Measuring the weather

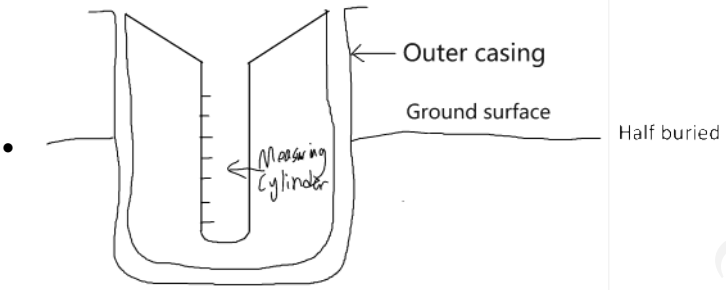
2023年10月9日 20:02

Keywords

- https://quizlet.com/cn/838128164/flash-cards/

Rain gauge - explanation

- Measure precipitation in mm
  - * Precipitation can be rain / snow / sleet / hail
- A hollow cylinder which contains a funnel and a measuring cylinder to collect the water
- Held in another outer casing
- Measuring cylinder is made of a fixed diameter so comparisons can be made between different rain gauges
- Diagram



Rain gauge - site factors

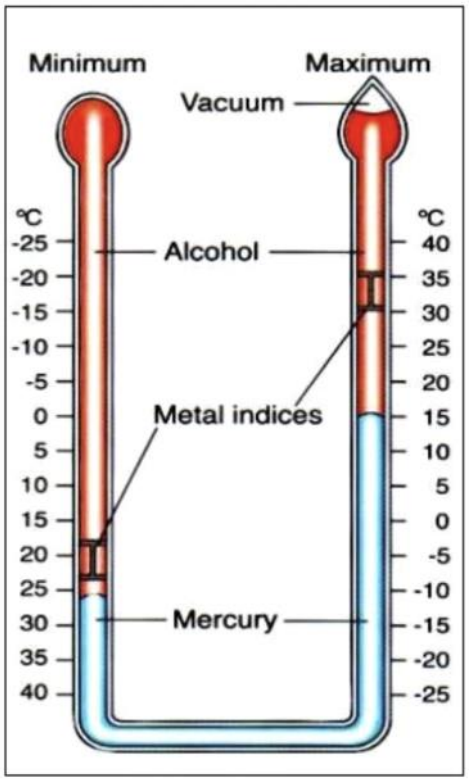
- Grass and not on hard surfaces
  - Avoid splashes entering into the gauge
- Part buried for stability
- Rim 30cm above ground surface
  - Avoid surface runoff entering
- No trees or roof overhanging
  - Avoid shelter and too little rain entering
- Away from buildings, trees, or other objects
  - Avoid drips entering the gauge

Rain gauge - taking reading

- At the same time of day at 9 a.m., every 24 hours
- Take out the funnel + measuring cylinder
- Read the amount of water in the measuring cylinder in mm, read at the bottom of the meniscus
- Melt any snow / hail before taking reading
- Pour away the water
- Reset the instrument

Six's thermometer / maximum-minimum thermometer - explanation

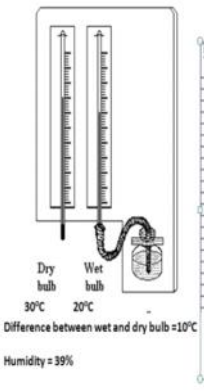
- Records the maximum + minimum temperatures in a 24 hour period
- Highest temperature
  - As temperatures rise, the mercury in the maximum thermometer expands
    - Pushes up the metal pin
  - When temperatures cool, the mercury contracts but the metal pin is left in place to record the highest temperature
- Lowest temperature
  - When the temperature falls, the alcohol contracts in the minimum thermometer
    - Pulls the metal pin upwards with mercury
  - When the temperature rises, the alcohol expands but it flows pass the metal pin leaving it in place to record the lowest temperature
- Diagram

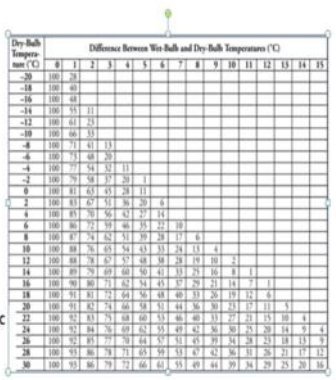
- 

Six's thermometer - reading

- At the same time of day at 9 a.m., every 24 hours
- Read from the bottom of the pins (*reversed scale for minimum temperature)
- The level of the mercury records current air temperature
- Pins are reset using a magnet

Hygrometer / wet and dry bulb thermometer

- Measure relative humidity as a percentage
- Have two thermometers that contain mercury to measure temperature
- Dry bulb is a normal mercury thermometer which measures actual air temperature
- Wet bulb is a normal thermometer but the bulb is covered with a muslin connected to a reservoir of water
- When water evaporates from the cloth latent heat is used so the air is cooled and the temperature on the wet bulb thermometer will be a few degrees lower than air temperature
- When air is humid, it is already saturated with water vapour and less evaporation will be able to take place
    - Less temperature drop on the wet bulb
- The smaller the difference between the dry + wet bulb temperature, the greater the humidity
- A conversion table is used to calculate the humidity using the dry bulb temperature and the difference between the two temperatures
- Diagram
- 



Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (°C)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
-20	100	28														
-18	100	40														
-16	100	68														
-14	100	55	11													
-12	100	61	23													
-10	100	66	33													
-8	100	71	41	13												
-6	100	73	48	20												
-4	100	77	54	32	11											
-2	100	79	58	37	20	1										
0	100	81	63	45	28	11										
2	100	83	67	51	36	20	6									
4	100	85	70	56	42	27	14									
6	100	86	72	59	46	34	22	10								
8	100	87	74	62	51	39	28	17	6							
10	100	88	76	65	54	43	33	24	15	6						
12	100	88	78	67	57	48	38	28	19	10	2					
14	100	89	79	69	60	50	41	33	25	16	8	1				
16	100	90	80	71	62	54	45	37	29	21	14	7	1			
18	100	91	81	72	64	56	48	40	33	26	19	12	6			
20	100	91	82	74	66	58	51	44	36	30	23	17	11	5		
22	100	92	83	75	68	60	53	46	40	33	27	21	15	10	4	
24	100	92	84	76	69	62	55	49	42	36	30	25	20	14	9	4
26	100	92	85	77	70	64	57	51	45	39	34	28	23	18	13	9
28	100	93	86	78	71	65	59	53	47	42	36	31	26	21	17	12
30	100	93	86	79	72	66	61	55	49	44	39	34	29	25	20	16

Barometer

- Measure atmospheric pressure in millibars (mb), average is 1013 mb
- An aneroid barometer has a chamber containing a vacuum

    - As air pressure changes, the chamber contracts & expands
- This movement is recorded by the needle on the front of the barometer
- The second needle is moved manually to record the current atmospheric pressure
    - Used to show the change in pressure over the next 24 hour period

Barometer - reading

- The pressure is recorded every 24 hours at the same time at 9 a.m.
- Open Stevenson's screen to get the barometer
- Take reading in millibars by looking at the black arrow
- Reset the instrument by moving the gold arrow in line with the black arrow to record current pressure

High / low air pressure effect

- High air pressure
    - Clouds cannot be formed
    - No precipitation
- Low air pressure
    - Clouds are formed
    - Precipitation / storms occurs

Anemometer

- Measure wind speed in m/s
- Light rotating cups are blown around by the wind
    - The faster the wind, the faster the cups move
- The revolutions are counted & converted into metres per second/ km per hour or knots

Anemometer - site factors

- Located on top of building for accurate measurement
- Placed away from shelter of buildings or trees which may reduce wind speed

Wind vane / weather vane

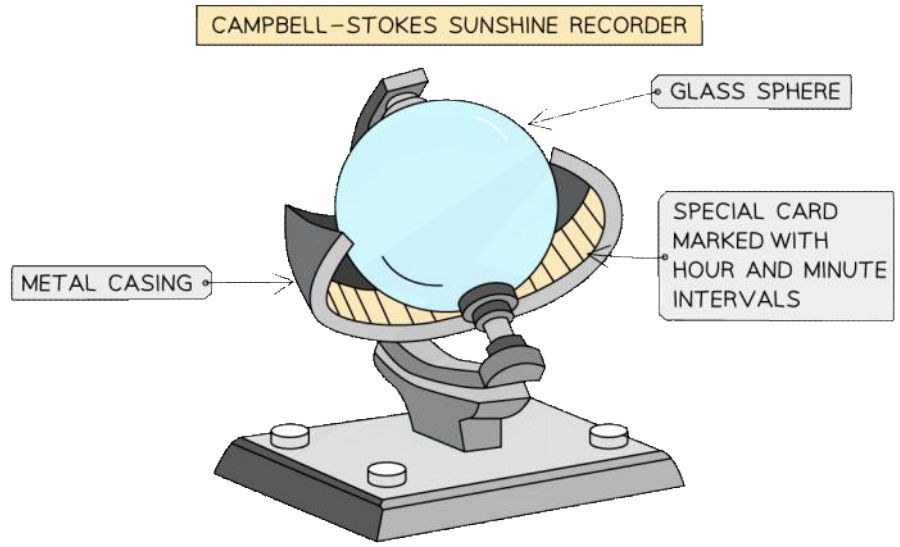
- Measure wind direction
- An arrow rotates freely above four fixed pointers which show the four compass points so direction can be worked out
- Arrow can be blown around by wind
- The arrow points in the direction the wind is coming from which is the name of the wind direction

Wind vane site factors

- Located on top of buildings or in open space
- Placed away from the shelter of buildings or trees

Sunshine recorder

- Record hours of sunshine
- A glass ball with a piece of paper located behind it
    - The paper is marked in minutes + hours
- When the sun shines, the rays pass through the glass ball and burn the paper recording the time of sunshine
- If the clouds block the sun, the paper is not burned
- The position of the sun moves overhead & it burns a line in the paper.

- 

Sunshine recorder - reading

- At the same time of day at 9 a.m., every 24 hours
- The paper is removed + work out the length of the burn
- The length of the burn indicates the hours + minutes of sunshine
- The paper is replaced to reset the instrument

Sunshine recorder - site factors

- Located in open space away from the shade of trees or buildings
- The ball is facing the sun i.e. facing south in northern hemisphere
- Often on top of the Stevenson's screen

Cloud cover

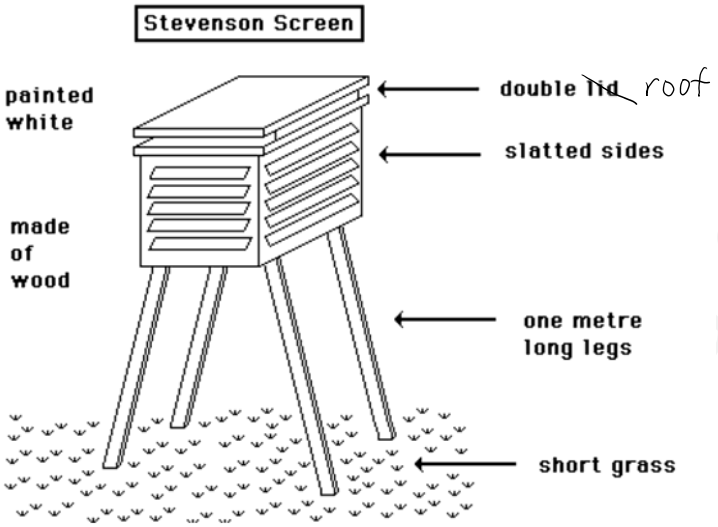
- Estimated by eye
- Measured in Oktas (no = 0 Oktas, full = 8 Oktas)
  - e.g. If half the sky is cloud covered, this is 4 Oktas.
- If the sky cannot be seen because of pollution, smoke or fog it is called obscured

Cloud types

- Cumulus
  - Cauliflower shaped
  - Flat bases
  - Fluffy, billowing
  - Range of altitudes
  - White, fair weather
- Stratus
  - Continuous layers
  - Covers most of the sky
  - White → grey
- Stratocumulus
  - Layer and heaped low level clouds
- Cirrus
  - Horsetail shape
  - High altitude, thin, wispy
  - Made of ice crystals
  - Fair weather
- Nimbus
  - Raincloud
- Alto
  - High

- Cumulonimbus
    - Heaped rainclouds linked with thunderstorms & heavy rain
    - Large altitudinal range
    - Tall, grey coloured
- Nimbostratus
    - Heavy layer of cloud which is dark
    - Brings continuous rain / drizzle

Stevenson's screen

- Contains
    - Six's thermometer
    - Hygrometer
    - Barometer
- It protects them from direct heat radiation + precipitation
- It allows shade temperatures to be recorded
- It has standardised characteristics so that weather recordings around the world can be compared.
- 

Stevenson's screen - characteristics

- Wooden box to reduce absorption of sun's heat
- Painted white to reflect the sun's radiation
- Double roof to create air layer in roof (allow air in)
- Slatted sides to let the air circulate, slanted downwards to prevent direct sunlight getting in
- Hinged door opens downward for easy access to instruments
- 125cm high legs: standardised around the world to allow comparison, avoid measuring ground temperature

Stevenson's screen - site factors

- In open space & away from obstacles e.g. buildings or trees
    - Reduce influence of heat from buildings or shade from trees
- On short grass to reduce impact of heat from ground
    - Not on concrete or tarmac which absorbs heat
- On legs 1.25m long
    - To measure air and not ground temperature
    - Standardise height for reliable comparison between weather stations
- Door facing away from direct sunshine (facing north in northern hemisphere)
    - Avoid direct sunlight when door is opened.
- In a protected area of the school e.g. fenced off
    - Avoid tampering by humans or harm from animals

Climate + ecosystems

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Climate

- The average weather condition e.g. temperature and precipitation over a period of 30 years.

Ecosystem

- The community of living (biotic) + non-living (abiotic) things interacting with each other in an area
  - Biotic things include plants + animals
  - Abiotic things include soil + water

Factors causing difference in global temperatures

- Latitude
  - The curve of the Earth means that the position of the sun in the sky is different in different latitudes
  - This affects the concentration of the solar radiation (energy) on the region
  - Around the Equator the sun is overhead + the solar radiation is concentrated over a smaller area which increases average temperatures
  - The solar radiation passes through thinner atmosphere so less energy is lost by reflection / absorption and more energy reaches the Earth's surface
  - In polar regions, the solar radiation comes in at an angle + is spread over a larger region. This means the temperatures are lower.
- Altitude
  - Higher altitudes have lower temperatures
  - Temperature decreases 0.6°C for every 100m increase in altitude
  - This is because the air density is lower at higher altitude + there are less molecules to absorb heat
- Distance from the sea
  - The sea heats up slowly in summer and cools slowly in winter because water has a high specific heat capacity
  - This means the sea cools coastal regions in summer but keeps them warmer in winter
  - The coastal regions have a lower annual temperature range than inland regions
- Ocean currents
  - Warm ocean currents e.g. North Atlantic Drift raise winter temperatures in coastal areas; cold ocean currents e.g. Californian cool them down in summer

Convectional rainfall

- Solar radiation warms the ground and air above it
- Warm air evaporates water from vegetation and ground to create water vapour in air
- Warm, moist air rises
- As air rises it cools down
- When condensation point is reached water vapour condenses to form water droplets which creates cumulus clouds
- Cumulonimbus clouds form when the cumulus clouds are too heavy and cannot hold water droplets
- Heavy rain falls at 3 p.m.
- Rains everyday

Relief rainfall

- When warm, moist air from the ocean hits mountains, it is forced to rise
- The moist air rises + cools
- The water vapour condenses in to water droplets producing clouds
- Precipitation on the windward side of the mountains
- The air then continues to move to the other side of the mountain and is not carrying little moisture
- On the leeward side of the mountain, the cool air sinks and warms up

- The air on the leeward side of the mountains is warmer so it can hold more water vapour and any moisture will evaporate + no condensation
- So there is no rainfall + clear skies
- The leeward side of the mountain is called the rain shadow

Global wind circulation causing difference in global rainfall

- At the Equator hot, wet air rises
    - This creates low atmospheric pressure on the ground
    - Rising air cools, water vapour condenses, clouds form and convectional rainfall happens in the Equatorial region
- High altitude air moves towards the poles and cools in the upper atmosphere
- In the Tropic of Cancer + Capricorn regions (20-30° north + south), the cool air sinks
    - This creates high atmospheric pressure on the ground
    - As the air sinks, it begins to warms up
    - The warmer air cannot condense any water vapour in the air and so there is no rain
    - These are the hot, desert regions which are sometimes called the tropical desert regions
- The circulation of air between the Equator and the Lines of the Tropics are called the Hadley Cells

Equatorial climate and ecosystem

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Keywords

- https://quizlet.com/cn/838128740/flash-cards/

Tropical forest distribution

- In a narrow belt around the Equator
- Between 8° N & S of Equator
- Places
  - South America = Amazon
  - Central Africa = Congo
  - Southeast Asia = Indonesia
- Exceptions
  - Kenya, East Africa
    - Around the equator but no rainforest
    - 1000m above sea level → too cold

Climate

- High rainfall
  - Over 2,000mm per year
  - Evenly distributed throughout the year
  - Caused by high temperatures during the day causing heavy convectional rainfall in the early afternoon
- High temperatures all year round
  - Average mean monthly temperature of 28°C
  - Because the TRF is located around the Equator where the sun is high in the sky all year round
  - Receive lots of solar radiation around the whole year
  - Lots of radiation concentrated in a small area
- Low annual temperature range
  - Difference between the average temperature of the hottest and coldest month is low
    - Approximately 3°C
  - This is because the sun is high in the sky all year round so insolation is high all year round
    - Insolation = incoming solar energy
- Low diurnal temperature range
  - Difference between the average daytime and night-time temperature is low
  - Heavy cloud cover in TRFs
  - Clouds reduce the amount of heat lost at night by reabsorbing escaping heat so temperatures do not decrease significantly at night
- High humidity
  - Usually over 80%
  - There is a large amount of water on plants + the ground because of the high rainfall
  - There are high rates of evaporation and transpiration all year round because of the high temperatures → lots of water vapour in the air → high humidity
- Low atmospheric pressure
  - Warm, air is rising

Vegetation characteristics in tropical rainforests

- High biodiversity of plants
  - Constant hot and wet climate is the perfect climate for plants to grow
  - Results in a constant growing season all year round
- Grow in distinct layers

Vegetation layers

Layer	Plant	Animals
Forest floor	• 1% of light • Very dark so little grows except fungi	• Insects and fungi live in decaying leaf matter
Shrub layer	• Low shrubs 4m high • 5% sunlight here • Large leaved plants e.g. ferns	• A lot of insects → food for bird / geckos / bats / tree frogs • Big cats e.g. jaguar and snakes live on this layer so they can spot prey
Under canopy	• Trees 20m high (& young trees) • Less dense than main canopy • Can survive in less sunlight by having larger leaves	Same as below ↓
Main canopy	• Trees 30-40m forming a continuous canopy • Few lower branches • Very little light gets through canopy	• Most abundant wildlife • Seed and fruit provide plentiful food supply • Many animals e.g. toucans, sloths + tree frogs, monkeys
Emergent layer	• Tall trees up to 50m high • Few lower branches • Grow above others to get full sunlight	• Only lightweight creatures that the thin branches can support • e.g. monkeys, birds, butterflies

Vegetation adaptations

- Lianas
  - Vine like plant which uses the large trees as a support + grow up them to reach the sunlight.
- Epiphytes
  - Grow on trees to get light + trap water + use dead leaves from the tree as nutrient
  - e.g. moss, lichen + orchids
- Drip tips
  - Pointed end of leaves to get rid of excess water
  - Excess water affect rate of transpiration and may cause the leave to break off
- Buttress roots
  - Grow both above and underground
  - Support and stability as trees are high

Soil characteristics

- Deep
  - The high temperatures + rainfall mean the bedrock is rapidly weathered
- Red
  - Abundance of iron oxides (red) in soil
- Infertile
  - Rapid uptake of minerals (nitrogen, potassium, phosporus) by the roots of dense, fast growing forest plants
  - Leaching
    - Water absorbs nutrients and takes them downwards

How soil gain nutrients

- Leaves and dead animals decomposing on forest floor
- Nutrients in rainfall
- The breakup of rock underneath the soil

Causes + effects of deforestation

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Causes of deforestation

- Logging
  - Trees cur down for the value of the wood for other purposes
  - High global demand for hardwood e.g. mahogany + teak to use for furniture and paper
  - Wood used as fuel wood for cooking as well
- Plantation agriculture / commercial farming
  - Farmers clear forests to plant palm oil trees / sugar cane to sell
- Cattle ranching
  - Forest is cleared so the land can be changed to grassland for cattle to graze
  - Cattles are sold for beef
- Subsistence farming / slash and burn method
  - The forest is burned to clear the forest quickly
  - The ash is fertile and for a few years the soil is productive enough for crops to be grown to feed the farmer and his family
  - After a few years the fertile soil is eroded by heavy rainfall and washed away to rivers so it is less fertile
  - The farmers then clears another area of the forest
- New settlements
  - New roads are built and the forest cleared to provide new settlers with farm land
- Mining
  - Valuable minerals e.g. gold + coal are in the ground or oil underground
  - Forest is cleared to access the minerals / oil + build access roads
- Hydroelectric power
  - Rainforest rivers are dammed + reservoirs flood the forest

Why deforestation causes vegetation to be degraded

- Burning the forest to clear the land use for other purposes causes the trees and the leaf litter beneath to be destroyed
  - The microorganism below are also killed during burning and dies due to the lack of nutrients from leaf litter
  - Therefore less nutrient is released back into the soil causing reduced plant growth
- The loss of trees leads to the loss of protection of soil from heavy rain through interception
  - There will be more leaching → nutrients in the soil to be lost beneath
  - Increased soil erosion so top soil is lost
  - Soil becomes increasingly infertile

Local impacts of deforestation on the environment

- Water + soil contaminated by toxic waste from the oil industry due to oil leaks from illegal tapping
  - Animals and plants killed by oil as it is toxic
- Increased flooding because there is no tree canopy to intercept the rainfall
- Increased leaching reduces fertility of the soil
- Increased run off causes soil erosion which reduce soil fertility
- Habitats of plants + animals destroyed so they cannot survive
  - e.g. oil contaminates water and soil
  - Loss of biodiversity
  - Some plants + animals extinct
- Eventually a decrease in rainfall + potential droughts because there are no trees for evapotranspiration + so there is less water vapour in the air

Local impacts of deforestation on human

- Homes of indigenous population destroyed

- Native people may be infected by pathogens that is carried by people from outside world that is fatal to them
- Conflict between native population + new settlers can be violent
    - The native people fight with new settlers / loggers / oil companies to defend their land
    - Native people die from conflicts
- Burning of trees causes air pollution + health issues e.g. breathing problems

Global impacts of deforestation

- Loss of carbon sink
    - Burning of trees increases carbon dioxide (a greenhouse gas) in the atmosphere
    - Reduction in carbon dioxide intake by plants so less CO_2 is removed from the atmosphere
    - Results in an increase in CO_2 in the atmosphere + contributes to climate change
- Loss of oxygen source
    - No trees are photosynthesising so less oxygen is produced
    - Currently 1/3 of world's oxygen comes from TRF
- Dead zones form at mouths of river
    - Soil is washed into the river due to increased erosion and deposited at mouth
- Loss of potential medicines
    - Over half modern medicine came from TRF plants
    - Many species become extinct before they are discovered

Native people in the rainforest

- Originally hunter gatherers lived in forest
    - Hunt animals + collect fruits for food
- Subsistence farmers as well using slash + burn method-
    - Burn small area of forest so ash provides some nutrients
    - Grow crops for 3 years
    - Soil becomes infertile because there are no trees to protect soil
    - Clear another area of forest
    - Allow the forest to regrow

Hot desert climate + ecosystem

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Keywords

- https://quizlet.com/cn/852883603/flash-cards/

Distribution of Tropical deserts

- Unevenly distributed
- Located on the Tropic of Cancer + Capricorn
  - e.g. Cancer = Saharan, Capricorn = Great Sandy Desert
- Mostly found in sub-tropical region around 15-30° N or S of Equator
- Often on the western side of the continents e.g. Atacama in South America
- Often in centre of continents e.g. Gobi

Climate

- High mean temperature of the hottest month
  - Approximately 30°C
  - When the sun is overhead in summer, the incoming solar radiation is concentrated + temperatures are high
- High annual temperature range
  - Temperatures vary throughout the year with distinct seasons
  - Hot summer with average temperatures up to 30^0C + in winter average temperatures can be cool e.g. 10^0C
    - Sun is overhead in the other hemisphere in winter → solar radiation spread out → low temperature
- High diurnal temperature range
  - Day time max. temperatures can be above 50^0C; night time temperatures can be below freezing
  - No cloud to reduce incoming solar radiation during the day (so daytime is hot) or to prevent heat loss at night (so nights are cold)
  - High altitude deserts are very cold at night
- Low total rainfall
  - Must be less than 250mm in a year (deserts are arid regions)
- Unreliable + unpredictable rainfall distribution
  - No seasonal rainfall pattern
  - There can be many months with no rain and sudden heavy rainstorms which create flash floods
- High atmospheric pressure
  - Air is descending due to the global wind circulation (descending arm of the Hadley Cell) / on leeward side of a mountain range
- Cloudless skies + low humidity
  - Air is descending + air warms up as it descends
    - So there is no condensation of any water vapour

Reasons for aridity

- Descending air in the Hadley cell
  - Deserts are located in the high pressure area where the air circulation of the Hadley Cell is sinking
  - The air warms up as it sinks → there is no condensation → no rain droplets are produced
- Rain shadow of a mountain range
  - Desert regions are found on the leeward side of mountain ranges
  - Air rises up to higher altitudes along one side of the mountain
  - Water vapour condenses and it causes precipitation, leading to relief rainfall
  - Air then continues to move to the other side of the mountain and is now carrying little

moisture
    - The cold, dense air sinks and warms up as it sinks
    - There is no condensation as the air is warm so no rain droplets are produced
        - These are called rain shadows (no rain)
- Cold ocean current
    - There is a cold ocean current along the coast where deserts are found
        - e.g. Peru current + Atacama Desert; West Australian current + Great Sandy Desert
    - Water from cold polar regions flows towards equator along west coasts of continents
    - The air is cooled above the cold ocean and condensation is forced over the sea, producing sea fogs
    - The air blowing onto the land is now dry so a desert forms
- Continentality
    - The desert is located in the centre of the continent and is a long distance from any ocean or lake so there is no source of moisture
    - Any moisture was precipitated before the wind reaches the desert area
    - The air is dry and cannot produce rain

Desert soil

- Infertile + contains few plants
    - There is very little dead matter for decomposition + it is too dry for the decomposers to work effectively so there are very few nutrients added to the soil
    - Plants cannot get nutrients for growth
- Is a degraded soil (eroded)
    - The soil is not protected by vegetation from the wind or the infrequent flash floods
    - The soil is easily eroded + any nutrients washed away
- Sandy soils are mobile and loose
    - Mobile = plants can be easily covered
    - Loose = plants can be uprooted
- Remains dry
    - Soil is hard baked which makes infiltration difficult
    - Even when it rains the water runs off the surface quickly
- Grey + saline
    - Evaporation of water brings salt up to the surface + deposit it when water evaporates

Vegetation characteristics

- Vegetation is sparse + low lying
- Low biodiversity
    - Only a few plants specially adapted to the arid / dry conditions + unpredictability of the rainfall can survive
- Named plant = cactus / Joshua tree

Vegetation adaptations

- Low density / low lying so not competing for limited water and nutrients
- Succulents: have fleshy stems + leaves to store water
- Pleated so it can expand to store more water
- Deep tap vertical roots to reach groundwater (up to 50m)
- Wide, shallow horizontal roots to access any rain water before it evaporates
- Spines to reduce water loss from transpiration
- Ephemeral
    - Drought resistant seeds can lie dormant for years until it rains
    - Then they complete their life cycle (germinate, flower & produce seeds) within 2-3 weeks.

Animal characteristics + adaptations to arid/dry climate:

- Named animal = Fennec Fox
- Nocturnal
    - Active at night to avoid heat of the day
- Burrowing

    - Stays underground during the day to avoid heat
- Large ears
    - To lose body heat
- Highly efficient kidneys
    - Produces concentrated acidic urine + dry droppings to avoid losing water
- Light colour fur
    - to reflect heat
- Thick fur/ tough soles on their feet
    - To protect them from hot sand

Yasuni Biosphere Reserve

2023年11月1日 17:25

Basic information

- Location
  - Amazon rainforest in eastern Ecuador
- Area
  - 30,000km^2

Biodiversity

- One of most biodiverse places in the world
- 1,350 species of animals and 2,700 species of plants
- 800 species of fish, including piranhas
- 350 Species of reptiles, including anacondas
- 300 species of mammals, including jaguars
- Thousands of species of plants and trees including mahogany + teak

Native population

- Two small tribes of people live in deliberate isolation within the borders of the Yasuni National Park
- Their rights – including the right to be left alone – are protected by Ecuador's law

Deforestation in Ecuadorean rainforest

- Ecuador has highest rate of deforestation in South America
- Primary rainforests now cover less than 15% of the country

Reasons for deforestation

- Drilling for oil
  - TNCs like Texaco
  - Access roads build to oil fields
- Logging + agriculture
  - Most deforestation for logging + agriculture happens along the access roads to the oil fields
- Illegal hunting
  - The oil roads allow for increased access to the forest

Local impacts of deforestation:

- Oil spills + contamination
  - In the 25 years that Texaco have operated in the Amazonian region of Ecuador, the oil company has spilled 17 million gallons of crude oil into the local river systems
    - The oil pipelines rust in the hot + wet climate which causes oil leaks
  - They also dumped 20 billion gallons of toxic waste
    - Poisons the soil + plants
  - Animals eating the plants or drinking contaminated water are poisoned
- Loss of biodiversity and threat of extinction of some species
  - Loss of habitats when the trees are cut down and the poisonous waste cause loss of species
  - This interrupts the food chain and can cause other species to be lost and even go extinct
- Degradation of the soil
  - The soil along the access roads are exposed to the heavy convectional rainfall + eroded into the rivers
  - Soil become less fertile
- Social conflicts with native tribes
  - The tribes try to defend their land and protect the forest
  - There have been violent conflicts between tribes and oil companies

Mojave desert

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Location

- 125,000km^2
- Boundary of FOUR US states including Nevada, Arizona and California
- Latitude 35° N of the equator in SW USA
- To the east of the Sierra Nevada mountain range
- Cold Californian ocean current flows along the western US coastline.

Climate

- Low annual rainfall (160mm) / arid
  - Latitude
    - Located around 35 N of the equator in SW USA
    - In descending arm of the Hadley Cell so air is sinking
    - Air warms up + limited condensation can take place
  - Rain shadow
    - Located in leeward side of Sierra Nevada mountain range
    - Air is sinking, warms up + limited condensation takes places
  - Cold ocean current
    - Cold Californian ocean current flows southwards along the western US coastline
    - Water forced to condense over the ocean surface so air lacks moisture
- High maximum monthly temperature (28℃ in July)
  - July = summer in northern hemisphere
  - Sun is overhead + solar radiation is concentrated on smaller area of land
- Low minimum monthly temperature (8℃ in January)
  - January = winter in northern hemisphere
  - Sun is lower in the sky and solar radiation comes in more at an angle + spread out
- High annual temperature range (20℃)
  - Position of the sun in the sky changes seasonally
- Extremely cold winters
  - Temperatures can go below freezing (0℃) and any precipitation falls as snow
  - The Mojave is a high altitude plateau (800m above sea level)
  - Temperatures are lower at higher altitudes
- High diurnal temperature range (15-25℃)
  - Due to low humidity + cloudless skies
  - No cloud to absorb escaping heat at night so deserts are cold at night

Plants + animals

- Mojave desert animals
  - Mojave Ground squirrel
  - Black tailed Jack rabbit
- Mojave desert plants
  - Cactus called Joshua tree
  - A shrub called creosote

Human activity in the Mojave Desert

- Mining
  - In the past it was used for mining
  - The Vulcan mine was the largest mining operation which supplied iron for World War 2
  - It is now closed but the scar on the landscape created by the mine can still be seen
- Military
  - Used for military bases with training facilities to prepare soldier

    - It is seen as a remote location where training can take place in secret
- Roads
    - Built to provide access for these mines + military bases
    - These opened up access for the other human activities
    - Route 66
        - One of the most important roads in the USA for transporting people and materials across the country
        - It links Chicago (in the east) and Los Angeles (in the west)
        - It runs through the Mojave desert and this increased the population growth and economic development of the desert towns e.g. Ludlow
- Agriculture
    - Extensive cattle ranching
    - Farmers graze cows on the fragile desert vegetation
- Tourism
    - The desert is located between the large cities of Los Angeles and Las Vegas and within one day drive for 40 million people
    - It is a tourist destination with four national parks located in the desert
    - Route 66 helped to increase the number of tourists who could visit the desert
    - Many tourists use off road vehicles and drive around the remote desert
- Energy production
    - Solar energy farms use the reliable hours of sunshine to produce electricity
    - The largest solar farm in the world is located in the Mojave Desert with 200,000 mirrors producing energy for 150,000 homes

Problems caused by human activity

- Population growth
    - Put pressure on the limited water resources
    - Water is being extracted from underground faster than is being replaced by rainfall
        - Causing underground water supplies to dry up.
- Overgrazing by cattle ranching
    - The most edible plants have been over grazed by the cattle causing disruption to the natural food chains
- Pollution
    - Some underground water sources has been polluted by the mining operations
- Tourism + off road vehicles
    - The wheels crush the fragile vegetation and animals burrowed in the sand for protection from the heat
    - The vehicles also compact the desert soils which means that when it rains the water runs off the hard surface, eroding the thin soils