

Glaciology, the Power of Ice

Students must be able to:

- Know the principal cause of the most recent ice age, the Pleistocene.
- To recognise the key processes and features of the glacial system.
- Identify UK examples of glaciated highlands.
- Describe features and processes of glacial erosion, as well as freeze-thaw weathering.
- Identify common land use in glaciated highlands.

Key knowledge:

- Earth has had a varied history with previous Ice Ages which have shaped the landscape. Today ice is located in areas of high altitude and latitude.**
- Earth has had a significant number of Ice Ages which has shaped the landscape. Earth has at one point being covered fully by ice. The most recent Pleistocene was caused by the joining of south and North America together which changed global ocean currents and the climate.
- The formation of glacial ice takes a number of years in which processes such as compaction take place and air is removed from the ice structure to form neve and firn. As ice accumulates the glacial budget is changed, which will over a time change the glaciers length.**
- There are two main types of glacial erosion. Both abrasion and plucking have shaped the landscape. Main features which can be seen in the UK and mountainous regions of the world are corries, arêtes and pyramidal peaks.
- Glaciers have a significant erosional force. However, they are also able to mover large amount so till and create features of deposition**
- Areas such as the Lake District have been shaped by ice and the features which are there today are a clear result of the last Ice Age.
- Many mountainous regions are reliant of snow fall to maintain their economy. This is especially true of ski resorts. Chamonix in the French Alps is both a winter ski resort and summer tourism destination.**

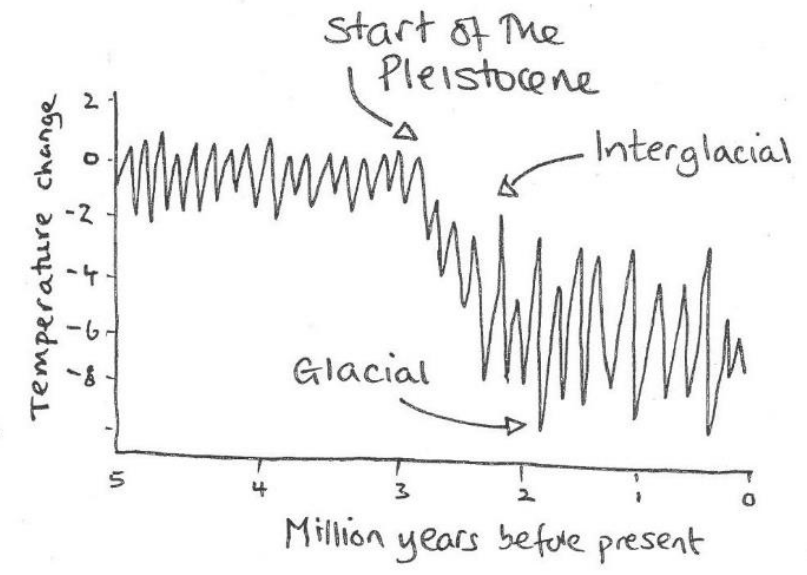
Key terms	Definitions
Glaciology	the study of glaciers and glacial processes.
Ice age	popular name for the cold times experienced in the Pleistocene period.
Pleistocene	recent geological time dominated by cooler global temperatures.
Glacier	a 'river' of ice.
Abrasion	erosional process where rock wears away other rocks.
Plucking	erosional process caused by ice freezing to a rock surface.
Accumulation	the addition of ice to a glacier from snowfall.
Ablation	the removal of ice from a glacier by melting and evaporation.
Glacial advance	the movement of a glacier's snout further down a glacial trough as a result of increased accumulation.
Glacial retreat	the movement of as glacier's snout back up the glacial valley as a result of an increase in ablation.
Snout	the front of the glacier
Corrie	bowl-shaped hollow in a mountain side where a glacier forms.
Arête	knife edged ridge between two corries.
Pyramidal peak	mountain peak where three or more arêtes meet.
Tarn	round lake in the base of a corrie.
Glacial trough	a deep U-shaped valley formed by glacial erosion.
Land use	How the area is being utilized by humans.
Landscape	human and physical features and appearance of an area of land.

GLACIOLOGY

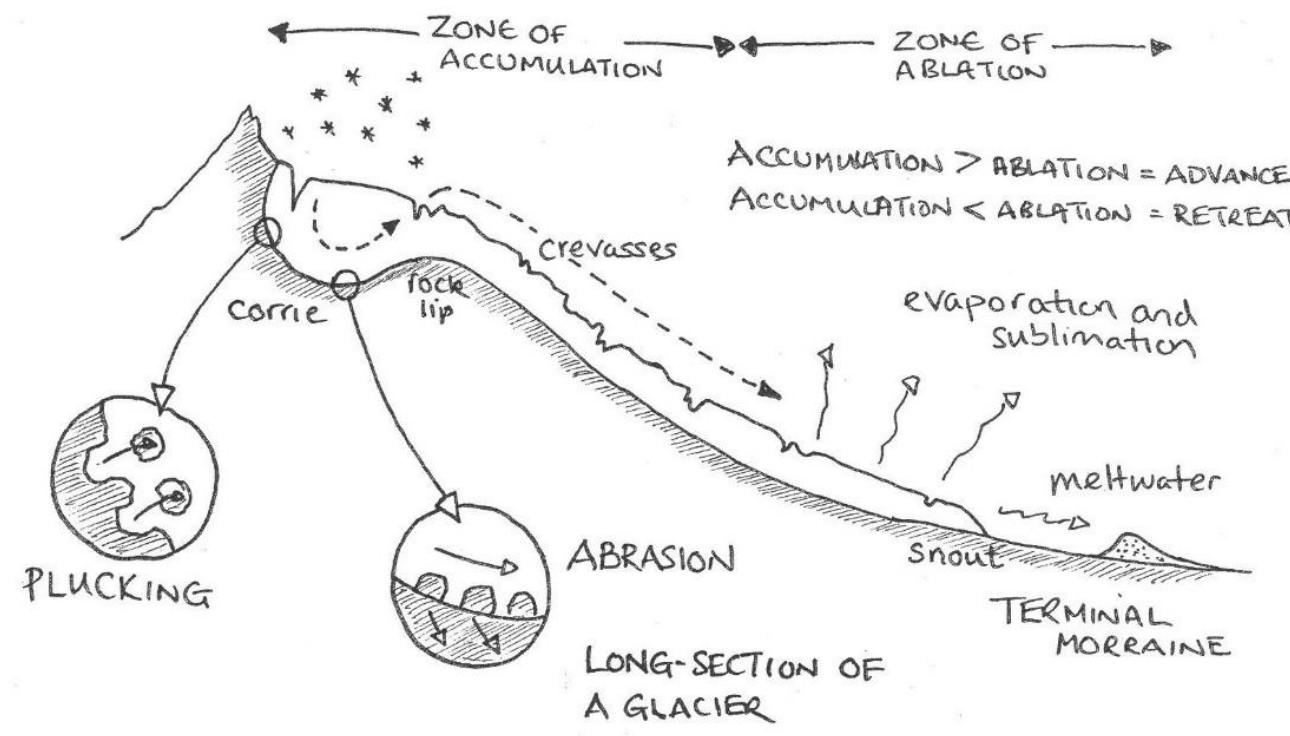
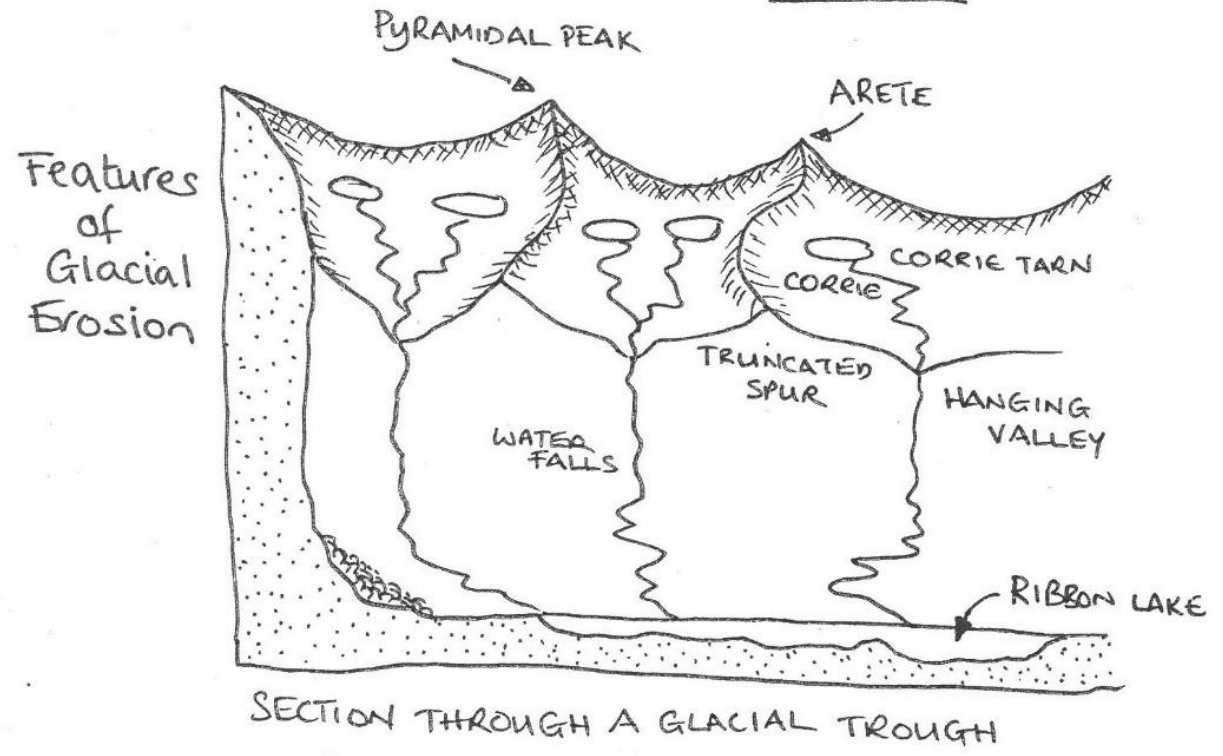
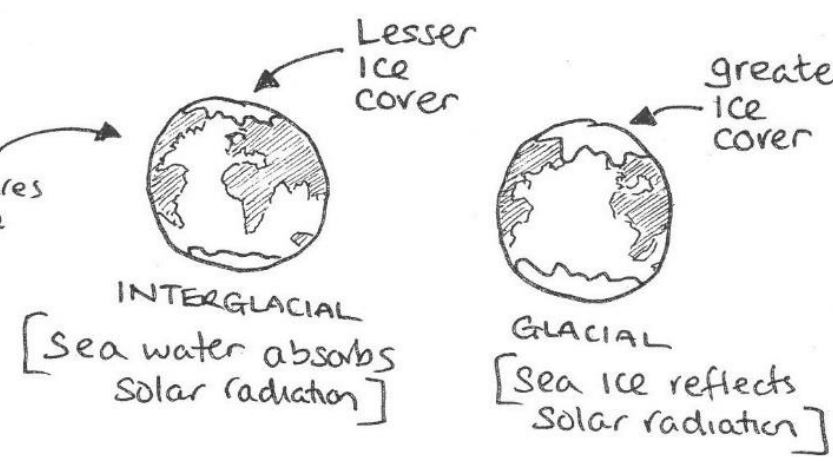
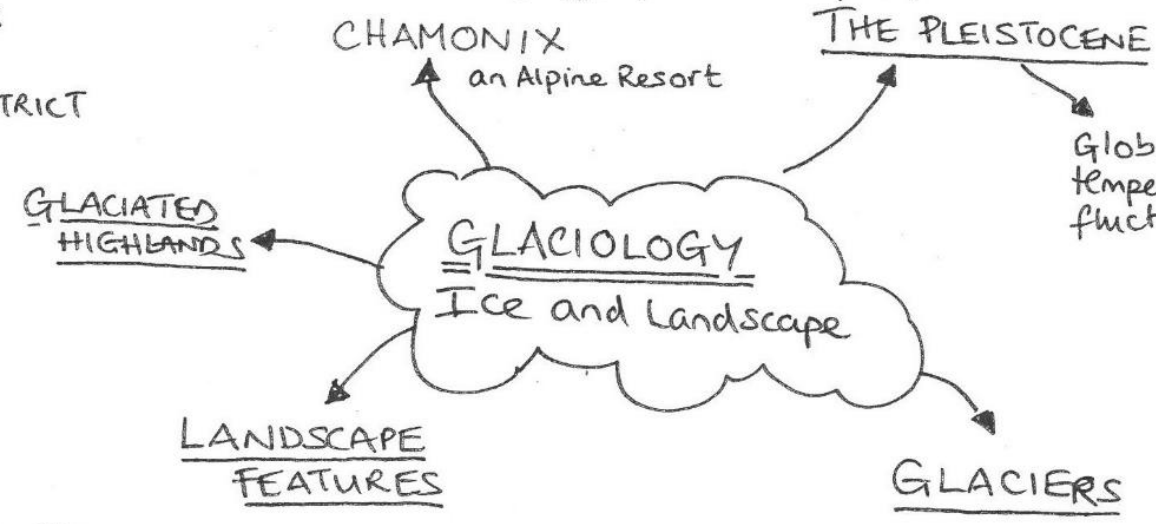
- the study of the impact of glaciers and ice sheets on landscapes and people.



1. ARGENTIÈRE GLACIER
2. MER DE GLACE
3. CHAMONIX
4. SERVOZ
5. LAC D'EMOSSON



- How is tourism managed in a glacial environment?
- How does summer tourism differ from winter spots?



Living Britain - Climate and ecosystems in the British Isles.

Students must be able to:

- Construct and describe the features of a climate graph.
- Recognise the key factors affecting the different climatic regions of the British Isles and parts of Europe.
- Define both ecosystem and biome.
- Identify the living and non-living elements of an ecosystem.
- Describe the elements of simple food webs, including food chains and trophic levels.
- Describe the basic elements of nutrient cycling within the temperate deciduous woodland biome.
- Describe how deciduous trees and some animals have adapted to the features of the temperate deciduous woodland biome.

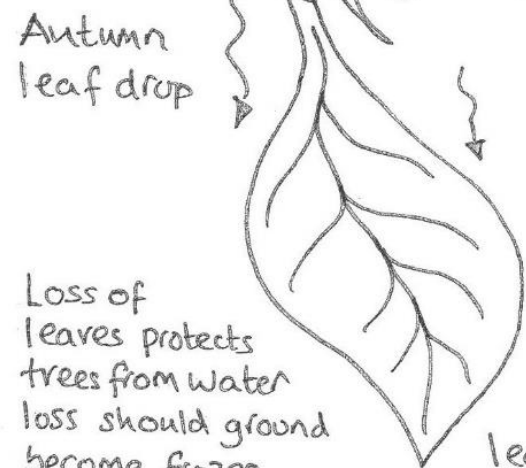
Key knowledge:

1. **Climate is the average weather of a place, usually measured over thirty years. There are several key factors affecting climate such as latitude, prevailing winds, distance from the sea and altitude.**
2. The climate of a location is presented using a climate graph. This is a dual graph which shows monthly mean temperatures in degrees centigrade (red line) and monthly mean rainfall in millimetres (blue bars). Climate graphs allow a quick visual comparison of different climates.
3. **The complex climate of the British Isles is determined by a range of factors such as latitude, relief, sea temperature and ocean currents and air masses. Know that summer climate is most influenced by latitude and winter is most influenced by the North Atlantic Drift current.**
4. Europe has many different climates depending on the physical geography of each region. This has led to the development of a wide variety of traditional foods and local houses most appropriate to the climatic conditions of the region.
5. **An ecosystem is a bio-geographical unit consisting of the living (biotic) and non-living (abiotic) elements of an environment. An ecosystem can range in scale from the microscopic to the global.**
6. Energy and nutrients pass through an ecosystem via food chains. Food chains have multiple links and connect with other chains to create food webs.
7. **The living elements of any ecosystem are linked together by complex feeding relationships between plants and animals. These feeding relationships can be shown in food chains, food webs and trophic pyramids.**
8. Before humans settled in the British Isles the majority of these islands was covered in forest, with pine and birch forests in the north and mixed oak woodlands in the south.
9. **Trees have adapted to the climate of the British Isles and evolved over millions of years to cope with cold winters and mild wet summers.**
10. Bears, squirrels and deciduous trees have all had to adopt a seasonal lifestyle/adaptations. One of the most important animals in the deciduous forest biome is the common earthworm.
11. **The world has several major terrestrial and aquatic ecosystems that cover vast areas but have similar characteristics. These global-scale ecosystems are known as biomes.**

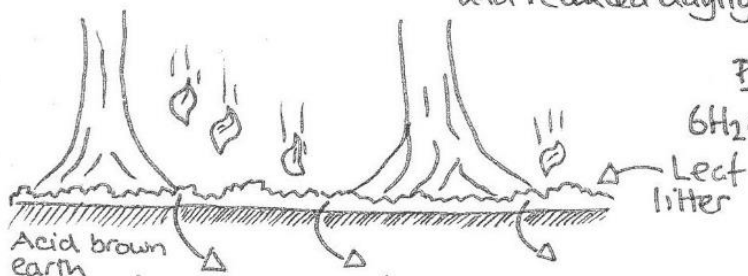
Key terms	Definitions
Ecosystem	the living and non-living elements of an environment linked together by transfers of nutrients and energy.
Biome	an ecosystem on a global scale, such as tropical rainforests or savannah grasslands.
Biotic	living elements.
Abiotic	non-living elements.
Deciduous	a plant or tree which loses its leaves, eg. during the winter.
Temperate	region between 40 and 60° of latitude with mild to warm summers and cold to mild winters.
Photosynthesis	the process by which plants convert solar energy, carbon dioxide and water into carbohydrates.
Chlorophyll	the green substance in plants where photosynthesis takes place.
Producer	the plants which create the building blocks of the trophic pyramid through photosynthesis. Produce food from the Sun's energy, water and carbon dioxide.
Consumer	animals which consume either producers or other consumers.
Decomposer	animals, such as earthworms, which eat dead matter.
Predator	an animal which hunts and eats other animals.
Herbivore	an animal which eats vegetable matter.
Carnivore	an animal which eats other animals.
Hibernation	when animals go into a suspended state (deep sleep) to conserve energy during the winter.
Migration	where animals move to another location for better food, water or breeding conditions.
Adaptation	the ways that plants and animals have evolved to cope with certain environmental conditions.

ABSCISSION

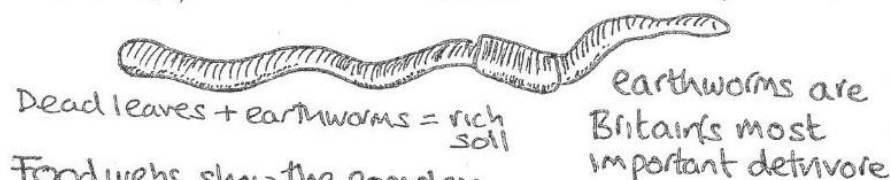
Chlorophyll taken back into the tree in the autumn, so leaves turn brown, yellow or red.



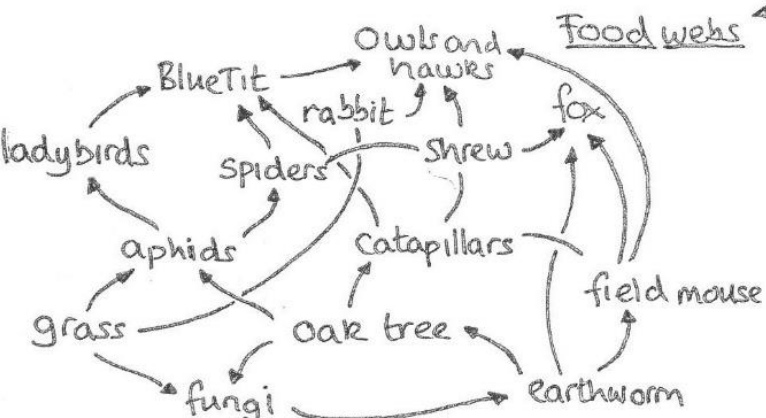
Leaf loss is stimulated by falling temperature and reduced daylight hours.



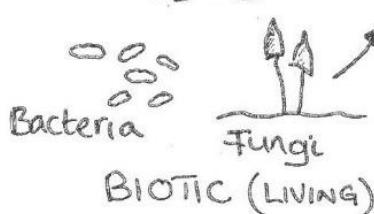
Autumn leaves taken into the soil by earthworms or broken down by fungi, moulds or bacteria.



Food webs show the complex feeding relationships in an ecosystem.



Plants

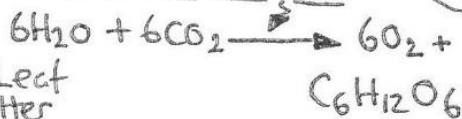


Ecosystems

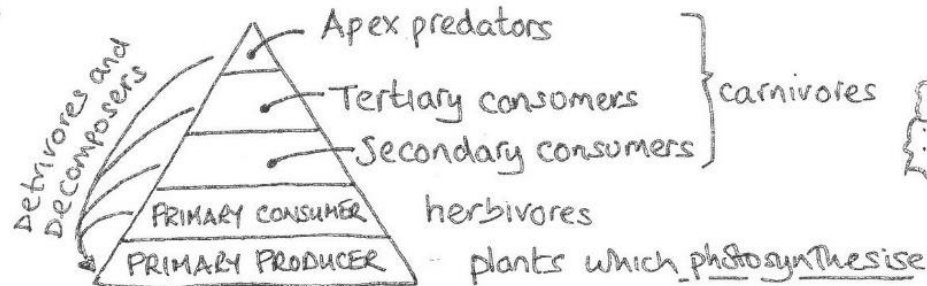
The living and non-living elements of an environment linked by transfers of nutrients and energy.



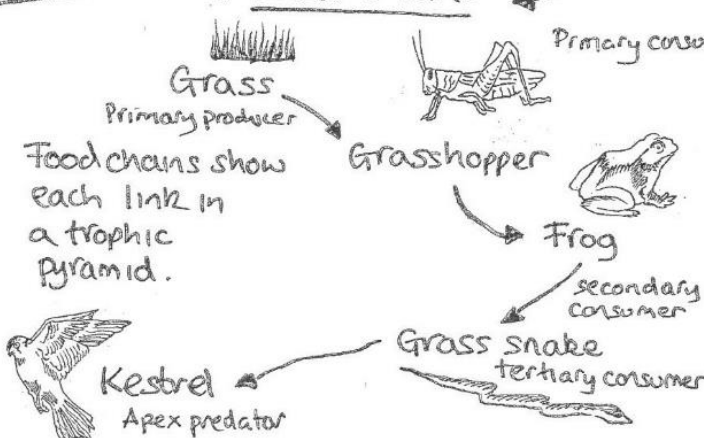
PHOTOSYNTHESIS



Feeding relationships - the Trophic Pyramid.

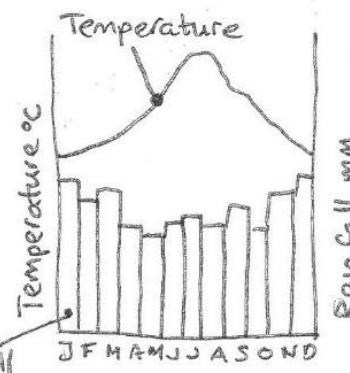


Food chains



Food chains show each link in a trophic pyramid.

CLIMATE GRAPHS



CLIMATE

The average weather of a place measured over thirty years.

FACTORS AFFECTING CLIMATE

- Latitude
- Distance from the sea
- Prevailing winds
- Altitude



EUROPE'S CLIMATE ZONES



Global Biomes - Terrestrial large-scale ecosystems

- Tropical Rainforest
- Hot Deserts
- Tropical grasslands
- Tropical Monsoon woodlands
- Mediterranean
- Temperate woodlands
- Temperate grasslands
- Alpine
- Boreal Forest
- Tundra
- Cold Deserts
- Polar Ice

African Biomes

Students must be able to:

- Identify simple links between the distribution of global biomes, latitude and atmospheric circulation.
- Recognise the main features of the tri-cellular models of atmospheric circulation.
- Describe the basic climatic features of equatorial rainforests, hot deserts and savannah grassland.
- Describe and explain some vegetation and animal adaptations to the climate of their biomes.
- Describe some of the features of the traditional societies in rainforests, deserts and savannah.

Key Knowledge:

8Ci: The continent of Africa has a diverse range of biomes – global scale ecosystems - from hot desert to tropical rainforest – whose distribution of mostly determined by the availability of water for plants to grow.

8Cii: The lower atmosphere of the Earth contains within it six circulatory cells – 3 each north and south of the Equator. The two Hadley, two Ferrell and two Polar Cells each have a significant impact on climate of the ecosystems over which they pass.

8Ciii: The regions of West and Central Africa close to the Equator experience an ‘Equatorial climate’ of high and stable temperatures and heavy rainfall throughout the year.

8Civ: Rainforest plants have adapted to the all year growing season and heavy rain with many adaptations, including growing tall with a high canopy, leaves with drip tips and wide buttress roots to support the tall trunk.

8Cv: While the rainforest is a very productive ecosystem for plants, life there for humans is very difficult. The forest dwellers of the Congo rainforest – often referred to as Pygmies - have some of the lowest life expectancies on Earth.

8Cvi: Hot deserts have annual rainfall below 250mm. They experience temperatures as high as 50+°C during the day but can become cold at night. Most hot deserts are located under the descending limbs of the two Hadley cells.

8Cvii: The extreme aridity of hot deserts makes life a struggle for plants and animals alike. Many have developed xerophytic (drought-tolerant) adaptations including waxy skins, no leaves, spines and thorns for plants and nocturnal behaviour for animals.

8Cviii: The Savannah climate is a transitional one between the rainforests and the hot deserts. The savannah exhibits two seasons – a wet and a dry season. The length of these seasons varies with distance from the Equator or desert margins.

8Cix: Plants have adapted to the dry seasons of the savannah by becoming xerophytic with adaptations including small leaves and being deciduous in the dry season. They also have pyrophytic (fire-tolerant) adaptations including thick corky barks or fire-resistant seeds.

8Cx: Grass or seed eating herbivores such as wildebeest and red-billed quelea have adapted to a wet and dry season climate by becoming migratory. This creates problems for their predators of they are territorial.

8Cxi: The short grass plains in the Serengeti are rich in wildlife because of the fertile soils created by the nearby Great Rift volcanoes, such as Ol Doinyo Lengai – the ‘Mountain of God.’

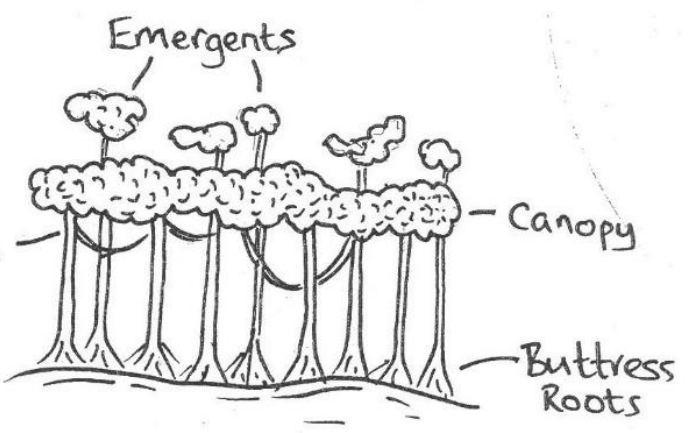
8Cxii: The Maasai people of Kenya and Tanzania have traditionally followed a system of nomadic pastoralism – raising cattle on the grasslands of the Serengeti/Mara eco-region.

Key terms	Definitions
Atmospheric circulation	the global movement of air in circulatory cells through the atmosphere.
Tri-cellular model	a simplification of actual atmospheric circulation to show the main atmospheric movements and influences on climate.
Hadley Cells	the two circulatory cells either side of the Equator meetings at the Inter-Tropical Convergence Zone.
Ferrell Cells	the two cells on the poleward sides of the Hadley Cells. The meeting air of the Hadley and Ferrell cells creates the Sub-Tropical High Pressure.
Dry season	a period of time with little or no rainfall.
Rainy season	a period of time when most rain falls.
Canopy	the zone of maximum leaf growth high above the floor in a tropical rainforest
Emergent	trees rising above the forest canopy.
Buttress roots	wide extensions at the base of rainforest trees to give the very tall trunks added stability.
Drip tips	points at the end of rainforest leaves which aid the shedding of water away from the tree.
Nocturnal	animals which become active during the night.
Migration	the movement of animals from one place to another, often in search of food or water.
Territorial	animals having a restricted area in which they live, which they guard against intrusion by other members of their same species.

AFRICA'S BIOMES

TROPICAL RAINFOREST

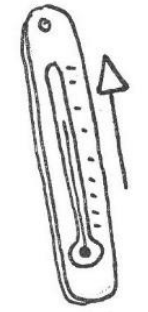
- Example countries:
- D.R.C.
 - Congo
 - Cameroon
 - Gabon



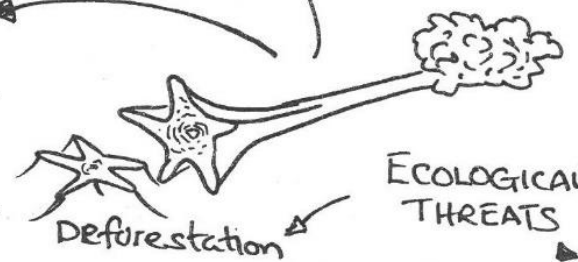
Traditional societies eg. Baka 'Pygmies', Gabon.

- low life expectancy
- low population density
- hunter-gatherers

- ECOLOGICAL THREATS
- Poaching for bush meat
 - Pollution
 - Habitat loss
 - Urbanisation



Climate change



- Climate change effects:
- Higher temperatures
 - Stronger El Niño = more droughts
 - reduced rainfall in some areas
 - Drought in 2016 affected 100 million people

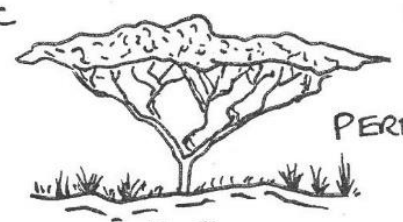
Deforestation: over-exploitation

SAVANNAH GRASSLAND

- Example countries:
- Kenya
 - Tanzania
 - Zimbabwe
 - Malawi
 - Senegal



ACACIA TREES (XEROPHYTIC ADAPTATIONS)



PERENNIAL GRASSES

ANNUAL GRASSES

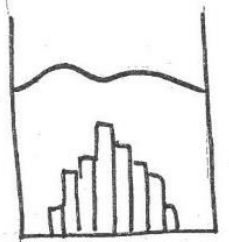
Wildebeest migrate in search of fresh grass.



Short Grass Plains

CLIMATE

Rainfall: 500-1500 mm/year
Temperature: 18-35°C



Kano, Nigeria, 11°N
975 mm
Temperature 22°C - 34°C

Wet season

HOT DESERTS

Rainfall: < 250 mm/year
Temperature: 10°C - 45°C
Driest location: Aswan, Egypt
0.89 mm/year

- Example countries:
- Egypt
 - Sudan
 - Somalia
 - Namibia



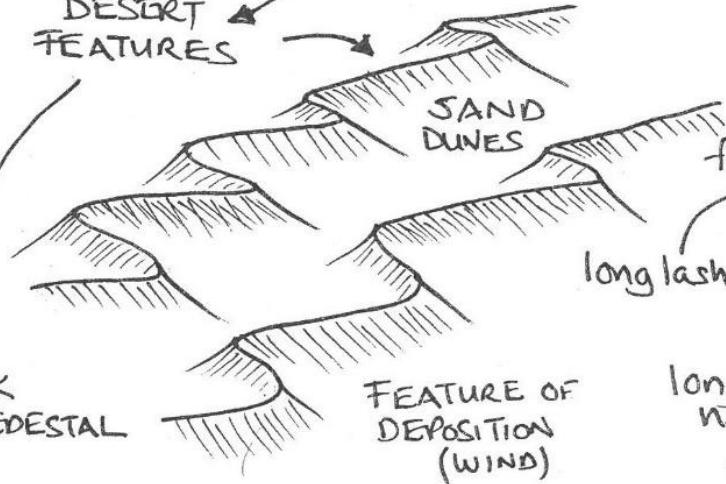
DESERT PLANTS



CACTI-LIKE ADAPTATIONS

- No leaves.
- Thorns or needles.
- Green skin with chlorophyll.
- Shallow roots
- Concertina stems.

DESERT FEATURES



ROCK PEDESTAL

FEATURE OF DEPOSITION (WIND)

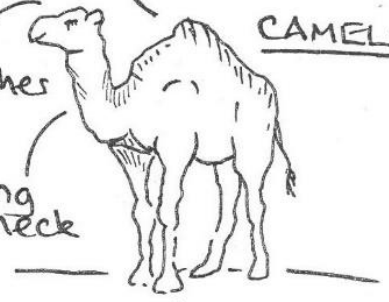
FEATURE OF EROSION (WIND)

fat in hump

long lashes

long neck

CAMELS



Wide feet

Mind the Gap – Development in West Africa.

Students must be able to:

- Create their own definition of human development.
- Identify a range of development indicators and describe how they can show development.
- Describe some of the physical and human causes of uneven and under-development.
- Describe some of the push and pull factors associated with rural to urban migration.
- Recognise the different scales at which development aid operates.
- Describe some of the strengths and weaknesses of international aid.
- Identify how rapid urbanisation has created a number of problems in Lagos, Nigeria.

Key Knowledge:

Development can mean many different things but in Geography is taken to mean the improvement in the quality of people's lives and their standard of living over time.

Geographers use graphs not only to present data but to identify patterns. Scatter graphs can be used to identify positive and negative correlations between two sets of data.

2000 years ago the richest countries in the world were India and China. In 1500 half of all the goods made in the world came from these countries. Yet, as Europe developed, much of the rest of the world declined.

Ghana is a country in West Africa whose capital is Accra. Despite being rich in natural resources and the world's second largest producer of cocoa, Ghana is still in the poorest 25% of all countries. It has a life expectancy which is 20 years lower than the UK.

Over half of Ghana's population live in rural areas where the majority are subsistence farmers or farm labourers. Many rural villages have no electricity, access to clean water or basic sanitation.

Ghana has some of the best conditions for growing cocoa (a South American forest tree) and has become over the last 130 years the world's second largest grower, after Cote D'Ivoire.

The Akosombo Dam was built in the 1960s by the newly independent Ghana. It was to be a symbol of change and progress in Africa but has also resulted in significant social, economic and environmental problems.

Small-scale development projects that use appropriate technology can help improve the lives of the poor without further damaging the environment.

Rural to urban migration has resulted in the growth of all the world's cities. In recent years pull factors in the city and push factors in the countryside have resulted in rapid urban growth in developing nations.

Megacities are conurbations with over 10 million inhabitants. There are 28 Megacities in the world but just six are in more economically-developed countries.

Lagos is the largest city in Nigeria and the fastest growing city in Africa.

Lagos is undergoing rapid urban growth. New arrivals face a daily battle to earn a living in the city and may end up living in slums.

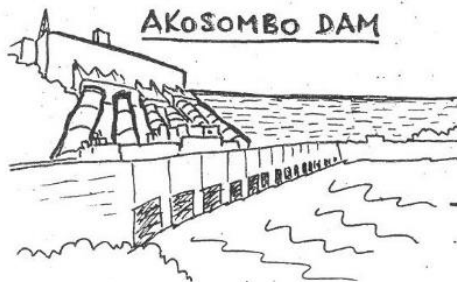
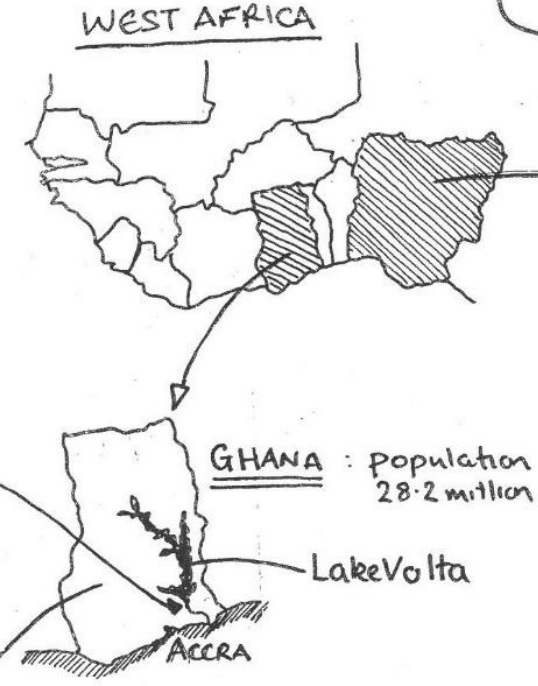
Lagos is undergoing an attempt to clear its slums and improve its image. This is leading to conflict between slum dwellers and the police.

Lagos plans to become the heart of the developing African economy with a new city called Eko-Atlantic built on reclaimed land adjacent to Victoria Island.

Key terms	Definitions
Development	the improvement in people's lives and standard of living over time.
Social	elements of Geography referring to peoples lives and the way they live.
Infant mortality	the rate of deaths amongst children under the age of one.
Gross Domestic Product	the total value of goods, services and raw materials produced in a country each year.
Gross National Income	the value of goods, services and raw materials earned by a country each year including overseas earnings.
Life expectancy	the number of years a person can, on average, expect to live.
Adult literacy	the percentage of adults who can read and write.
Appropriate technology:	technology which meets the needs of a society which is both affordable and sustainable.
Urbanisation	the increase in the percentage of people living in towns and cities.
Rural	the countryside and small villages.
Urban	towns and cities.
Informal settlement	a settlement where poor inhabitants build temporary housing, often illegal.
Slum	common word for informal settlement. Slums may become more permanent over time.
Migration	the movement of people from one place to another to live and work.
Push factor	something negative that encourages a migrant to leave their home region.
Pull factor	something positive that attracts a migrant to a new location.



MIND THE GAP
Development in West Africa



- ★ **AKOSOMBO PROS**
 - Generates electricity
 - Raises taxes for government
 - Employs well-paid workers
 - Powers aluminium smelter
- ★ **AKOSOMBO CONS**
 - Flooded 4% of country
 - Many villages lost to Lake Volta
 - Silting up of lower Volta
 - Increased bilharzia infections
 - Raised government debt



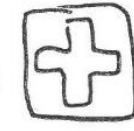
- Ghana is world's second largest cocoa producer.
- Employs over 3.2 million workers and farmers.
- Rises and falls in cocoa prices can affect over 6 million people.

NIGERIA: population 182 million



Lagos is Africa's fastest growing city with a population of over 24 million people.

- Many work in the informal economy.
- Many live in slums.



Life expectancy

Infant mortality

No. of doctors and nurses



Olushosun dump in Lagos is home to over 1000 people

scavengers collect recyclable waste to sell

Only 10% of rubbish in Lagos is recycled



- Makoko is one of Lagos' many slums
- Many homes are built on stilts or piles of rubbish and sawdust
- Makoko is home to over 100,000.