> <li>Indigenous groups and oil and gas workers</li> <li>Lemmings, wolves and reindeer</li> <li>Slow growing plants. Short grasses, lichens and mosses</li> </ul>



**PLANT ADAPTATIONS**

- Dormant in winter
- Shallow roots
- Adapted to grow in 50 – 60 days
- Use underground runners / bulbs instead of seeds to reproduce
- Arctic Willow – small and round for protection from wind
- Bearberry – small leaves and bright red berries for reproduction
- Snow Buttercup and Arctic Poppy – produce flowers quickly

**ANIMAL ADAPTATIONS**

- Caribou – large hooves for water logged ground; 2 coats for insulation; survive on limited food in the winter e.g. Lichens
- Polar bears – thick coats for insulation; white for camouflage
- Birds migrate
- Arctic wolves – padded paws to grip the permafrost
- Arctic ground squirrels – hibernate in the winter

**Issues related to Biodiversity**

- Low biodiversity
- Changes have effects on all dependent species
- Global warming is causing species to move to the poles
- Arctic species are at real risk



**Year 9: Term 2 - Promoting Justice and Peace - Opposing ecosystems of USA – Cold Environments**

**INTERDEPENDENCE OF CLIMATE, SOILS, PERMAFROST, PLANTS, ANIMALS AND PEOPLE**

- Nutrients from the soil move to grass and then animals. Animals help spread seeds leading to the reproduction of plants
- Low plant cover and slow decomposition means low nutrients in the soil and less ability of plants to grow
- Herbivores e.g. reindeer migrate and carnivores follow
- In summer in the Tundra the plants absorb heat and prevent permafrost thawing. Permafrost provides water for animals. Soil waterlogged as lower layer of permafrost does not melt. If it melts it will cause floods and release greenhouse gases

**KI : Development of cold environments creates opportunities and challenges**

Key terms	Definitions
Infrastructure	The basic equipment and structures that are needed for a country or region to function properly
Mineral extraction	The removal of solid mineral resources from the earth

**OPPORTUNITIES**

Mineral extraction	<ul style="list-style-type: none"> <li>Gold, copper, iron ore, lead, zinc and silver</li> <li>1968 – Oil in Prudhoe Bay, North Slope, Alaska. Trans Alaskan pipeline travels 1287km to Valdez. Sea ice means tankers can't be used</li> <li>Oil and gas – 90% Alaska's earnings (\$14 billion) and 1/3 of jobs</li> <li>Gold – 1/5 of mining wealth. Tintina gold belt across Alaska</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Air and water pollution from oil and gas e.g. Exxon Valdez disaster 1989</li> <li>Getting harder and more costly to extract oil</li> <li>More than 50 HEP plants provide 1/5 of Alaska's electricity</li> <li>Geothermal power as part of Ring of Fire</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>Salmon most valuable from Arctic Ocean and Pollock fisheries in Bering Sea</li> <li>78, 500 jobs. Worth \$5.8 billion to economy</li> <li>Subsistence fishing for food, fuel and bones</li> </ul>
Tourism	<ul style="list-style-type: none"> <li>1.9 million visitors from mid May to Mid September (60% off cruises)</li> <li>Cruises; Hiking; fishing; whale watching; kayaking; Northern Lights in winter; Historical sites such as Inupiat and Yukon heritage</li> <li>1 in 13 jobs in tourism and is worth \$4 billion to the economy</li> </ul>

**CHALLENGES**

Extreme temperatures	<ul style="list-style-type: none"> <li>Indigenous people have adapted to extremes e.g. Inupiat are hunter gathers – eat whale for blubber and vitamins. No fruit and vegetables</li> <li>Reindeer are kept for fur and meat and some indigenous people are nomadic to farm these</li> <li>Active layer of permafrost thaws in summer – buildings subside, transport links damaged</li> <li>Winter – hard to get water supply. Ice cause frost heave so roads have to be built on gravel and houses on stilts</li> </ul>
Inaccessibility	<ul style="list-style-type: none"> <li>Transport costs high; can't rely on deliveries.</li> <li>Sensitive national security buildings here</li> <li>No off road travel in summer</li> <li>Solifluction (active layer flows downhill) cuts off highways</li> <li>Can be a long way from employment, opportunities and services so people are self reliant</li> </ul>
Provision of building and infrastructure	<ul style="list-style-type: none"> <li>Houses are on telescopic piles which contract and expand with ground movement</li> <li>Triple glazing</li> <li>Steeply pitched roofs so snow slides off</li> <li>Roads on gravel pads 1 – 2 metres thick</li> <li>Airport runways painted white to reflect sun and stop them warming too much</li> <li>Utilities above ground covered by utilidors</li> </ul>

**KI : Cold environments are at risk from economic development**

Key terms	Definitions
Fragile environment	An environment that is easily disturbed and difficult to restore if disturbed
Wilderness areas	A natural environment that has not been significantly modified by human activity

**VALUE OF WILDERNESS AREAS AND WHY PROTECT THESE?**

- Habitats and help biodiversity – scientists can study these
- Natural ecosystems – last remaining areas not affected by humans
- White snow reflects sunlight and helps regulate global temperatures
- Indigenous people live here traditionally
- Very fragile environment – takes long time to recover
- Highly specialised species that can't adapt quickly
- Conflict with the traditional cultures if put upon e.g. Inupiat use bowheaded whales and Inuits help hunters get polar bears

**PROTECTING THE COLD ENVIRONMENT**

Use of technology	<ul style="list-style-type: none"> <li>Modern construction methods to minimise environmental impacts e.g. piles</li> <li>Mobile phones in remote area</li> <li>2 way video conferencing for health care and education used by Inuit</li> <li>University of Alaska – online degrees</li> <li>Alaska Native Knowledge Network – online database preserving Inuit culture</li> </ul>
Role of Governments	<ul style="list-style-type: none"> <li>1964 Wilderness Act – wilderness areas protected from development including Alaska</li> <li>Alaska running short on money due to low world oil process. Oil exploration banned in the Alaska National Wilderness reserve</li> <li>NOAA (National Oceanic and Atmospheric Administration) oversees sustainable fisheries</li> </ul>
International Agreements	<ul style="list-style-type: none"> <li>1959 Antarctica Treaty limits visitor numbers; stops nuclear activities. No ships of more than 500 people</li> <li>International Whale Convention 1986 0 ban on commercial hunting</li> <li>Arctic Council – delivering sustainable development through Arctic regions. Represents 8 countries and indigenous populations.</li> </ul>
Conservation groups	<ul style="list-style-type: none"> <li>WWF and Greenpeace argue for sustainable management</li> <li>Inuit Circumpolar Council represents indigenous people. Campaigned against Pebble Mine gold mine</li> <li>Greenpeace calling for the Arctic to be a global sanctuary</li> <li>WWF works with local communities, scientists, oil companies and governments to move to a sustainable future</li> </ul>

