

# Ecosystems

## What is an Ecosystem?

An ecosystem is a system in which organisms interact with each other and with their environment.

## Components of an Ecosystem

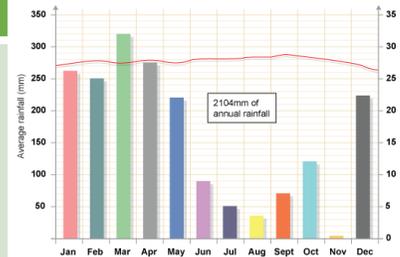
<b>Producer</b>	Producers are plants and all energy comes from the sun, through photosynthesis.
<b>Primary Consumer</b>	Consumers get energy from eating producers (herbivores)
<b>Secondary Consumer</b>	Secondary consumers get energy from eating primary producers carnivores)
<b>Decomposer</b>	Break down plant and animal material and return nutrients to the soil (bacteria and fungi)
<b>Food Chain</b>	Shows the energy transfer from one animal to another
<b>Food web</b>	Shows connections between producers and consumers in a complex way.



## Distribution of Tropical Rainforests

Tropical rainforests are centred along the Equator between the Tropic of Cancer and Capricorn. Rainforests can be found in South America, central Africa and South-East Asia. The Amazon is the world's largest rainforest and takes up the majority of northern South America, encompassing countries such as Brazil and Peru.

## Tropical Rainforest Biome

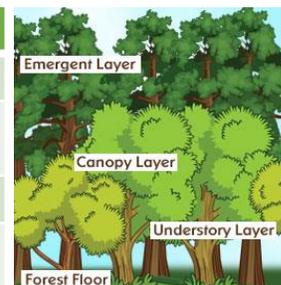


## Climate of Tropical Rainforests

- Warm and wet climate, high rainfall (over 2000 mm a year) and high temperatures (average 27°C).
- Temperatures are high and constant as the sun is always overhead.
- Rainfall is high as high evaporation rates due to high temperatures creates clouds and heavy rainfall.
- Distinctive wet season lasting 6 months due to intense rainfall.

## Layers of the Rainforest

<b>Emergent</b>	Highest layer with tree reaching 50 metres.
<b>Canopy</b>	Most life is found here as it receives 70% of the sunlight and 80% of the light.
<b>U-Canopy</b>	Consists of trees that reach 20 metres high.
<b>Shrub Layer</b>	Lowest layer with small trees that have adapted to living in the shade.



## Adaptations to the rainforest

Tropical rainforests have a huge <b>biodiversity</b> .	
<b>Sloths</b>	Are camouflaged to forest environment.
<b>Buttress Roots</b>	Support tall trees & absorb nutrients.
<b>Drip Tips</b>	Allows heavy rain to run off leaves easily
<b>Lianas &amp; Vines</b>	Climbs trees to reach sunlight at canopy.

## Rainforest inhabitants

Many tribes have developed sustainable ways of survival, such as shifting cultivation. The forest provides inhabitants with...

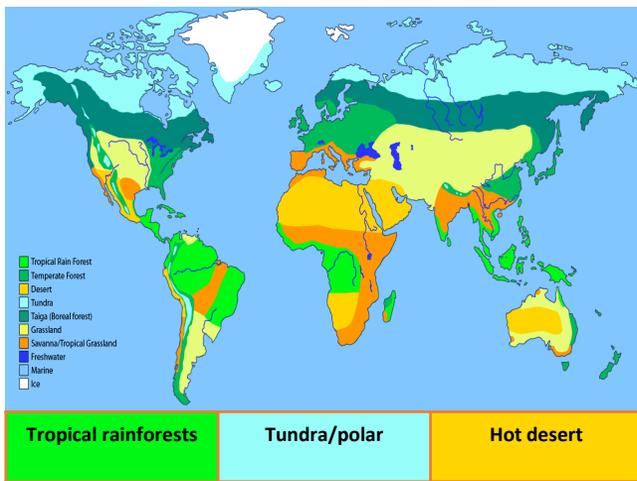
- Food through hunting and gathering.
- Natural medicines from forest plants.
- Homes and boats from forest wood.

## Ecosystem's Components

<b>Abiotic</b>	These are non-living, such as air, water, heat, rock.	
<b>Biotic</b>	These are living, such as plants, insects, and animals.	
	<b>Flora</b>	Plant life occurring in a particular region or time.
	<b>Fauna</b>	Animal life of any particular region or time.

## Biomes

A biome is a large geographical area of distinctive plant and animal groups, which are adapted to that particular environment. The climate and geography of a region determines what type of biome can exist in that region.



## Effects of Human Activity on the Rainforest

<b>Logging</b>	<b>Agriculture</b>
<ul style="list-style-type: none"> <li>• Most widely reported cause of destructions to biodiversity.</li> <li>• Timber is harvested to create commercial items such as furniture and paper.</li> <li>• Has led to violent confrontation between indigenous tribes and logging companies.</li> </ul>	<ul style="list-style-type: none"> <li>• Large scale 'slash and burn' of land for ranches and palm oil.</li> <li>• Increases carbon emission.</li> <li>• River saltation and soil erosion increasing due to the large areas of exposed land</li> <li>• Increase in palm oil is making the soil infertile.</li> </ul>
<b>Mineral Extraction</b>	<b>Tourism</b>
<ul style="list-style-type: none"> <li>• Precious metals are found in the rainforest.</li> <li>• Areas mined can experience soil and water contamination.</li> <li>• Indigenous people are becoming displaced from their land due to roads being built to transport products.</li> </ul>	<ul style="list-style-type: none"> <li>• Mass tourism is resulting in the building of hotels in extremely vulnerable areas.</li> <li>• Has caused negative relationships between the government and tribes</li> <li>• Tourism has affected wildlife (apes) by exposing them to human diseases.</li> </ul>

## Rainforest Management

To protect rainforests they need to be managed sustainably by...

- Selective logging – only felling trees if a certain size.
- Replanting – replacing trees that have been felled.
- Education and conservation – protect rainforest by making them conservation areas that can be used for education.
- Ecotourism – introduces people to the natural world to benefit local communities and protect the environment.

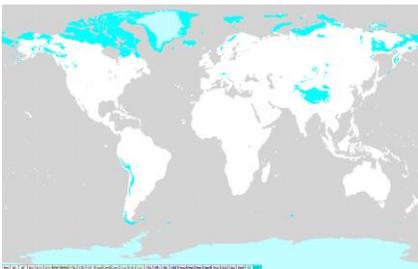
## Biome's climate and plants

Biome	Location	Temperature	Rainfall	Flora	Fauna
<b>Tropical rainforest</b>	Centred along the Equator.	Hot all year (25-30°C)	Very high (over 200mm/year)	Tall trees forming a canopy; wide variety of species.	Greatest range of different animal species. Most live in canopy layer
<b>Hot desert</b>	Found along the tropics of Cancer and Capricorn.	Hot by day (over 30°C) Cold by night	Very low (below 300mm/year)	Lack of plants and few species; adapted to drought.	Many animals are small and nocturnal: except for the camel.
<b>Tundra</b>	Far Latitudes of 65° north and south of Equator	Cold winter + cool summers (below 10°C)	Low rainfall (below 500mm/ year)	Small plants grow close to the ground and only in summer.	Low number of species. Most animals found along coast.

## Polar/Tundra Regions Biome

### Distribution of cold environments

Both polar and tundra are found in high latitude areas and mountains regions of the world.



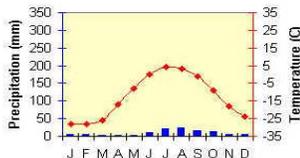
### Climate of cold environments

#### Polar

- Long cold winters, temperatures are often below -50 °C.
- Low snowfall.

#### Tundra

- Cold, windy and little rainfall (mostly snowfall).
- Winter temperatures may drop to -20 °C.
- Brief summers can be quite warm.



### Adaptations to cold environments

Few plants are found in polar regions, but a wide variety are found in tundra environments

Plants			Animals	
<b>Polar</b>	Moss and lichen	Found on edges of ice, doesn't need soil to grow and cant withstand cold temperatures.	Polar bears	Thick fur to retain heat. Layer of fat to retain heat. Black nose & feet to retain heat.
<b>Tundra</b>	Bearberry	Low growing to survive winds. Small leaves to retain water. Hairy stems to retain heat	Arctic Fox	Small ears to retain heat. Camouflage to help with hunting. Scavenger.

### Opportunities in cold environments

#### Tourism

- Huge increase in tourism to observe wildlife and experience wilderness.

#### Fishing

- Lots of fish stocks in cold water.
- Increase in commercial fishing due to increase in global population.

#### Mineral Extraction

- Reserves of metals and coal.
- Extremely valuable resources.

#### Energy

- Fossil fuels are abundant.

### Challenges in cold environments

#### Temperatures

- Very low temperatures and long hours of darkness make building very difficult.

#### Relief

- Mountainous areas and rugged terrain make cold environments very inaccessible for vehicles delivering materials for construction.

#### Buildings

- If the permafrost layer begins to melt, the ground becomes unstable and susceptible to landslides.

#### Infrastructure

- Building roads, railways and pipelines for water and electricity supplies is very difficult on frozen ground that is liable to melting.

### Protecting cold environments

To ensure cold environments do not suffer long term damage they need to be managed sustainably.

**Technology** - used to access minerals and fossil fuels should be managed carefully to avoid the destruction of wilderness areas.

**International agreements** - allow standards to be set to ensure that economic development does not happen at the expense of the environment.

**Conservation** – conservation groups put pressure on governments not to exploit the resources found in cold environments.

**Governments** - have the power to create laws which state how cold environments can and should be used.

## Hot Desert Biome

### Distribution of Hot Deserts

Hot deserts are mostly found in dry continental interiors, away from coasts. They are found 30 °N and 30 °S of the equator.



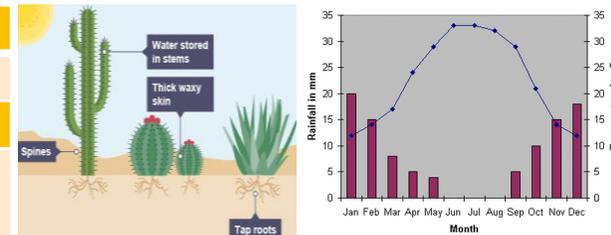
### Climate of Hot Deserts

- Hot and dry climate, low rainfall (less than 250 mm of rain per year).
- Lack of cloud cover means extreme temperature changes.
- Daytime temperature can exceed 40 °C.
- Lack of cloud cover means night time temperatures drop below 0 °C.
- Two seasons: summer temperatures range between 35 - 40 °C, and winter temperatures ranges between 20 - 30 °C.

### Adaptations to the desert

Hot deserts are home to a diversity of plant animals and birds.

Plants	Animals		
<b>Small, waxy leaves</b>	Reduces water loss	<b>Rodents</b>	Nocturnal, live in burrows
<b>Long roots</b>	To reach deep underground water	<b>Snakes and lizards</b>	Retain water by waterproof skin.
<b>Spines</b>	Lose less water, prevent animals eating them.	<b>Camels</b>	Go days without water.



### Desertification

Is the process of land turning into desert as the quality of soil declines over time.

Population growth	Removal of wood
<ul style="list-style-type: none"> <li>• Increasing populations puts greater pressure on the environment for wood, food and water.</li> <li>• Population increases where there are developments such as mining.</li> </ul>	<ul style="list-style-type: none"> <li>• Wood is used for cooking, as the population increases there is a greater need for wood.</li> <li>• Land is cleared, roots are removed from the soil and soil erosion occurs.</li> </ul>

#### Overgrazing

- Increasing populations means more areas are being farmed.
- Vegetation is overgrazed and the soil is exposed to erosion.

#### Climate Change

- Global temperatures are increasing and deserts are getting warmer and drier.

### Opportunities in Hot Deserts

#### Tourism

- Mass tourism to see animals species.
- Explore on camels.
- Main source of income and improvements development.

#### Agriculture

- Irrigation makes commercial arable farming viable.
- Produces crops such as wheat and cotton which generates an income.

#### Mineral Extraction

- Valuable reserves of minerals.
- Used to produce a range of things.

#### Energy

- Produced using solar panels.
- Wind energy also generates electricity.

### Challenges in Hot Deserts

#### Temperature

- Temperatures exceed 50 °C in summer, so is hard for people to work, farm or tour.

#### Water supply

- Less than 250 mm per year water must be used sustainably – without it the industry would collapse.

#### Inaccessibility

- Most of the desert is inaccessible and has poor infrastructure.