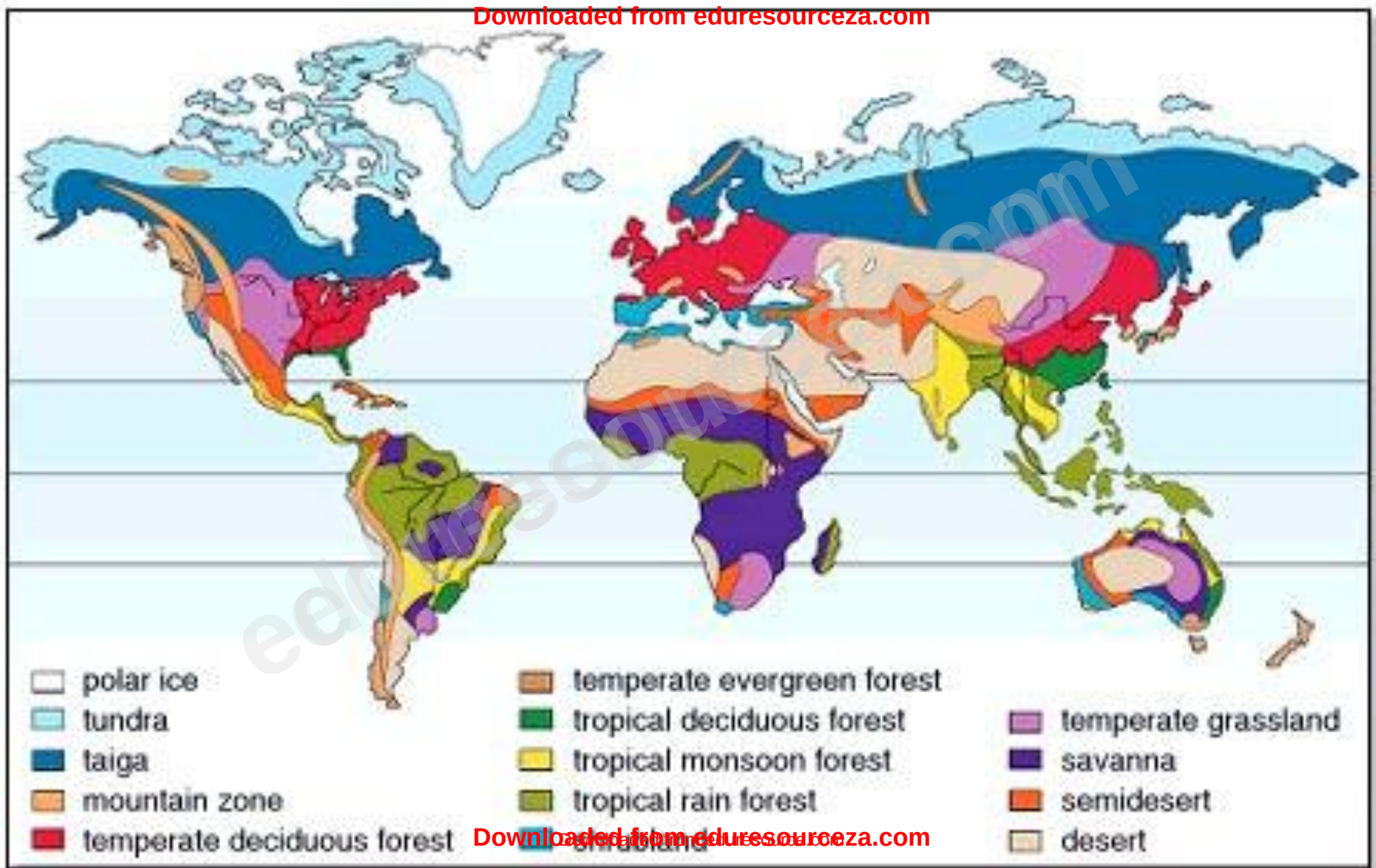




Weather, Climate and Ecosystems

M Ralph



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Starter!



Write it down!
List 4 different
types of climate?

Learning Objectives

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All : can tell the difference between weather and climate

Most : will recognise the different weather instruments used to measure the weather

Some : can find the location and distribution of Climate Zones.

Extension: what type of climate do we have in the UAE, explain what type of seasons and weather patterns exist



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Definitions

What is Weather?

Weather is the atmospheric conditions over a certain area at a specific time

What is Climate?

Climate is the average weather in a place over a long period of time



Definitions

What is an ecosystem?

An ecosystem is a community of living organisms (plants and animals) sharing an environment. The largest ecosystems are called biomes.

What is a biome?

A biome is a very large ecosystem e.g.
Tropical Rainforest



Activity

You have 4 minutes to remember the meaning of the 4 key words

- Weather
- Climate
- Ecosystem
- Biome



Stevenson Screen

- Maximum and a minimum thermometer
- Hygrometer



Wind Vane

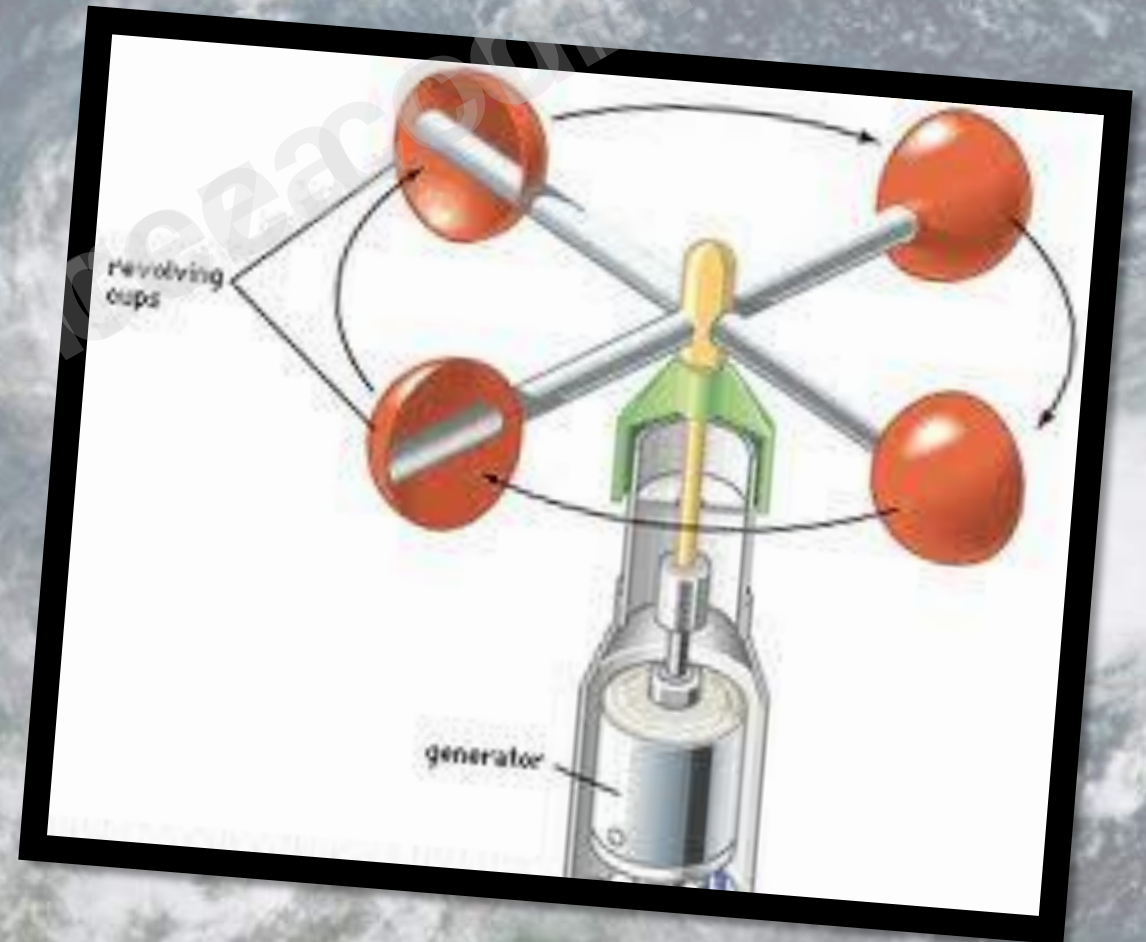
- The wind vane is a free moving arrow on a high mast measuring wind direction
- The tail of the arrow is wide and is blown forward by the wind
- So the head of the arrow points in the direction which the wind is blown



Anemometer

Measures Wind
Speed

*Hands Up!
Try to explain how
this works?*



Max and Min Thermometer

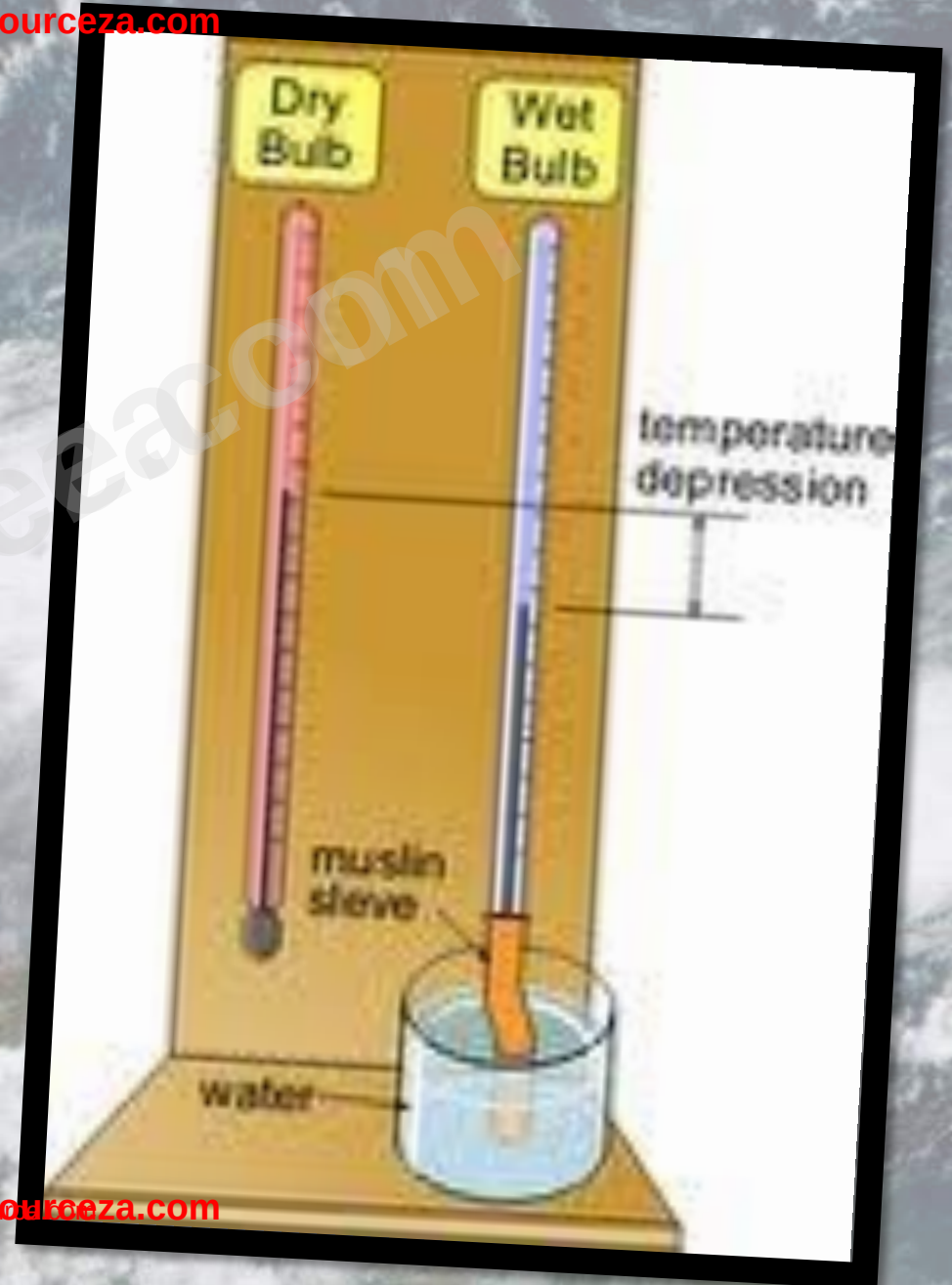
Measures Max and Min temperature over 24 hour period



Hygrometer

- Used to measure relative humidity (water vapour)
- Gives a percentage of how much water vapour is in the Air

WHY are there two Different Types WET and DRY bulb thermometers???



Sunshine Recorder

Measures the
Hours of
Sunshine Each
day

*How does it
work???*



Rain Gauge

Used to measure
precipitation in
millimetres

How does it work?



Barometer

Used to measure air pressure

What unit of measurement is used?



Clouds

- Formed from water droplets and ice particles
- Various types depending on..

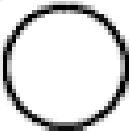
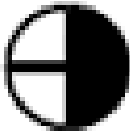
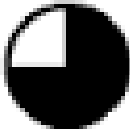
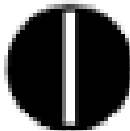
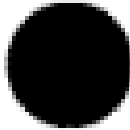
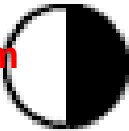
- Shape

- Height in the sky

3 categories

- Low level
- Medium level
- High level

Measured in Oktas (8/8)

	0 Oktas (no cloud)		5 Oktas
	1 Okta		6 Oktas
	2 Oktas		7 Oktas
	3 Oktas		8 Oktas (no blue sky)
	4 Oktas		Sky obscured



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Quick Quiz ☺



- Go to the back of your copybook
- Write down the name of the different weather instruments (1 mark)
- And also write down what it is used for (1 mark)

Please don't strain your eyes by looking into someone's work beside you ☺

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1



2



3



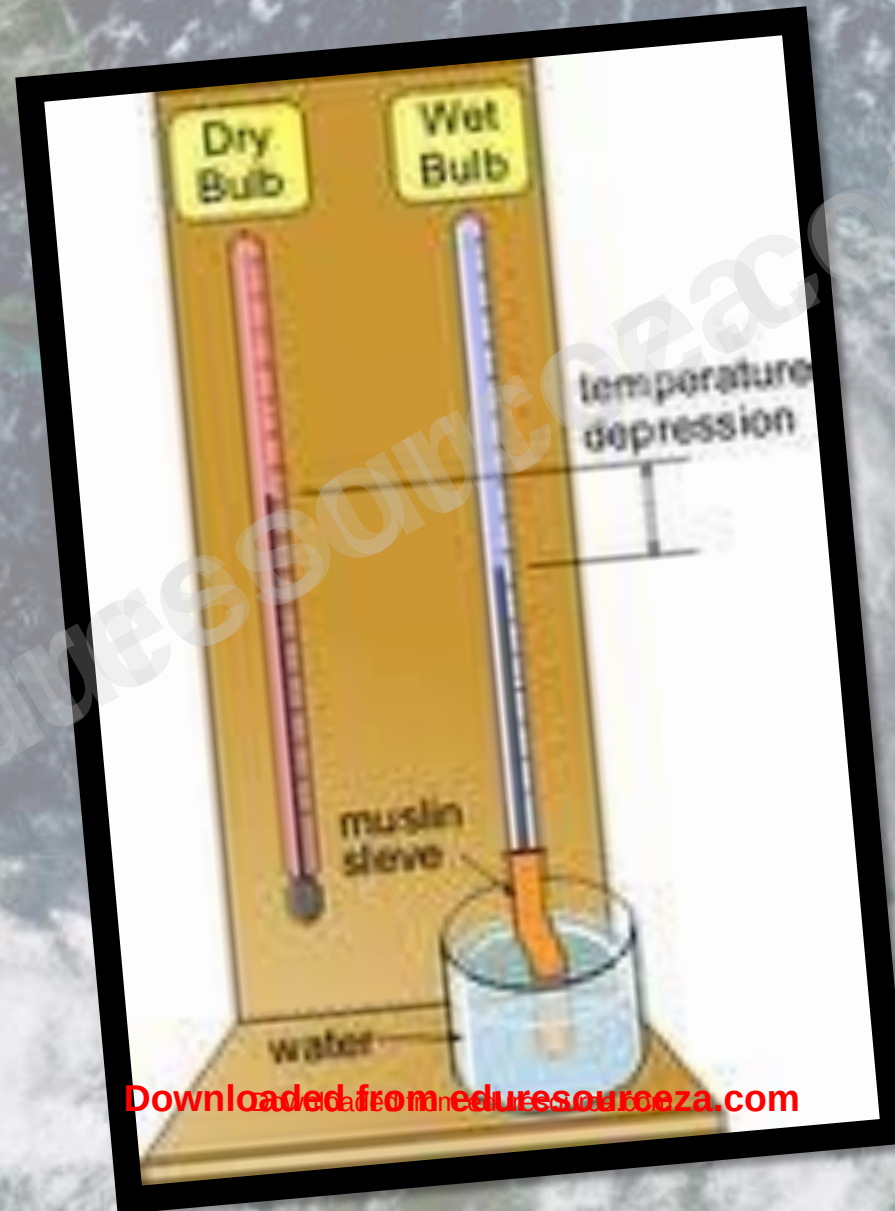
4

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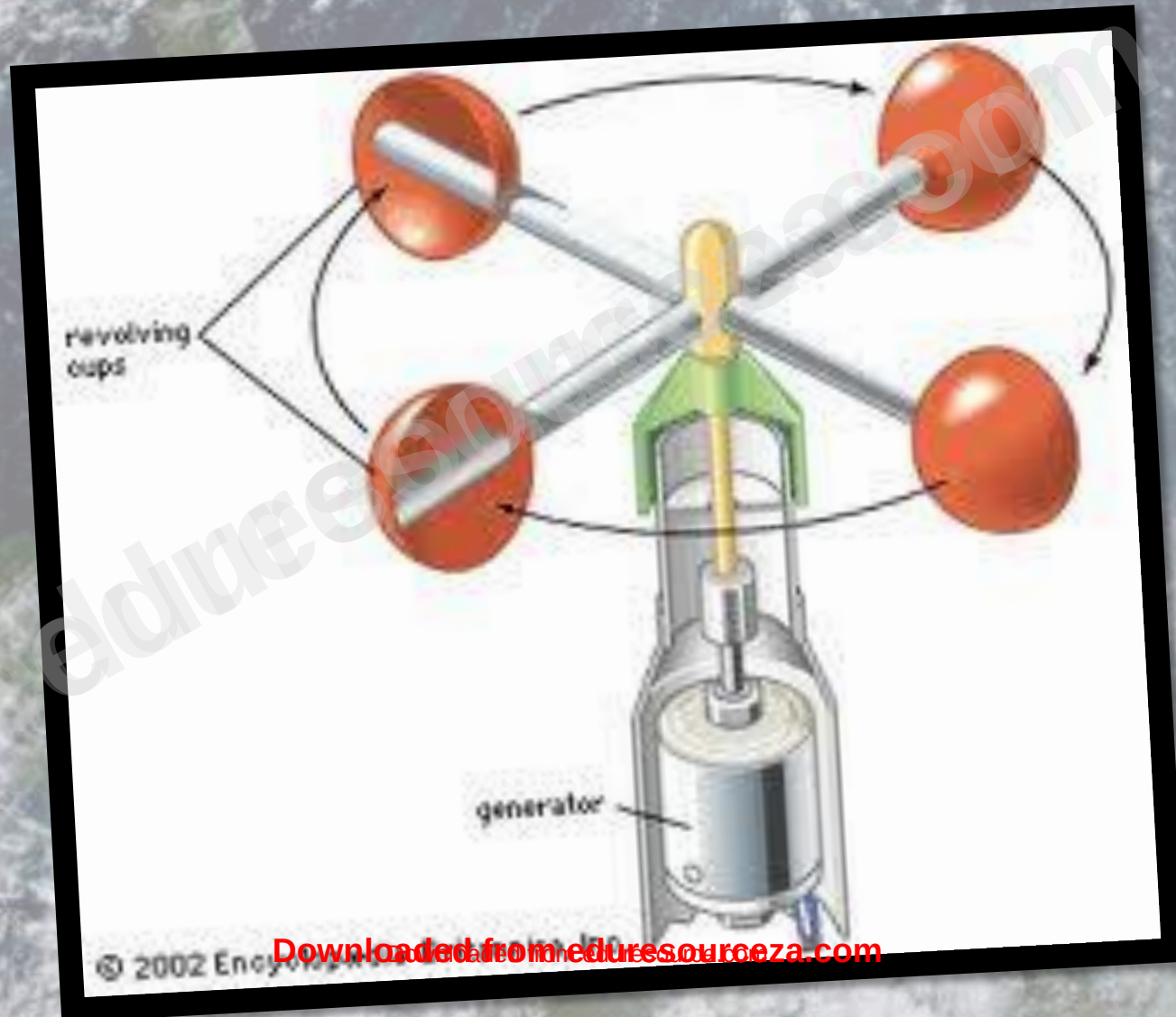
5



6



7



8

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Climate and weather are not the same

Climate and weather are not the same

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Climate and weather are not the same

Climate and weather are not the same

Climate and weather are not the same



Starter!



Write it down!

**What are the
following weather
instruments used
for: Thermometer,
Wind Vain and Rain
Gauge?**

Learning Objectives

All – can recognise the various factors that affect climate

Most – will be able to explain the process of the various factors that affect climate

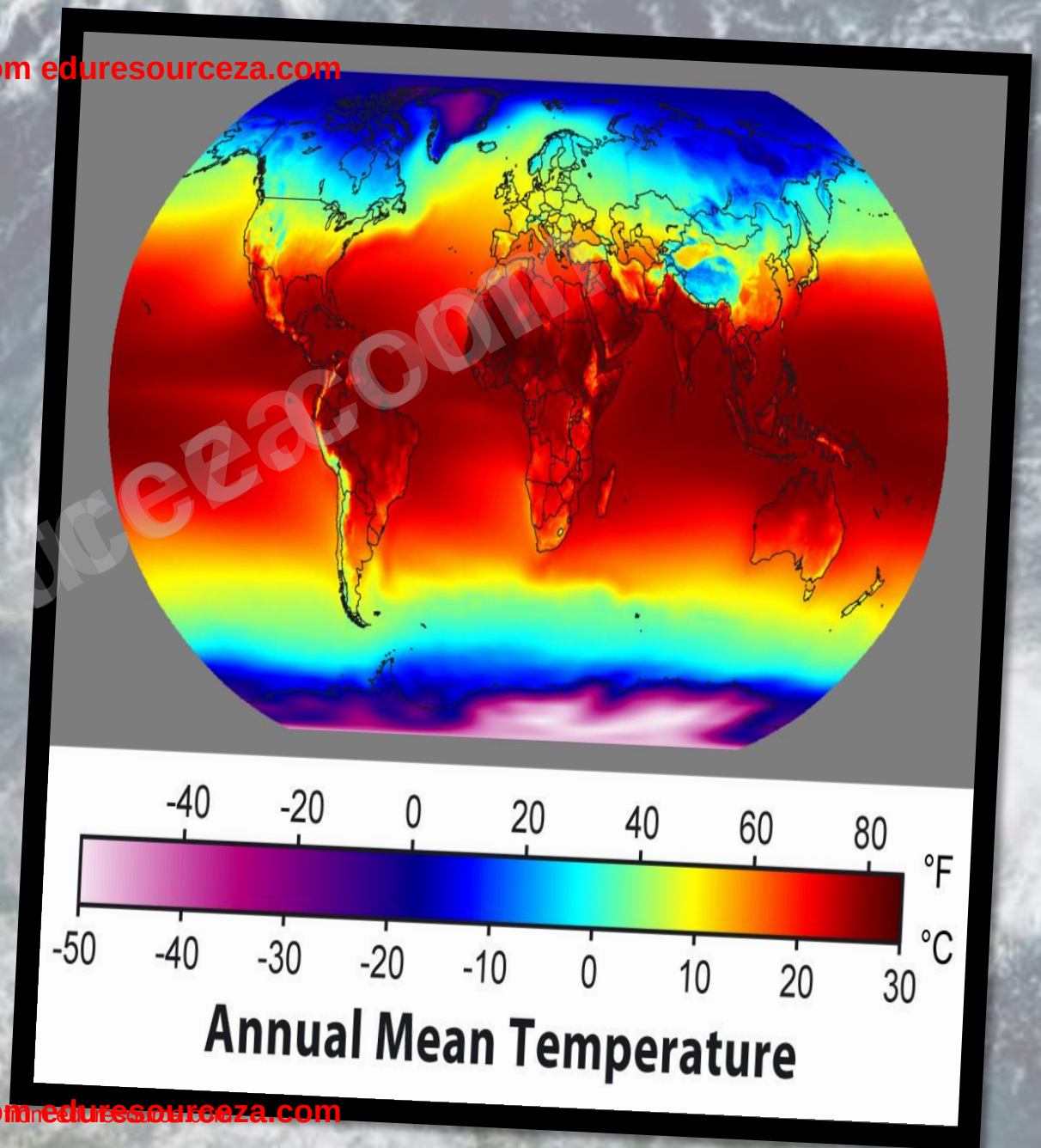
Some – can draw labelled diagrams explaining the process of the various factors that affect climate

Extension: research the main factors that affect the type of climate we have here in the UAE



Quick Question!

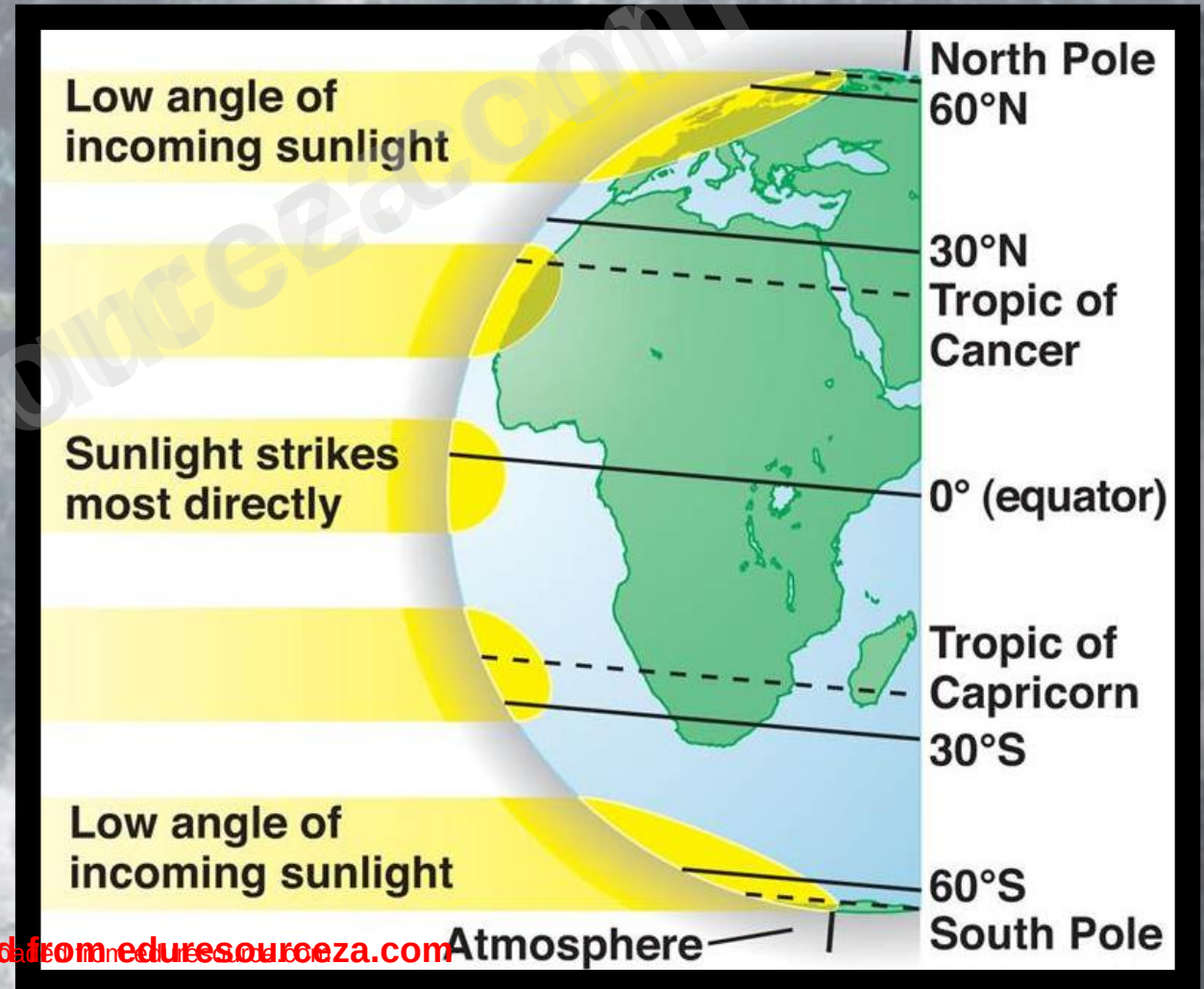
Why are some areas of the earth hotter than others?



Latitude

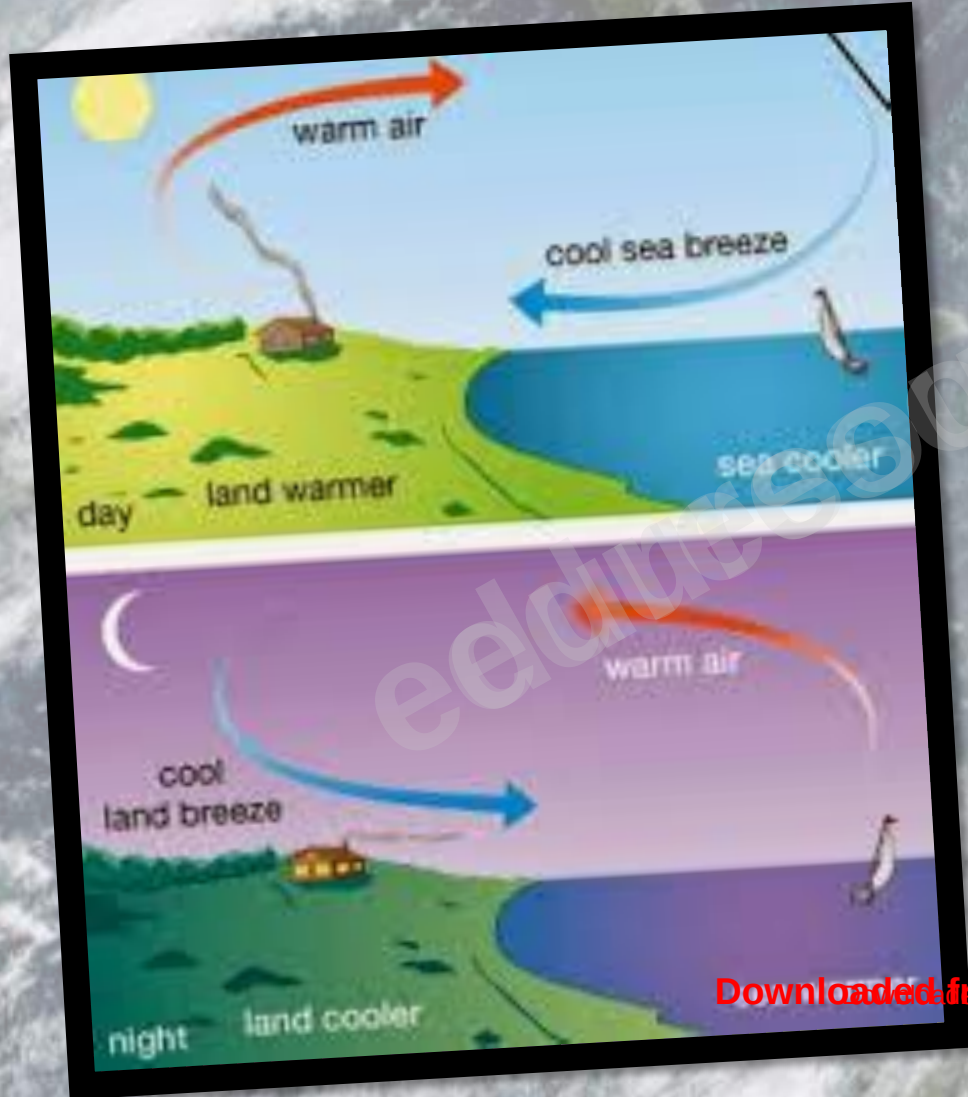
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The further north or south you move from the equator, the cooler it gets because the sun's rays are less concentrated



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Distance from the sea



Areas near the sea
are warmer in winter
and cooler in
summer

*Can you explain
why?*

Altitude

- Altitude is the height above sea level
- The higher the altitude of a region the cooler the temperature becomes

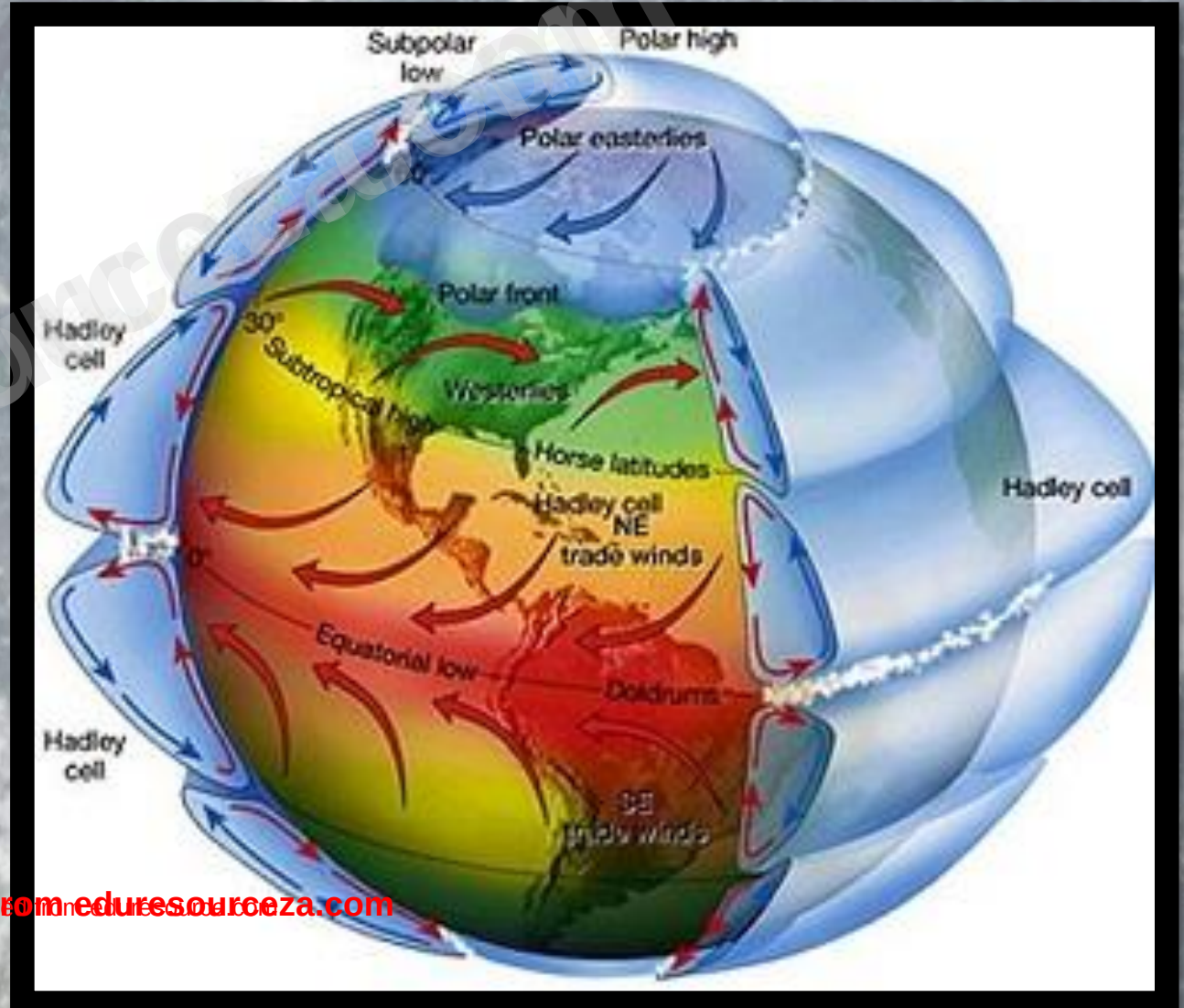
Can you name this mountain?



Prevailing Winds

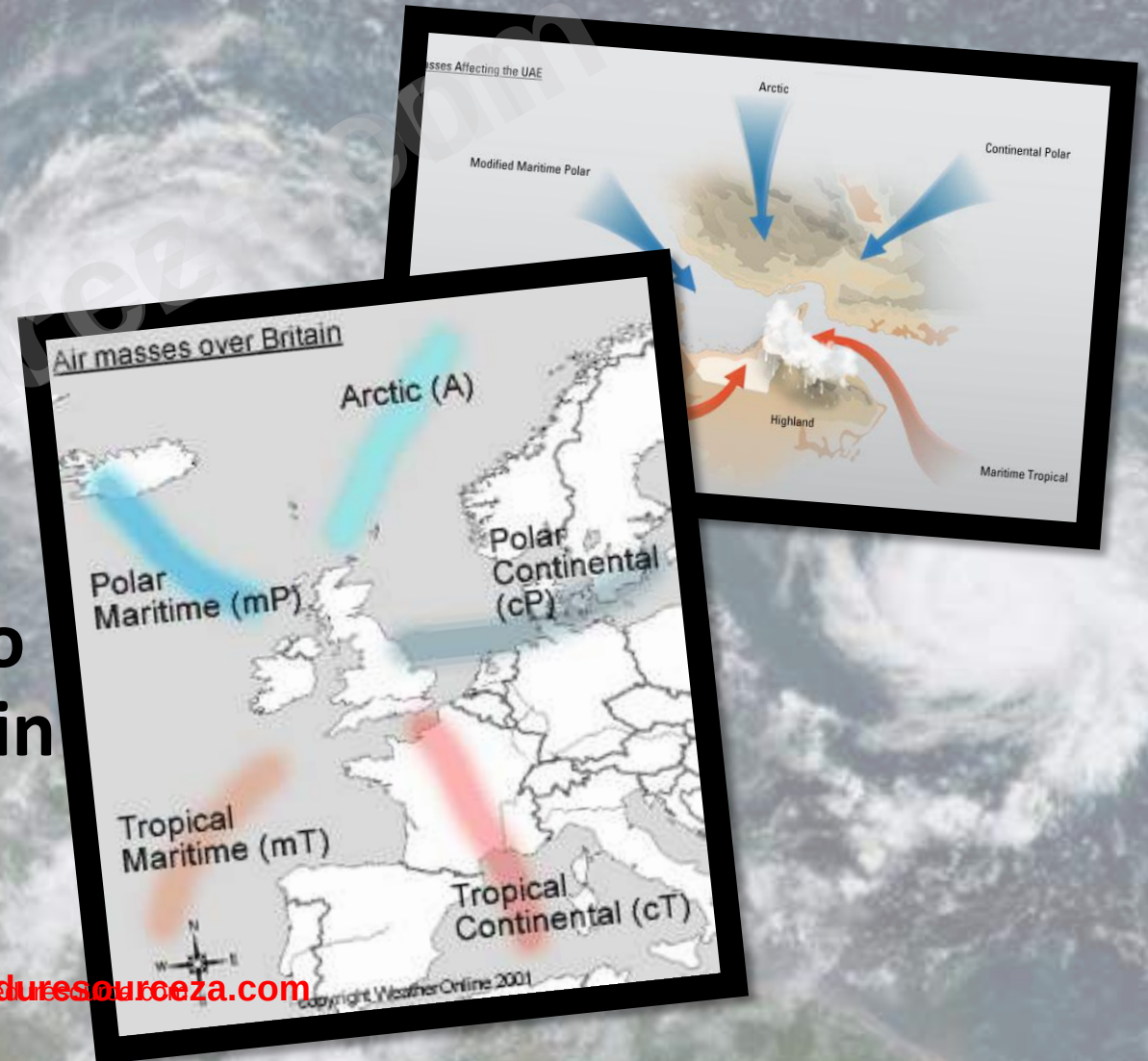
The main direction
the winds blow

*Look in your books
and try to figure
out the UAE's
prevailing winds*



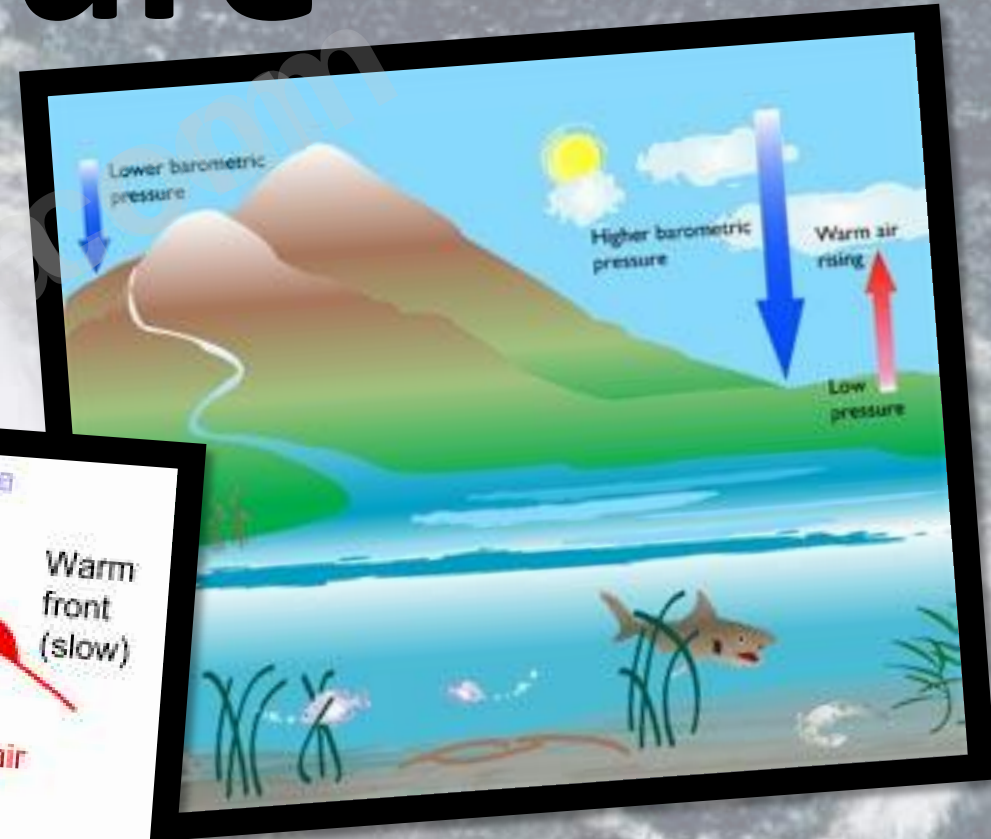
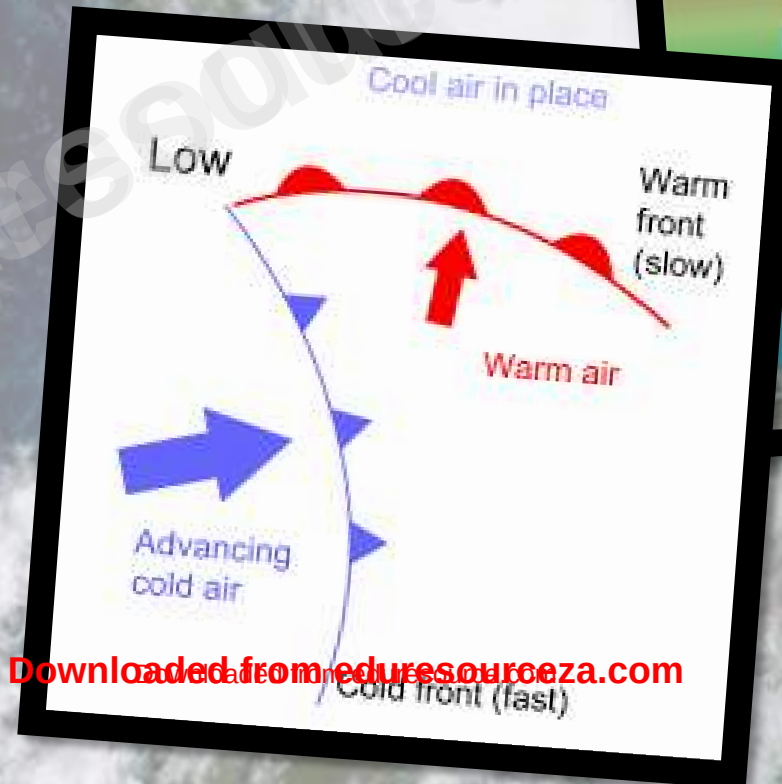
Air Masses

- An air mass is a large body of air with relatively uniform characteristics (temperature and humidity)
- The characteristics of an air mass are determined by its source region. The source regions tend to be semi-permanent anticyclones in the sub-tropics and polar regions ('tropical' or 'polar' air).

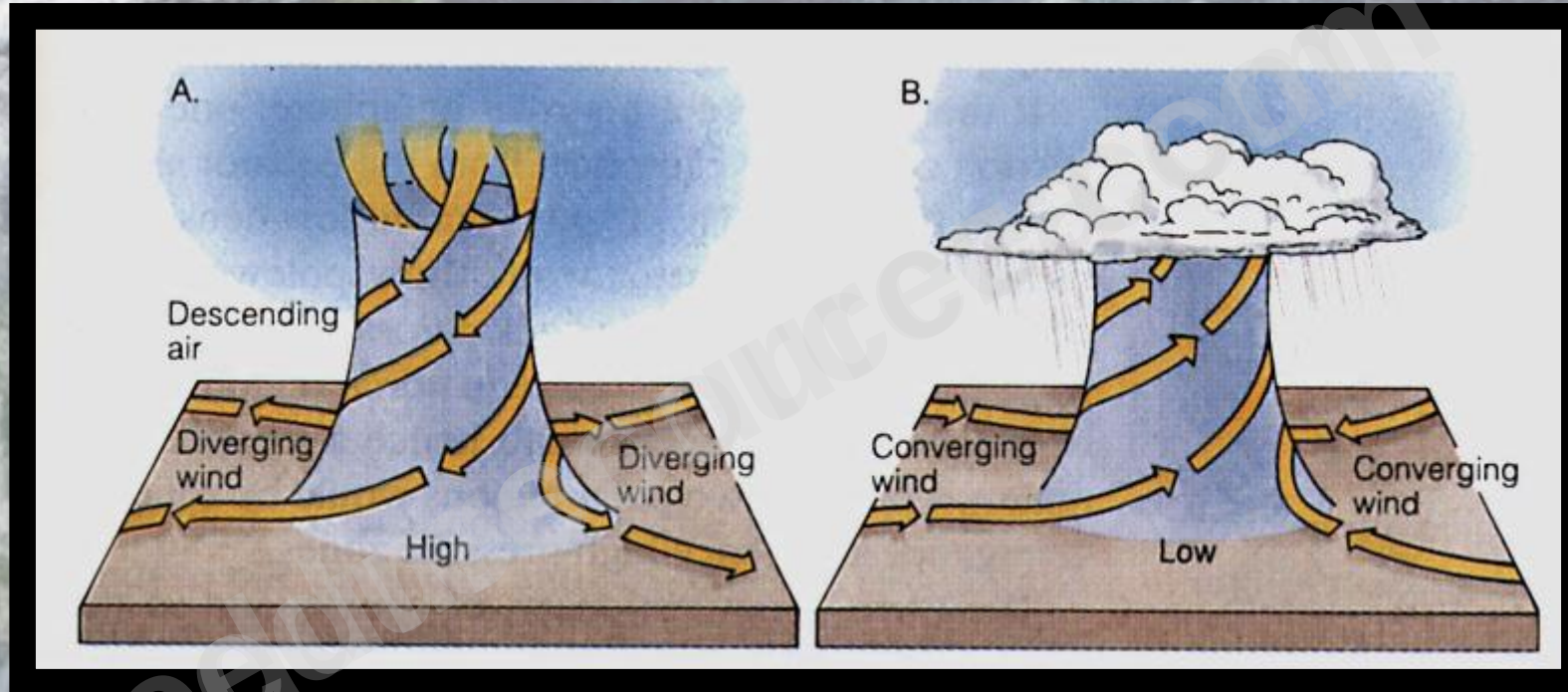


Air Pressure

- Warm air rises so there will be Low pressure
- Cool air descends so there will be High pressure



High & Low Pressure

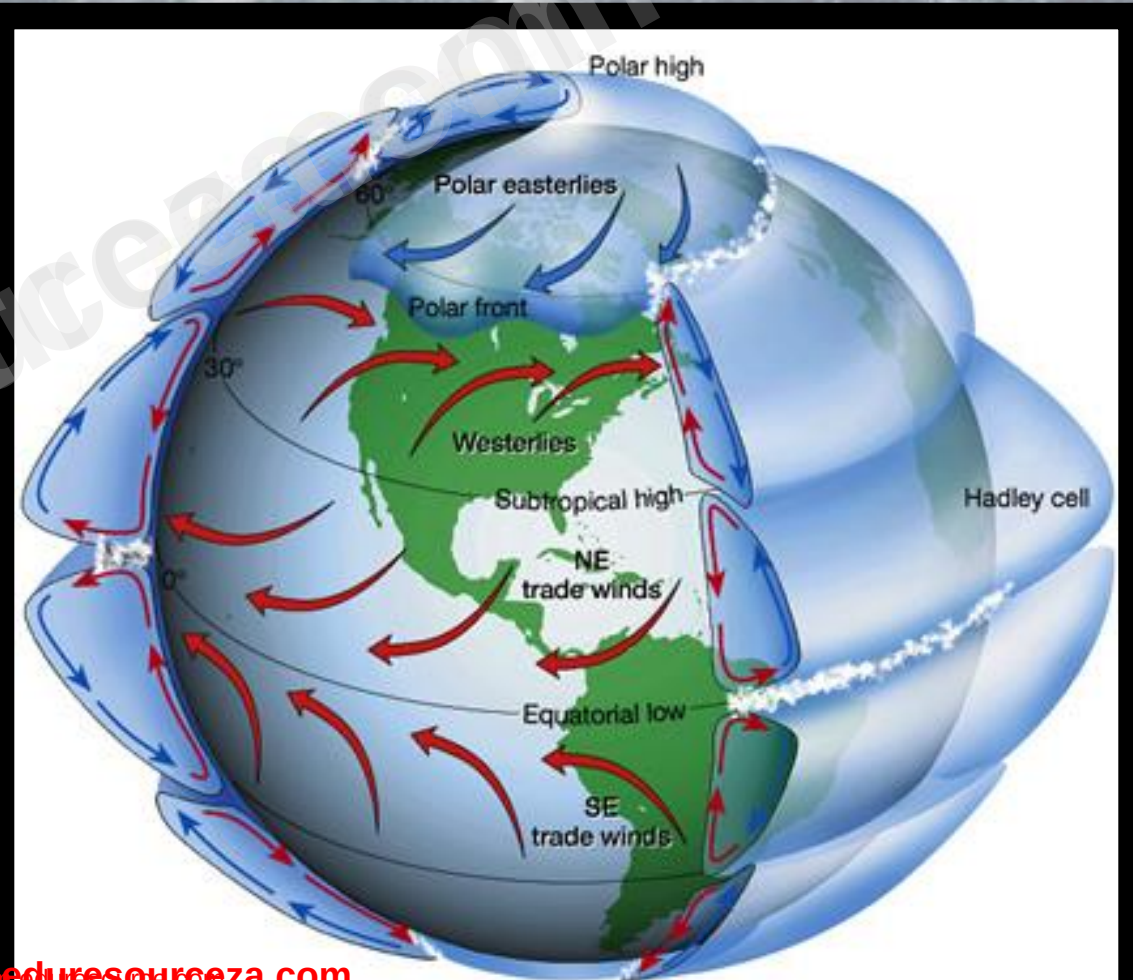


In a **high** pressure system dense air is forced downwards and spreads out over the surface of the earth

In a **low** pressure system air is dragged in and forced upwards where it cools and forms clouds

Wind Currents

- Wind currents distribute the sun's heat from one part of the world to another
- Warm air currents make areas warmer than normal
- Cold air currents make areas cooler than normal

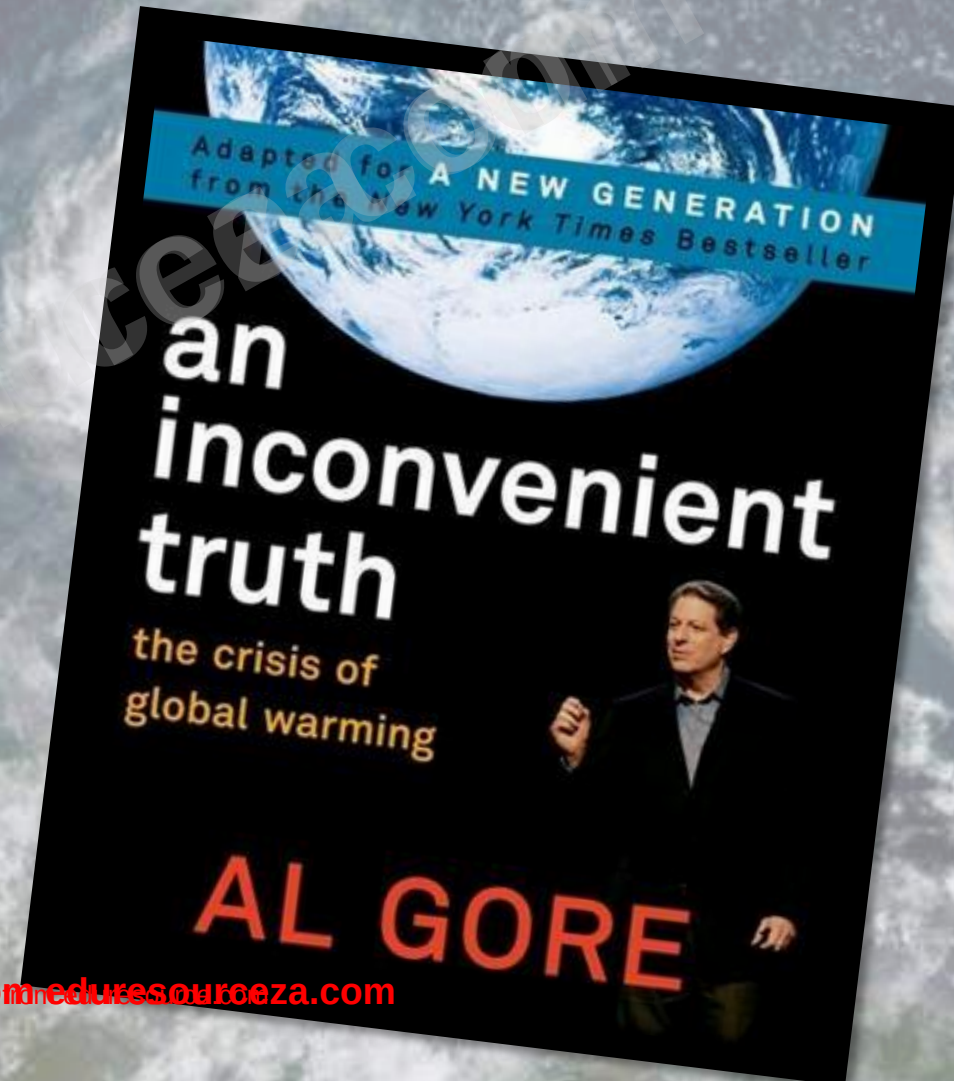


Ocean Currents

- Ocean currents affect the temperature and rainfall of an area
- Warm ocean currents make the surrounding areas warmer and rainy
- Cool ocean currents make the surrounding areas cooler and drier



Climate Change: Global Warming



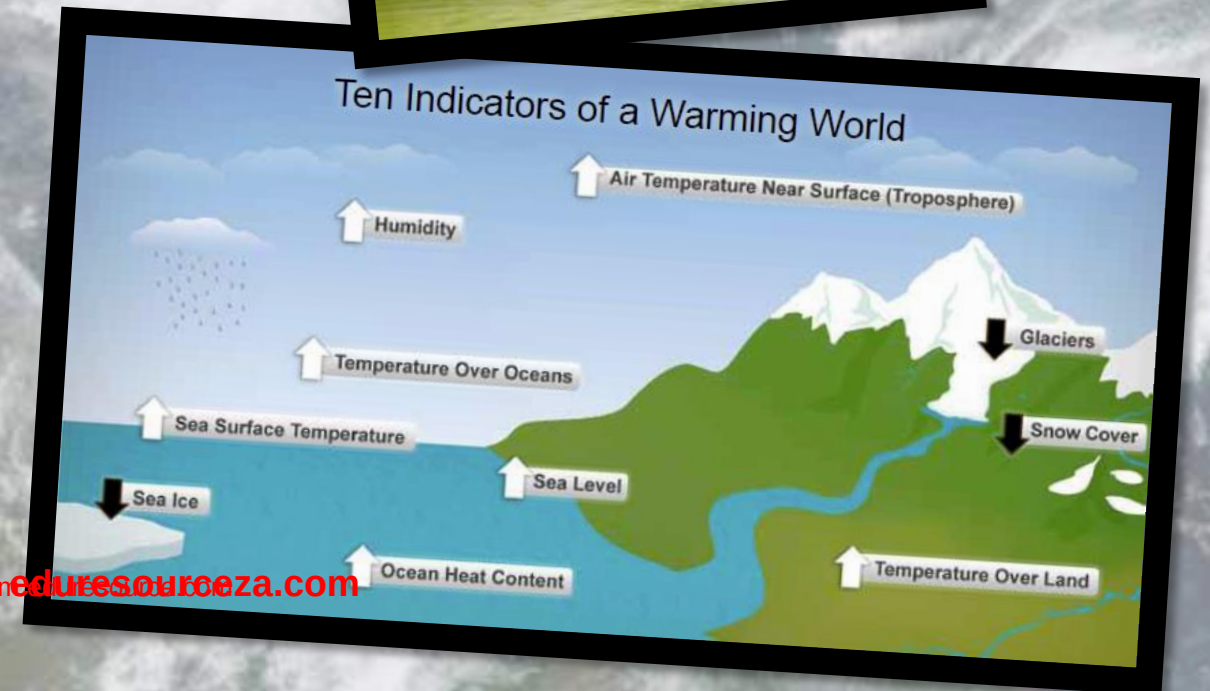
Definitions

- **Climate Change** is any change in the weather over a long period of time
- **Global Warming** is the increase in global temperature over the last century

<https://www.youtube.com/watch?v=Jxi-OlkmxZ4> (10 min)

Evidence of Global Warming

- Rising sea level
- Rising global temperatures
- Ice caps are melting
- More severe storms and flooding

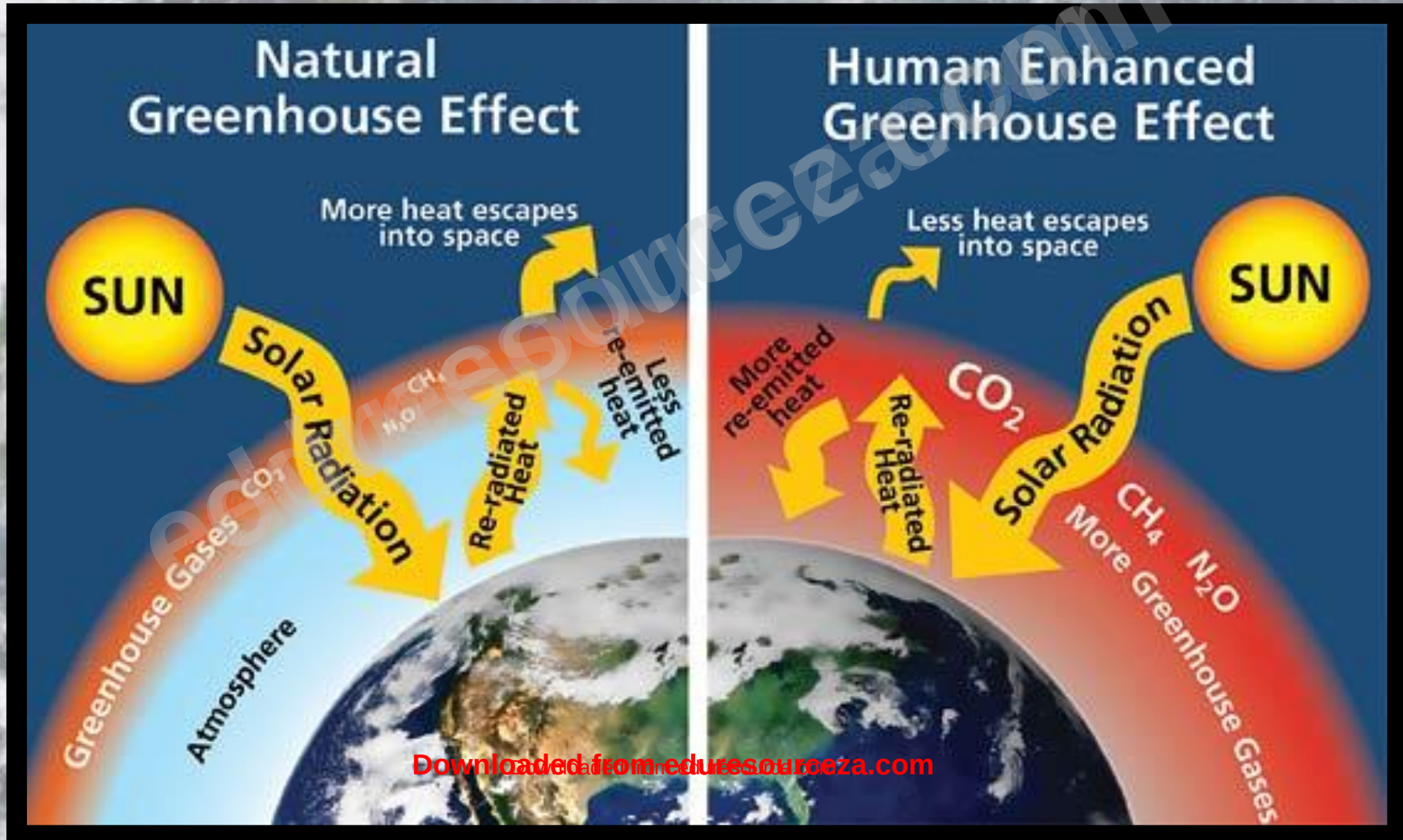


Debate!

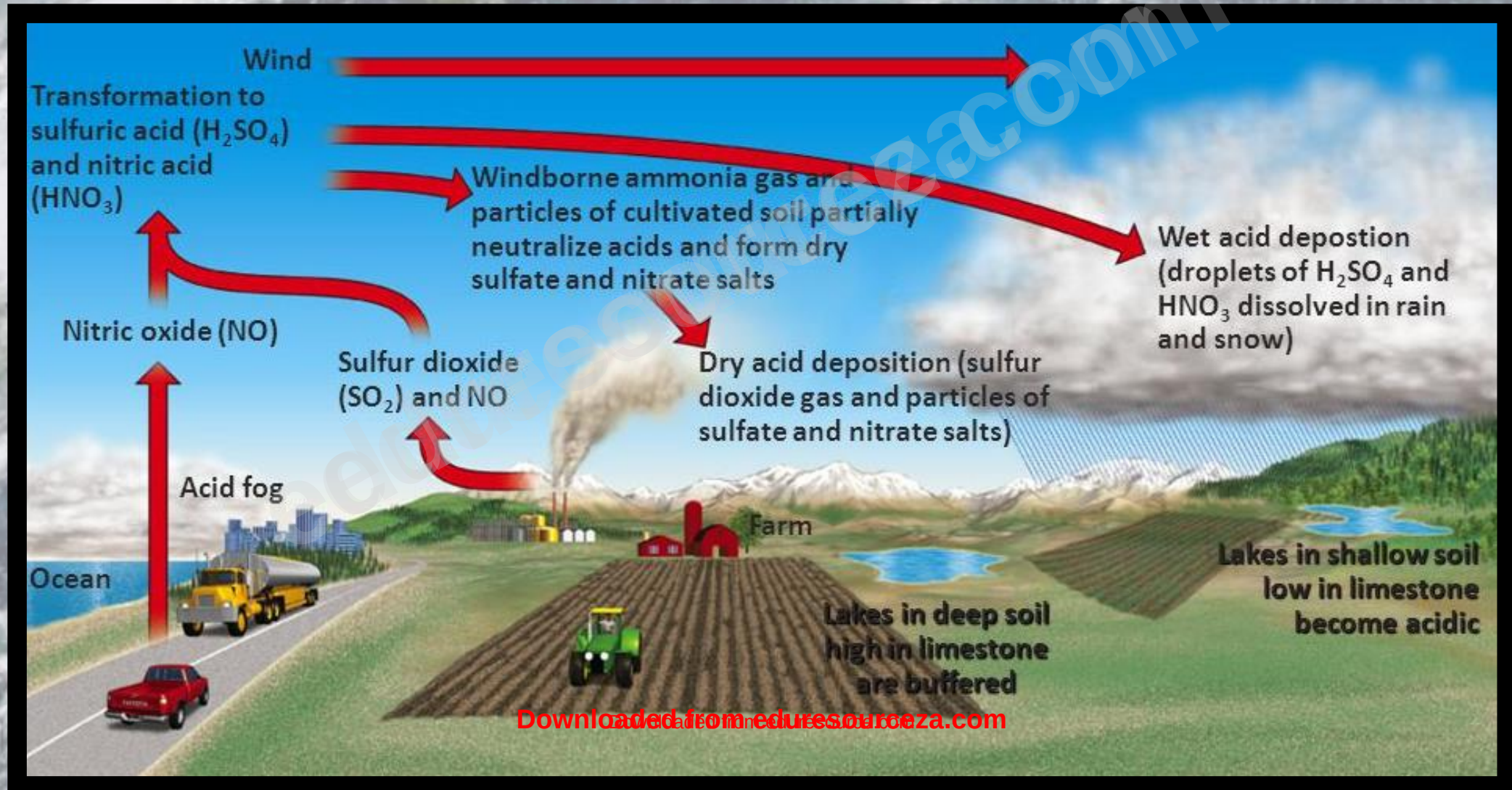
Motion: Global warming is not real



The Green House Effect

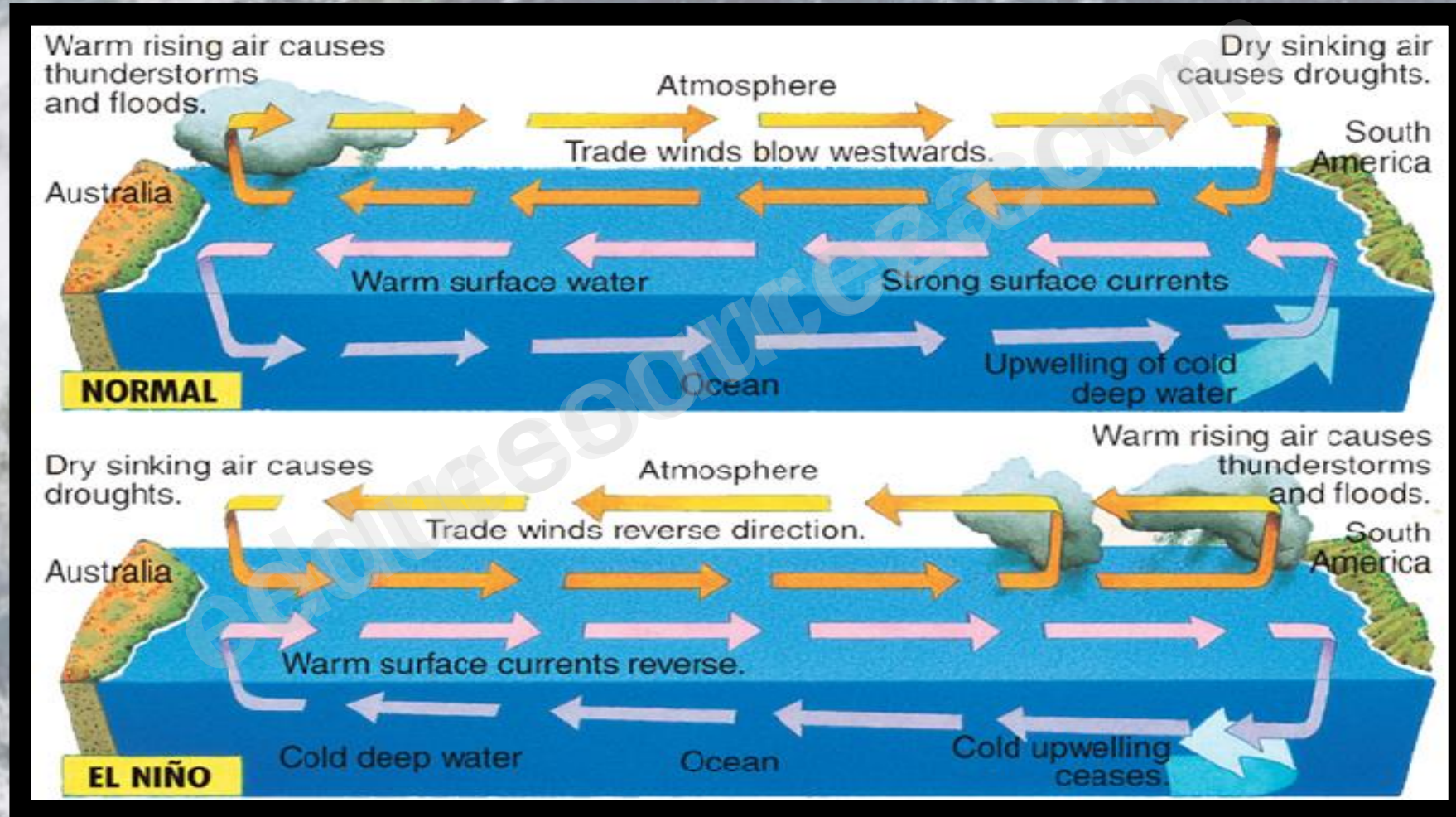


Acid Deposition



El Niño

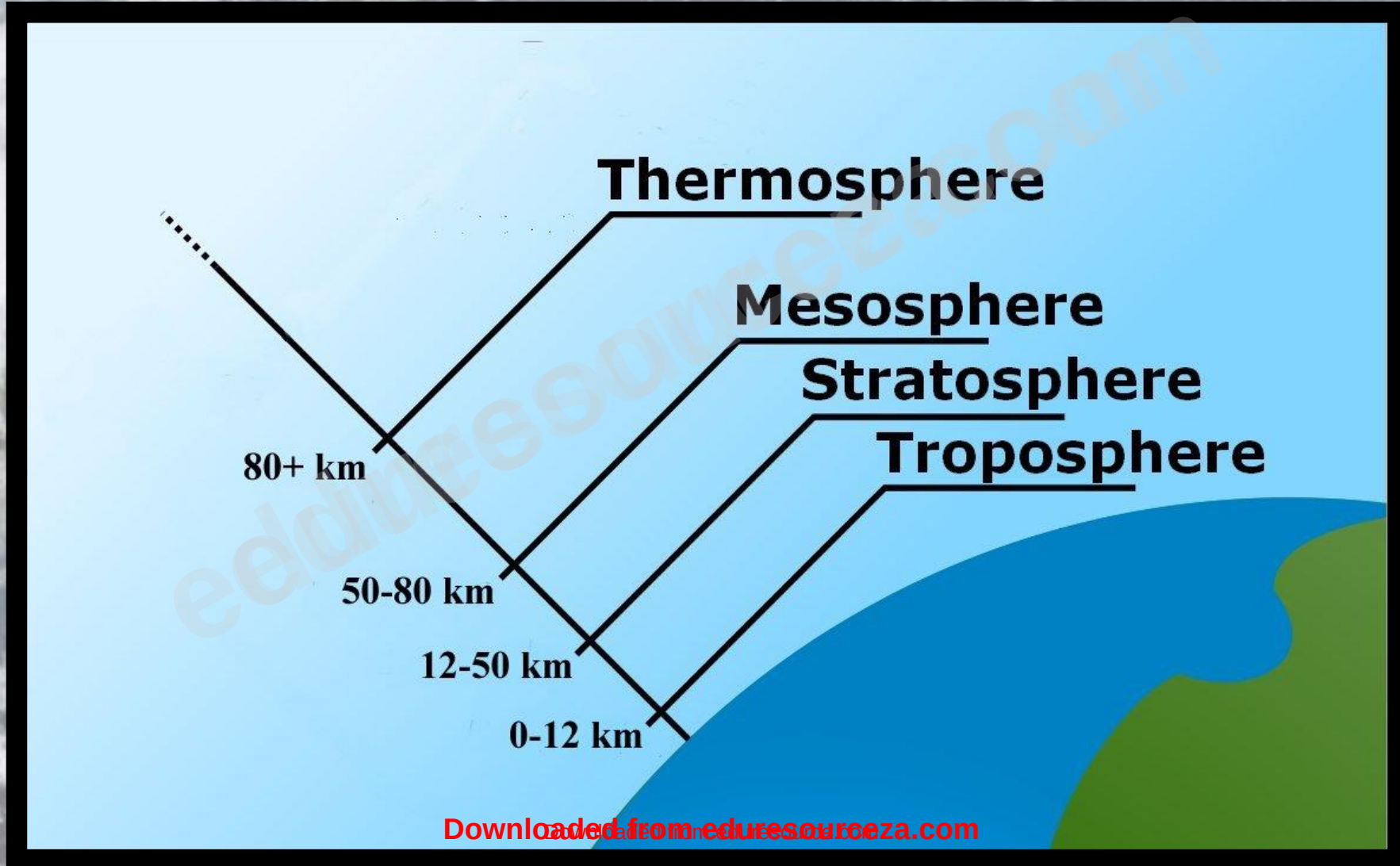
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<https://www.youtube.com/watch?v=Rjj8qPs6nLc>

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Ozone



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Starter!



Write it down!
**Explain how
distance from the
sea can affect the
type of weather you
experience ?**

Learning Objectives

All - Can recall what Global warming is.

Most – can describe the role of carbon dioxide and methane in the greenhouse effect and global warming.

Some - To explain how human activity may give rise to changes in global carbon dioxide and methane concentrations.

Extension: What is the most popular car in the UAE? Do you think the carbon dioxide emissions in the UAE are large? Explain your answer



The Fight against Global Warming



Global Warming #Facts

- Although local temperatures fluctuate naturally, over the past 50 years the average global temperature has increased at the fastest rate in recorded history.
- Experts think the trend is accelerating: the 10 hottest years on record have all occurred since 1990.
- Scientists say that unless we curb global warming emissions; average temperatures could be 3 to 9 degrees higher by the end of the century.

How does global warming work?

1. About half of the solar radiation reaching the Earth is absorbed and heats the Earth's surface.
2. The Earth emits infra-red radiation and some of this is 'blocked' due to clouds and gases in the atmosphere- this also heats the Earth's surface.



The Greenhouse Effect

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1) Heat and light energy reach us from the sun...

3) ...some of the heat escapes back into space...

4) ...while some of it is reflected back to the Earth – this is called The Greenhouse Effect

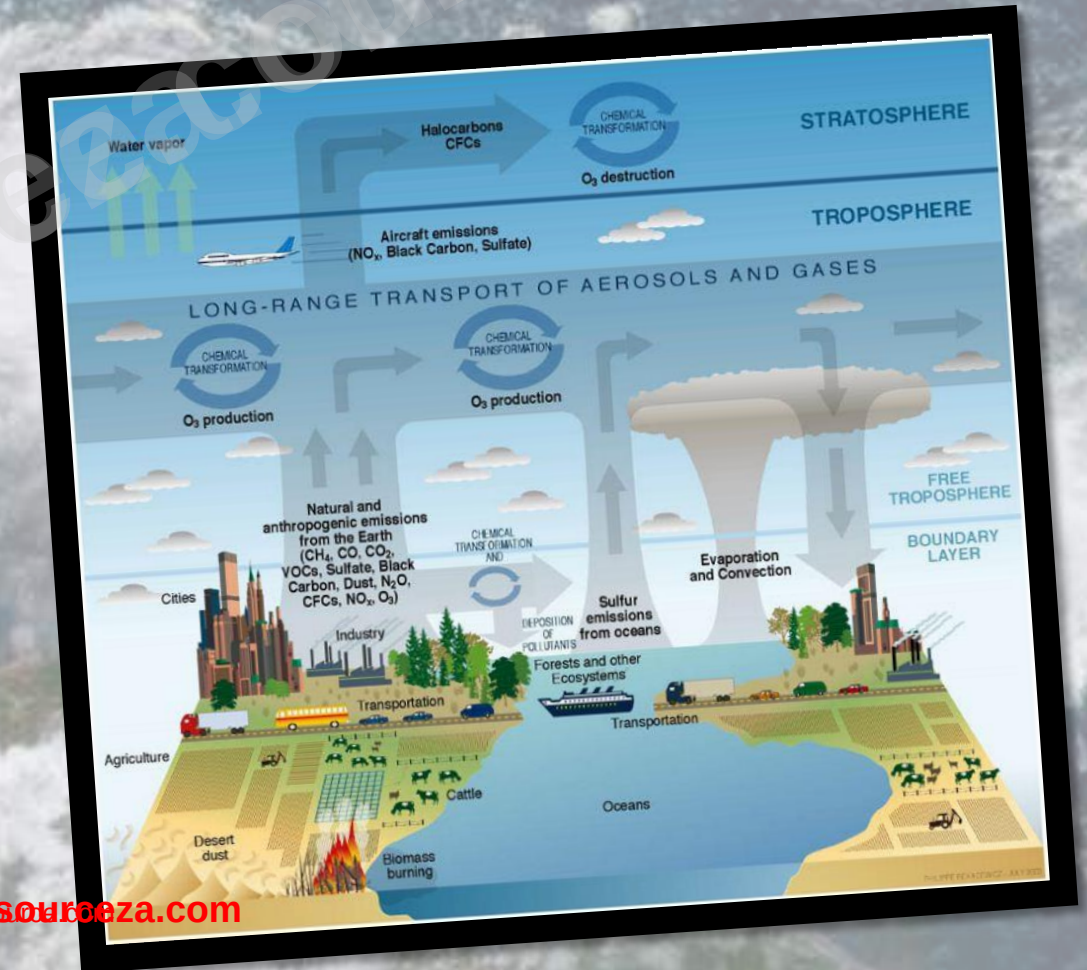
2) ...a lot of this heat is reflected off the Earth's surface...

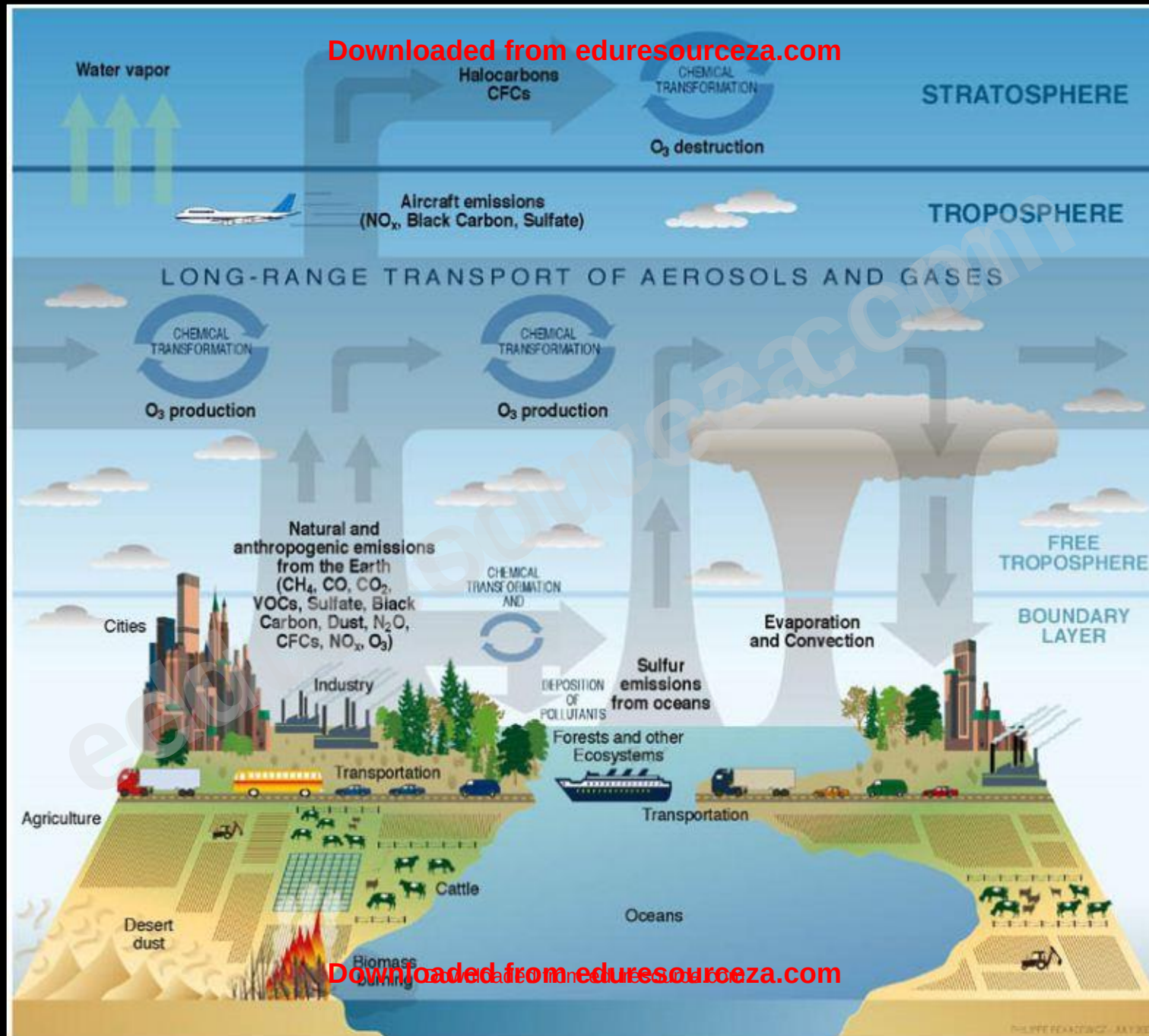
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What part does CO₂ and methane have in Global warming?

Carbon dioxide, methane and other air pollutants are collecting in the atmosphere like a thickening blanket, trapping the sun's heat and causing the planet to warm up.





Burning fossil fuels

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- Releases the carbon dioxide stored millions of years ago. We use fossil fuels to run vehicles (petrol, diesel and kerosene), heat homes, businesses and power factories.
- Coal-burning power plants are the largest U.S. source of carbon dioxide pollution - they produce 2.5 billion tons every year.
- Automobiles, the second largest source, create nearly 1.5 billion tons of CO₂ annually.



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Deforestation

Releases the carbon stored in trees and also results in less carbon dioxide being removed from the atmosphere.



Draw out the following chart and answer the questions without using your notes...



Summary of global warming impacts

Increase in global mean temperature relative to the late 20th century

0 1 2 3 4 5 6 7 8 9 °F

Physical

The risks associated with some extreme weather events increase with temperature

- Other effects include sea level rise and ocean acidification. Warming could be irreversible for several millennia.

Ecological

The larger the increase in temperature, the more species will be at risk of extinction

20-30% of species at risk of extinction

further extinctions

Social

- Mix of positive and negative impacts. Low-latitude and less-developed areas are especially vulnerable.

The negative impacts of climate change tend to increase with temperature. Larger temperature increases will be more difficult to adapt to.

Large-scale impacts

The risk of large-scale and/or abrupt impacts increases with temperature

Partial deglaciation of Greenland and West Antarctic ice sheets adds 4-6 m (13-20 ft) or more to sea level rise

0 1 2 3 4 5 °C

The Fight for Change Timeline

- 1979 World Climate Conference
- 1985 Vienna Convention for the protection of the Ozone Layer
- 1987 Montreal Protocol
- 1988 Intergovernmental Panel on Climate Change
- 1992 Earth Summit, Rio de Janeiro, Brazil
 - United Nations Intergovernmental Panel on Climate Change (UNIPCC)
- 1997 Kyoto Protocol (Treaty)
 - 2001 USA would not sign the treaty
 - 2005 treaty was ratified when Russia signed



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Starter!



Write it down!
**Explain the term
Deforestation?**

Learning Objectives

All – can identify the cross section of a hurricane/tropical storm

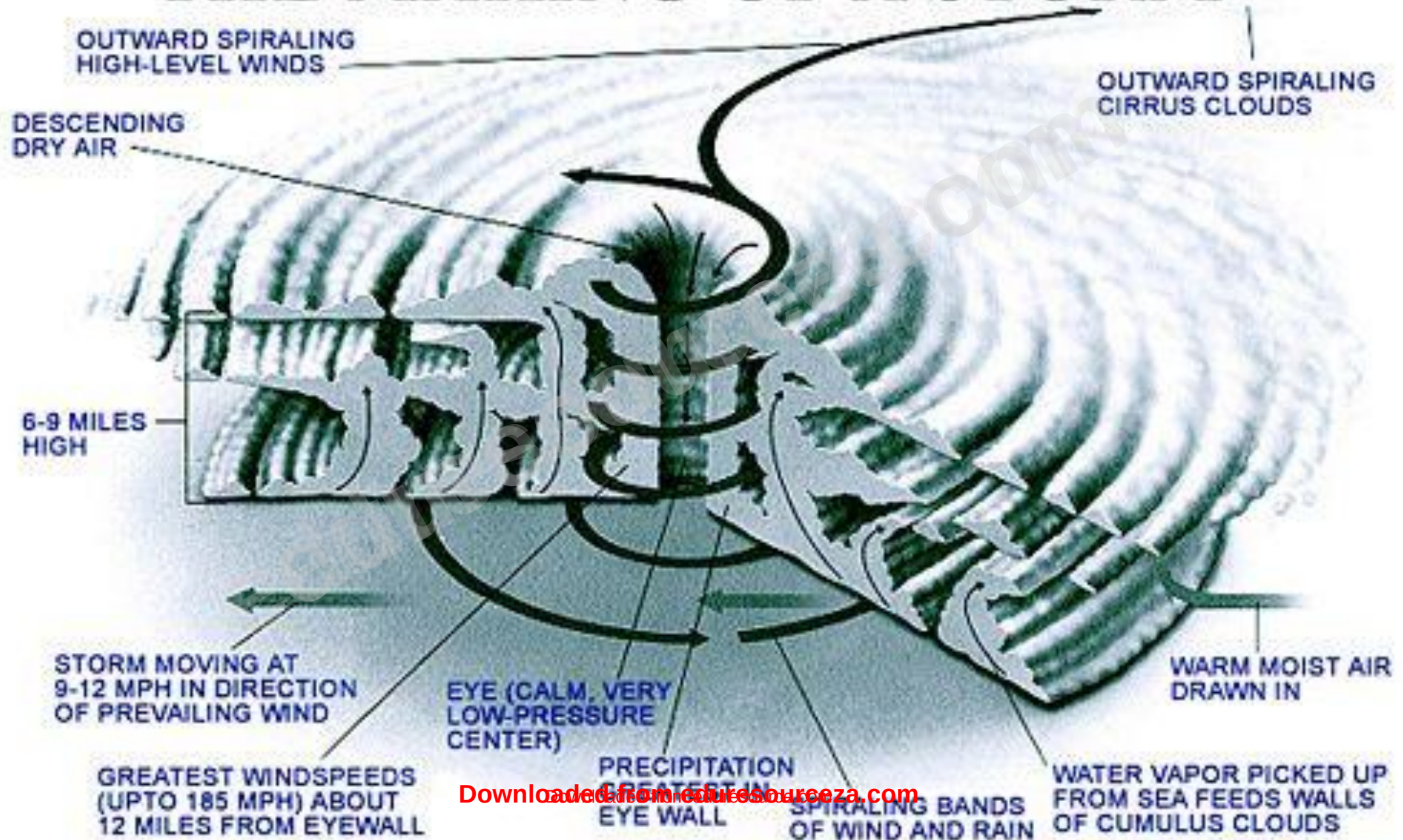
Most – can describe the weather conditions needed for a tropical storm to form

Some – can apply their understanding of tropical storms to recognise the short term and long term effects of hurricanes

Extension: Hurricane Harvey was the latest storm to hit the USA describe the impacts of this storm



THE MAKING OF A STORM



Tropical Cyclones

- **Edge of the storm:** high temperature and high pressure, less cloud, less wind and rain, wind is not as strong
- **Vortex:** thick cloud cover, extremely strong winds, thunderstorms, extremely heavy rainfall.
- **Eye of the storm:** very low air pressure, clear sky, calm warm weather conditions

Conditions required for tropical storms to occur...

- Warm water above 27 degrees C
- The warm water then heats the air above it (so it rises quickly)
- As it rises it turns and spins inwards, creating an area of very low pressure in the eye



What You Know so Far about Factors Affecting Weather and Climate...

Latitude

Distance from the Sea

Altitude

Prevailing winds

Air masses

Air Pressure

Climate Change

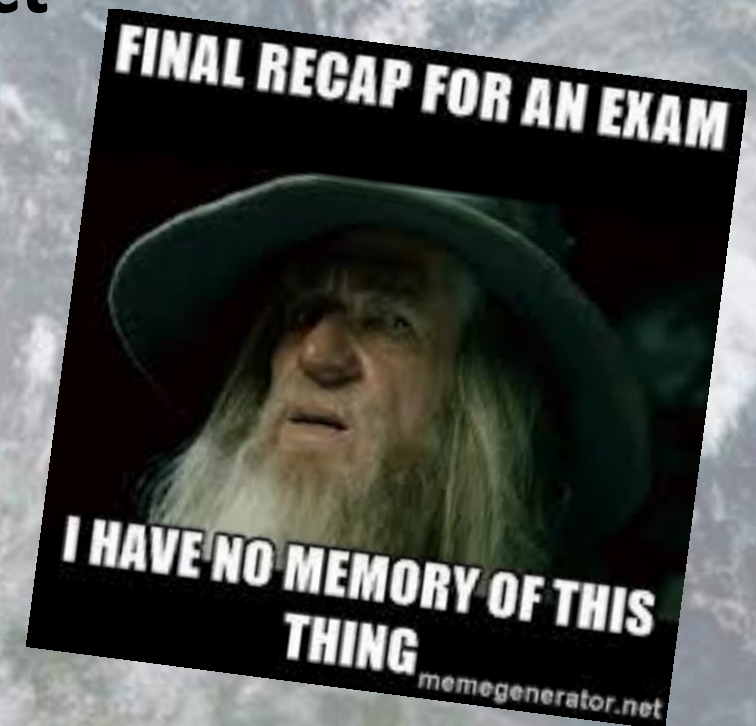
Global Warming

Greenhouse gasses and the
Greenhouse effect

Acid Deposition

El Nino

Ozone



Effects of a Tropical Storm

- Average length can be up to ten days
- 3 types of damage
 - Wind
 - Storm surges
 - Floods

Long term effects can largely depend on whether the storm has hit an MEDC or LEDC

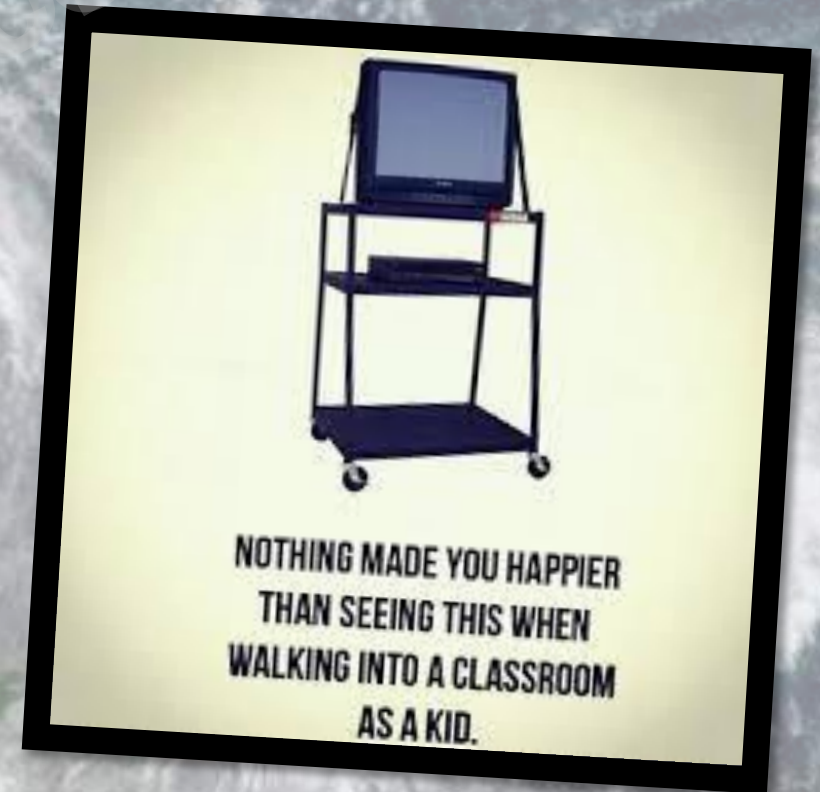
Why do you think this is?

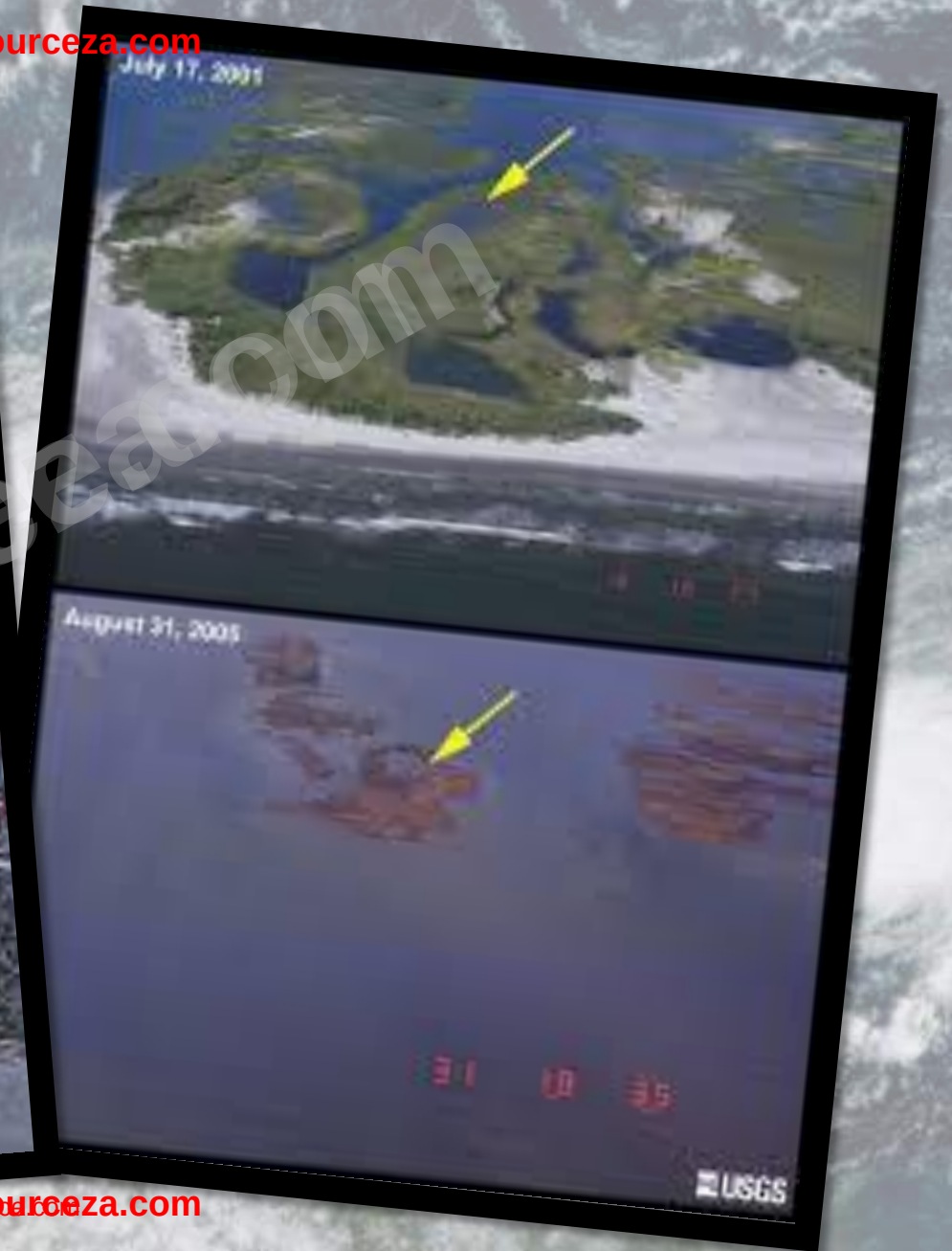
Hurricane Katrina, August 2005

- <https://www.youtube.com/watch?v=HbJaMWw4-2Q> (5min Video)
- Category 5 Hurricane winds reaching 280KMph, one of the worst the USA has ever faced

Answer the following questions while watching the clip

1. what day did the storm reach a category 5 ?
2. where was the main shelter set up for people who couldn't leave?
3. What type of social problems occurred?





Hurricane Katrina – Social Impacts

- Across Louisiana and Mississippi, 1836 people were killed
- 1million people were left homeless
- There was a lack of clean water, food and toilet facilities in New Orleans
- Looting and public disorder became a serious problem



Hurricane Katrina – Economic Impacts

- Nearly everyone in New Orleans became unemployed
- The total economic impact for Louisiana and Mississippi was estimated to be over \$150 billion
- Oil and natural gas production in the Gulf of Mexico was reduced, as well as imports of oil and natural gas



Hurricane Katrina – Other Impacts

- Communication networks failed – many telephones and mobiles didn't work; internet access and local TV stations were disrupted
- Around 1.7 million people lost electricity
- Most major roads, into and out of, New Orleans were damaged
- The Levees and floodwalls protecting New Orleans were breached- 80% of the city ended up under water
- Buildings suffered extensive damage



Some of the Facts...

- Relatively little damage was done by the wind, because many of the buildings were built to withstand hurricanes **(flooding)**
- Most of the roof of the Superdome sports stadium was ripped off (where 30,000 people had gone for shelter)
- Over the whole affected area, 60,000 people had to be rescued



Why did Katrina do so much damage in a rich country that has prepared for such events?

- **Human Reasons** – many people ignored an instruction to evacuate New Orleans, either because they were living below the poverty level (so they couldn't afford to evacuate) or because they wanted to protect their homes from looters
- **Physical Reasons** – new Orleans is located in the marshlands of the Mississippi Delta, the land is constantly sinking. It is built on soft, easily eroded sediment. Much of the city also lies below sea level and the water is kept out by artificial levees. Some areas are more than three meters below sea level

Why did Katrina do so much damage in a rich country that has prepared for such events?

- **Economic Reasons** – when protective structures are planned their design depends on the cost effectiveness. *(think back to coastal protection)* There is little reason to spend a lot of money providing protection against events that are considered unlikely to happen in a long time period... the levees and floodwalls built were only designed to prevent damage from hurricanes up to category 3
- A year after the disaster the population of new Orleans was only half the size of what it had been (about half a million)

How does the USA prepare from Hurricanes?

- Meteorologists at the NHC monitor satellite images to track storms with an aim to provide early warnings
- Predictions are not always successful as storms can suddenly change course; exactly where they will fall is not known until very near the time it actually happens
- If an evacuation is ordered and the storm does not hit where predicted there will be huge economic cost and disruption to peoples lives
- The NHC uses various means to educate people in advance of what dangers they may face, what to do if caught in a hurricane (disaster plans)
- The federal emergency management agency was set up to make sure that places are prepared for disasters of whatever kind, and to give help in an emergency and aid recovery after it

CBS News Archive of Hurricane Katrina

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<https://www.youtube.com/watch?v=RD0-dvQfARk>

This Clip shows the aftermath of the storm



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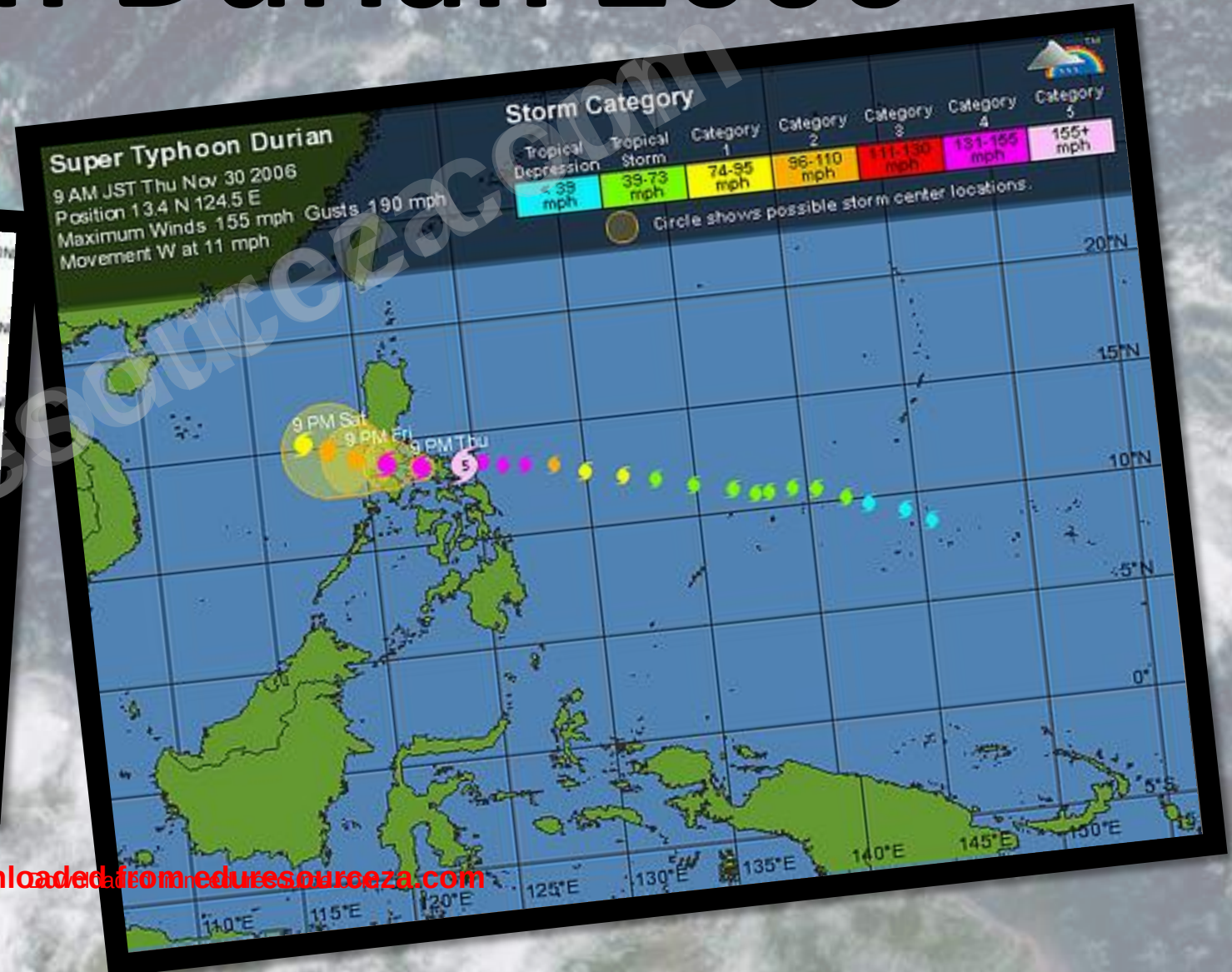
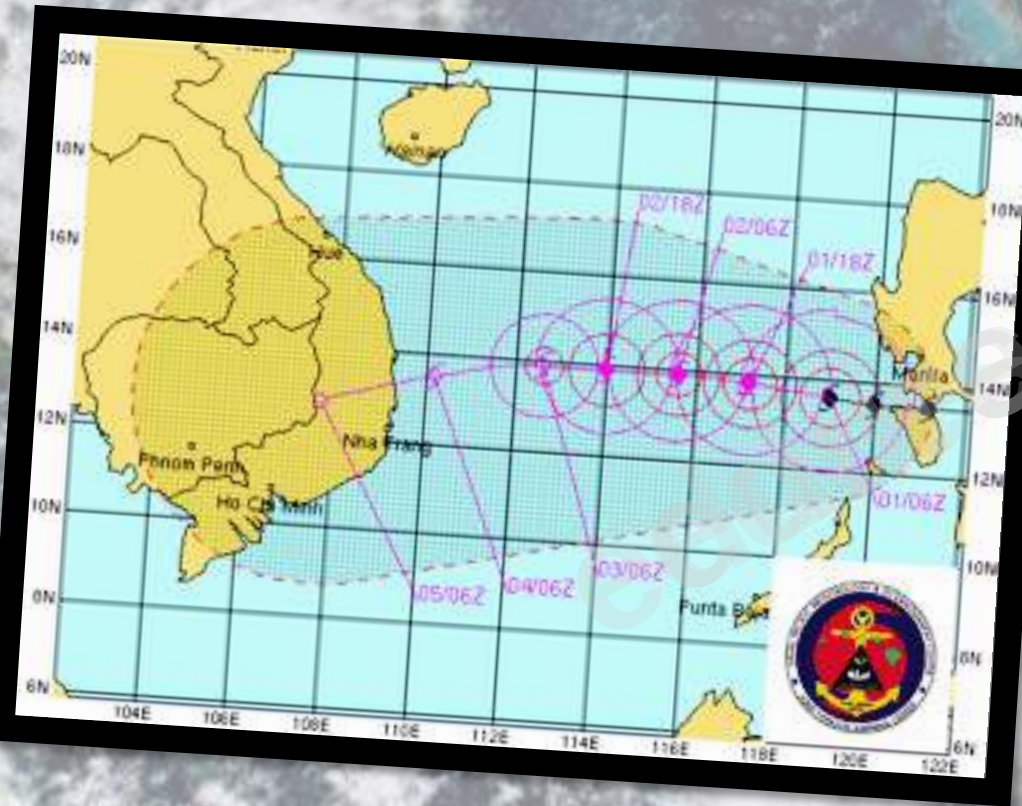
Quick Quiz!

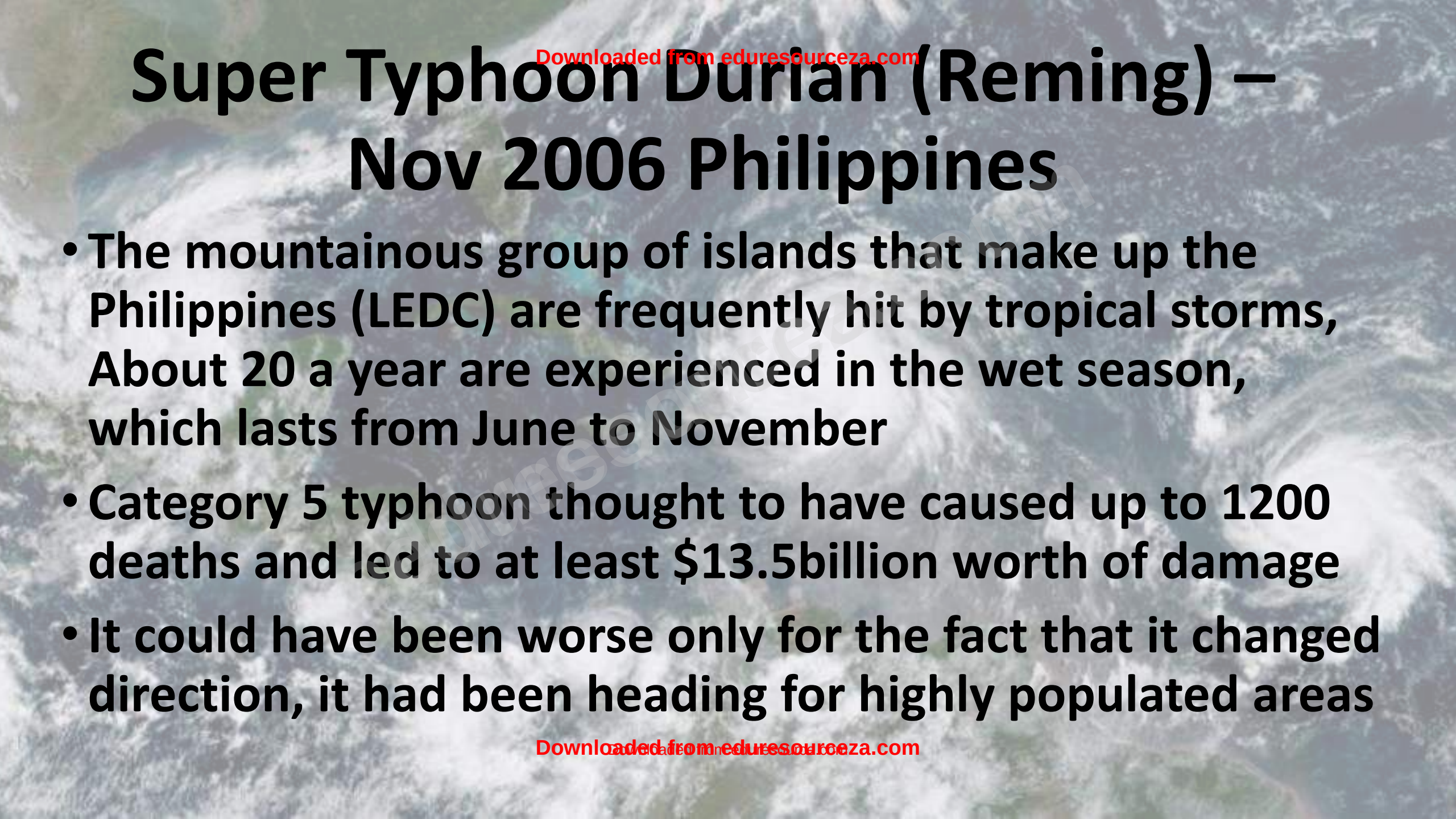


- When did hurricane Katrina occur?
- How many people died in Hurricane Katrina?
- What was the estimated damage of Hurricane Katrina?
- What were the economic impacts of Hurricane Katrina?
- How does the USA prepare for tropical storms?



Typhoon Durian 2006





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Super Typhoon Dorian (Reming) – Nov 2006 Philippines

- **The mountainous group of islands that make up the Philippines (LEDC) are frequently hit by tropical storms, About 20 a year are experienced in the wet season, which lasts from June to November**
- **Category 5 typhoon thought to have caused up to 1200 deaths and led to at least \$13.5billion worth of damage**
- **It could have been worse only for the fact that it changed direction, it had been heading for highly populated areas**

Video Clip (4min)

- <https://www.youtube.com/watch?v=jh6KgNnH3N8>



The Damage!

- Durian reached wind speeds of 320KMph (the strongest in the history of the country) This wind destroyed the anemometer at Virac that recorded it. The winds were described as unimaginable strength
- The typhoon caused a lot of damage to towns on the east coast, it uprooted the forests on the Catanduanes, destroyed 80% of the buildings and left large ships beached on the shore
- It blew away houses, took roofs off large buildings and made concrete and steel structures crumble

The Damage...

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- The torrential rains saturated volcanic deposits on Mt. Mayon which caused mudflows that raced down steep slopes onto settlements (people had no warning; no time to escape)
- All power and communication lines were destroyed; this severely delayed all emergency and medical services
- Schools(2,300), hospitals, government buildings, banks and other important buildings were destroyed
- 3.2million people were affected, 90,000 people were living in 488 evacuation shelters, 214,000 houses were destroyed and 330,000 were partially destroyed

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The Needs!

- Tents for emergency shelter
- Medicines Vaccines
- Power for Hospitals
- Food
- Sleeping mats
- blankets
- Mosquito nets
- Slippers and clothing
- Candles
- Hygiene kits
- water



The clean up effort !

- The Philippines govt. gave millions of dollars for relief and rebuilding
- Other govt. and many national and international organisations sent aid
- Blame on the flooding has been put down to inadequate drainage systems, but the most damaging factor is deforestation
- The Philippines used to have a cover of tropical rainforest all but 3% of this has now been cleared to provide valuable export income *(think about the mudslides)*

The Clean up effort continued

- In 2011 after more disastrous flooding, landslides and deaths, the local govt. banned the new cutting of natural forests
- Several previous govts. tries to ban logging but corrupt officials turned a blind eye
- They need to work on restoration and recovery after each tropical storm so there is no money left to put preventative measures in place

Quick Quiz

1. When did Typhoon Durian occur?
2. Where did the typhoon hit?
3. How many people died ?
4. What was the cost of the damage
5. Why were there such sever mudflows?



Starter!

Write it down!

What is the difference between a hurricane and a typhoon?



Ecosystems

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Learning Objectives

All - can locate the rainforest ecosystem on a map

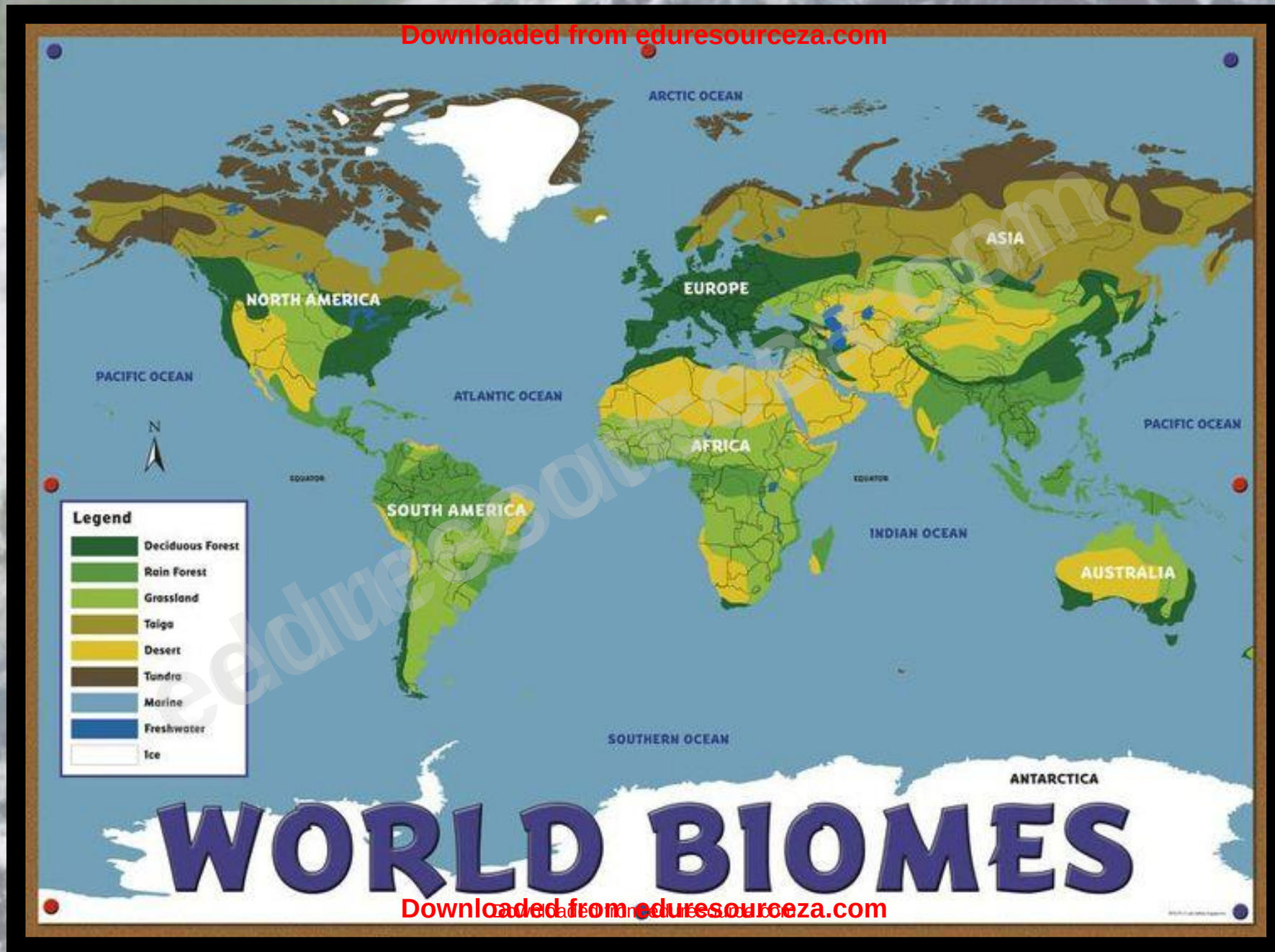
Most – can explain the weather conditions in the Rainforest

Some – can list and explain reasons why people are cutting down the rainforest

Extension: Describe in detail the UAEs Ecosystem

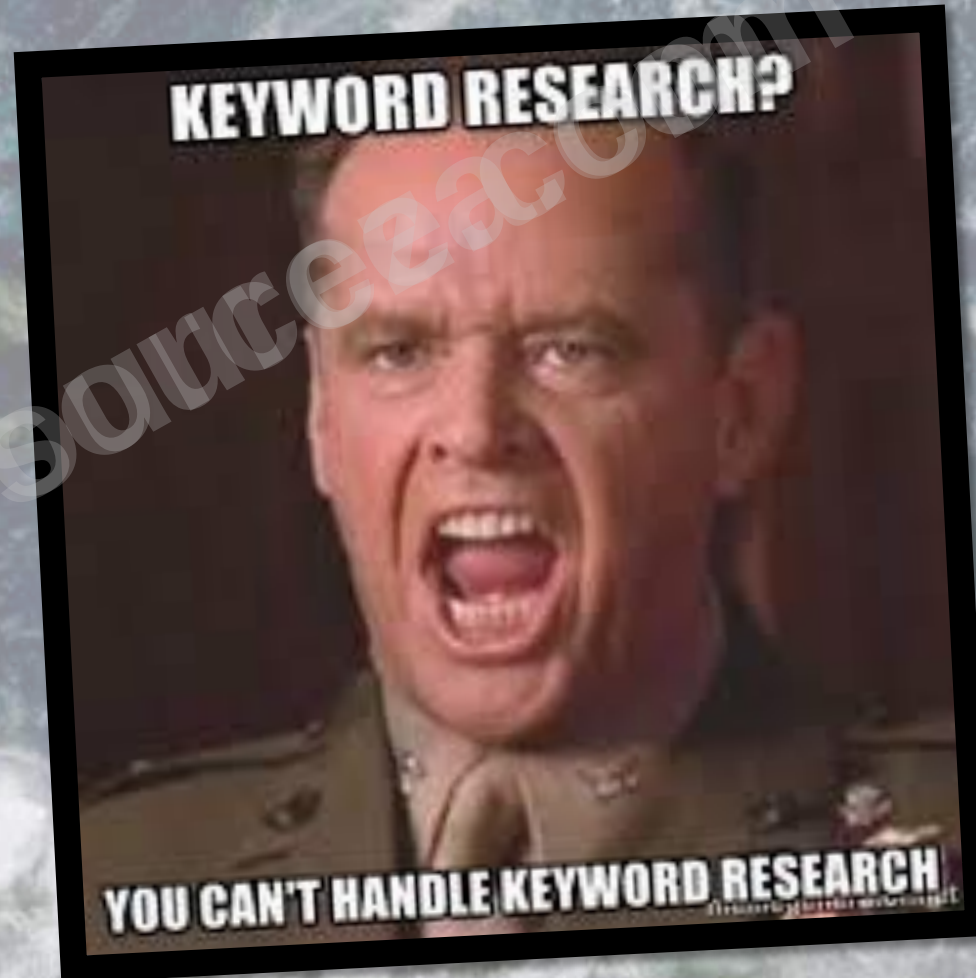
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Key Words

- Ecology
- Vegetation
- Ecosystem
- Biome
- Decomposer
- Nutrient



Match the Definitions

- **Ecology**
- **Ecosystem**
- **Biome**
- a collection of related ecosystems
- the study of relationships between living things and their environment
- a system of living things that interact with each other and with the physical world

Climate Regions & Ecosystems

- All climate regions have their own ecosystems
- Ecosystem is made up of:
 - Living things such as plants and animals
 - The environment (air, land , soil, vegetation, climate, water etc.)

Layers of the Rainforest



EMERGENT LAYER

The tallest trees are the emergent layer. There is a lot of sunlight there. Animals found there are eagles, monkeys, bats and butterflies.



CANOPY LAYER

This layer is full of leaves and branches. Many animals live in this area since there is a lot of food. Animals that live there are snakes, toucans and treefrogs.



UNDERSTORY LAYER

Very little sunshine reaches this area so the plants have to grow larger leaves get sunlight. Many animals live here including jaguars, red-eyed tree frogs and leopards. A lot of bugs live here.



FOREST FLOOR

It's very dark down here. Almost no plants grow in this area. Giant anteaters live in this layer.

Emergents

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- 40 – 80m high
- Are the tops of the tallest trees in the rainforest
- These are much higher, and give the trees an advantage (in terms of light)

Canopy

- 20 to 40 metres high
- This leafy environment is full of life such as insects, arachnids, birds and some mammals
- Is where the upper parts of most of the trees are found

Under canopy

- 10 – 20m high
- is the second level up
- There is limited sunlight
- Saplings wait here for larger plants and trees to die, leaving a gap in the canopy into which they can grow
- Woody climbers called lianas avoid having to wait for gaps by rooting in the ground and climbing up trees to get to the sunlight

Shrub layer

- Under 10m high
- It is dark and gloomy with very little vegetation between the trees
- is at ground level in a tropical forest
- During heavier rainfalls this area can get flooded

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Adaptations

- The vegetation has adapted to get sunlight, and protect itself
 - The emergents reach sunlight by growing tall
 - Thick vines called lianas reach sunlight by looping around tree branches
 - Plants called epiphytes just perch on high branches. They feed on rain, and nutrients from rotting leaves
 - In the shrub layer plants grow large leaves with lots of chlorophyll to trap as much sunlight as possible
 - The tallest trees have strong buttress roots to stop themselves from falling over
 - Roots don't grow deep in to the soil they spread out near the surface (why?)
 - Leaves protect themselves in 3 ways?? Can you guess how?

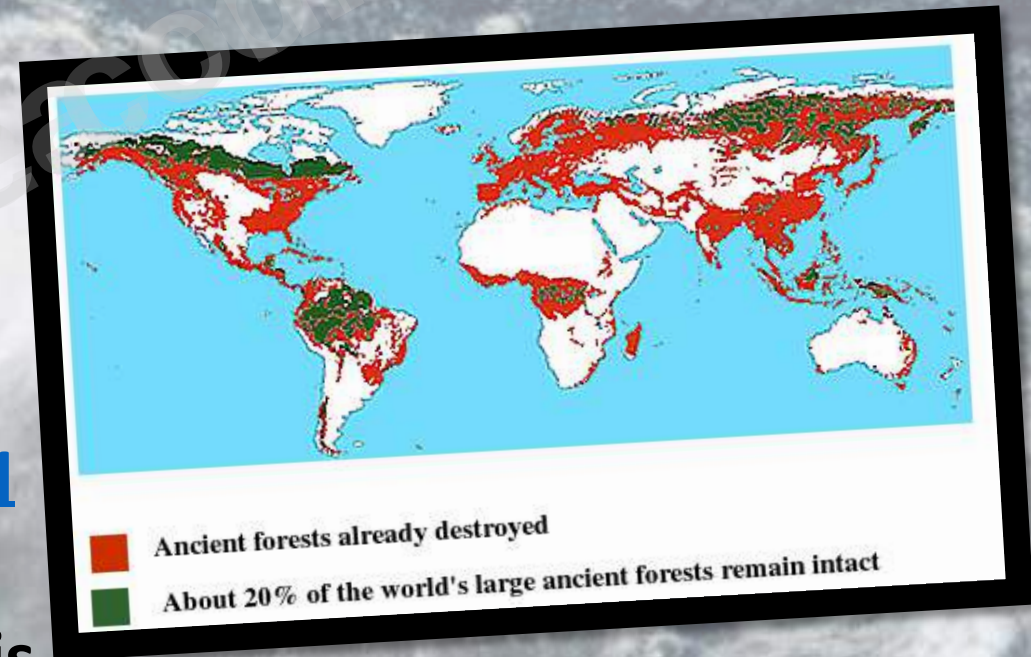
What is happening to the Rain Forest?

- Large areas are being burned to clear land for farming
- Some big companies set up cattle ranches or oil palm plantations
- Tree logging to make furniture

<https://www.youtube.com/watch?v=jBqMJzv4Cs8>

#FunFact more than 150 acres of rainforest is lost every minute of every day, and 78 million acres lost every year! *Source: rain-*

tree.com/facts.htm



Trees take carbon dioxide out of the atmosphere and this helps reduce the causes of Global Warming!

Soil becomes infertile once the trees are removed, so the land can no longer be used for farming.

Loss of food for local people who rely on the fruit and nuts to form their diet so without it they may go hungry.

Rainforest provide nice shade for the local people when it is really hot – without it they may get ill.

Muddled up...

Here are some effects of deforestation...

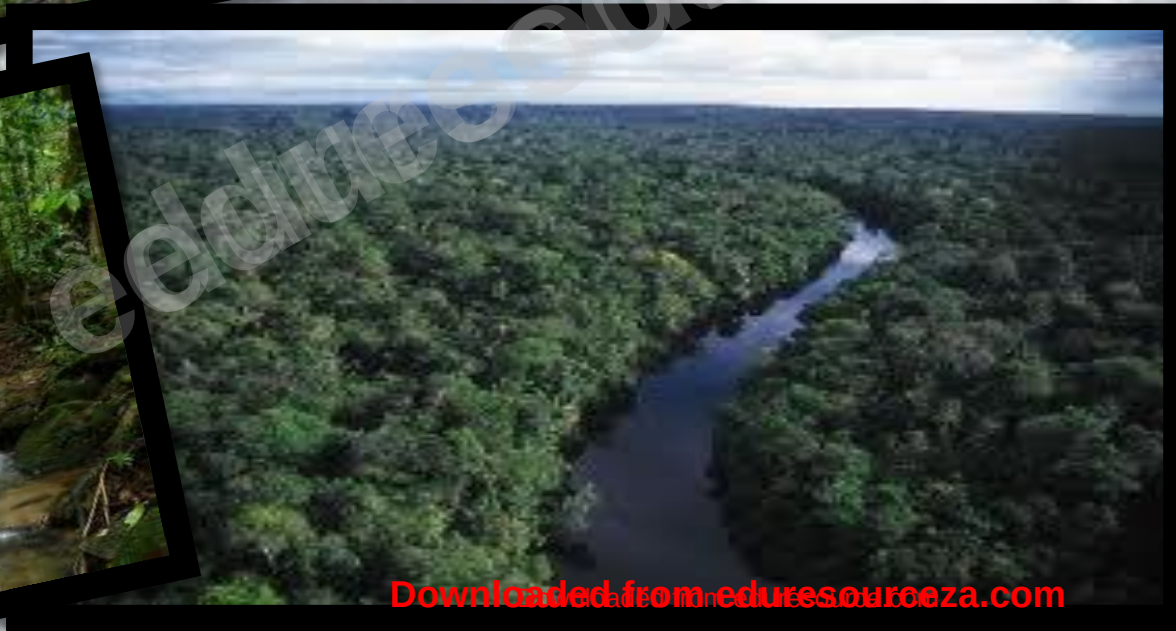
Which one do you think is the most serious? Why?

When you remove trees the nutrient cycle is broken so the rainforest survival system will break down.

Local people need wood for cooking and building. The women have to walk further to get it when the trees are removed.

Welcome to the Amazon Rainforest...

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Vegetation Specifics

- **Tree Leaves**
 - **Drip Tips & Holes**
allow leaves to
shed heavy
rainfall and
reduce weight of
water



Vegetation Specifics

- **Tall Trees**
 - The race for sunlight stimulates rapid growth to compete for space in the canopy
 - Trees can be 40m high
 - Trunks are straight and branchless



Buttress Roots

- Give stability to tall emergent trees
- They increase the size of the base of the tree



Parasitic Plants



- **Strangler Fig, Lianas & Vines**
 - **Grow up the trunk of tall emergents or canopy trees for support to quickly reach the sunlight**
 - **They steal nutrients and original tree can die**

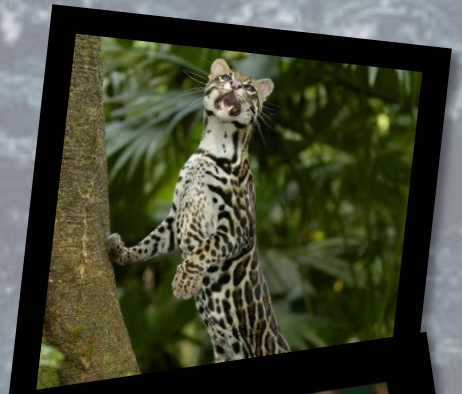
Animal Adaptations

- **Sloths**
 - Many live in trees permanently and rarely return to ground level
 - They navigate using vines and branches
 - Algae grows in fur on back



Animal Adaptations

- Size
 - Animals tend to be small and light to easily manoeuvre in trees e.g. The Ocelot
- Nimble
 - Many animals are very good at moving with their hands, feet and some use tails!
 - E.g. Proboscis Monkey, Orangutan



Insects & Birds

- Bright Colours
- Diverse species
- Adapted to food and environment



Soil

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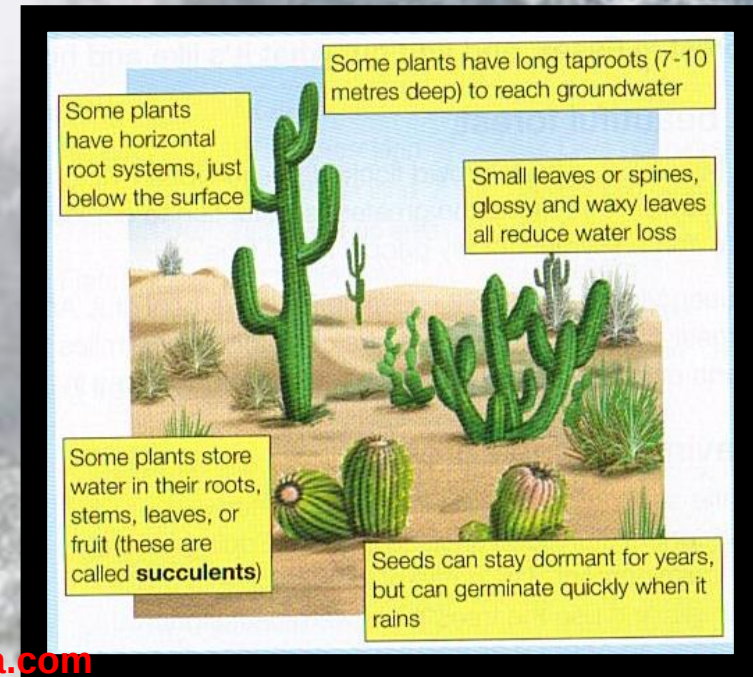
- Fragile Environment
- Relies on rapid decomposition of dead material
- When forest cleared this cycle is broken and soil rapidly loses fertility
- Humus not replaces, soil becomes infertile and is eroded



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Vegetation Adaptations

- Little light penetrates to forest floor
 - Dense undergrowth develops where sunlight can penetrate
- Evergreen appearance
 - Continuous growing season
- Drip Tips / drainage leaves
- Straight, branchless trunks
- Buttress Roots
 - Provide support for tall trees



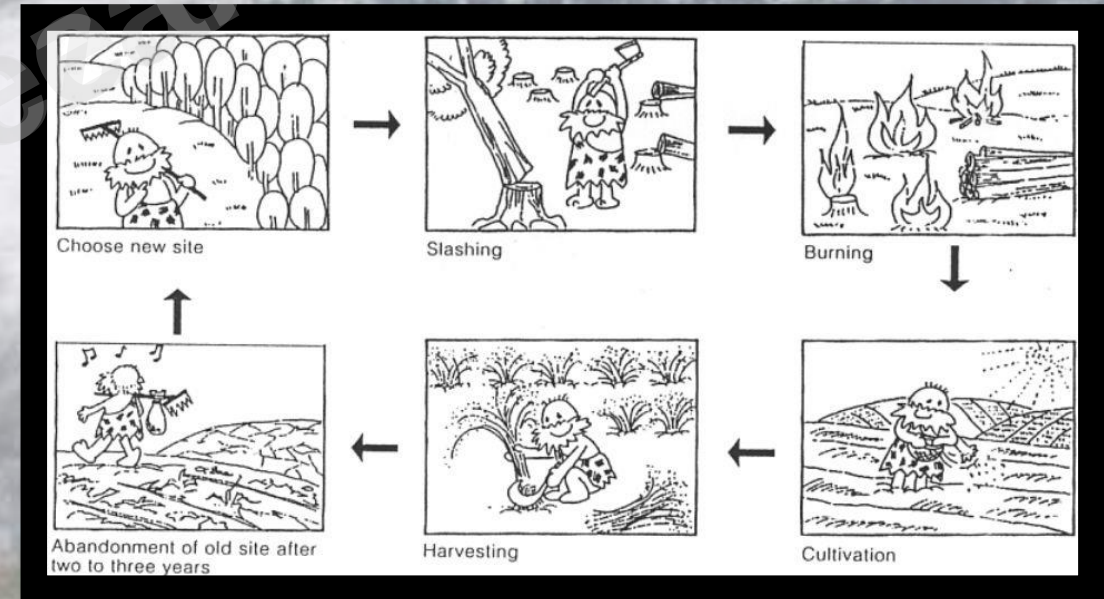
Deforestation

- Human impacts
- Loss of biodiversity
- Many hectares of land lost daily
- Causes
 - Mining
 - Minerals / precious metals and stones
 - Farming
 - Cattle ranches (McDonalds)
 - Small scale shifting cultivation
 - Logging



Shifting Cultivation

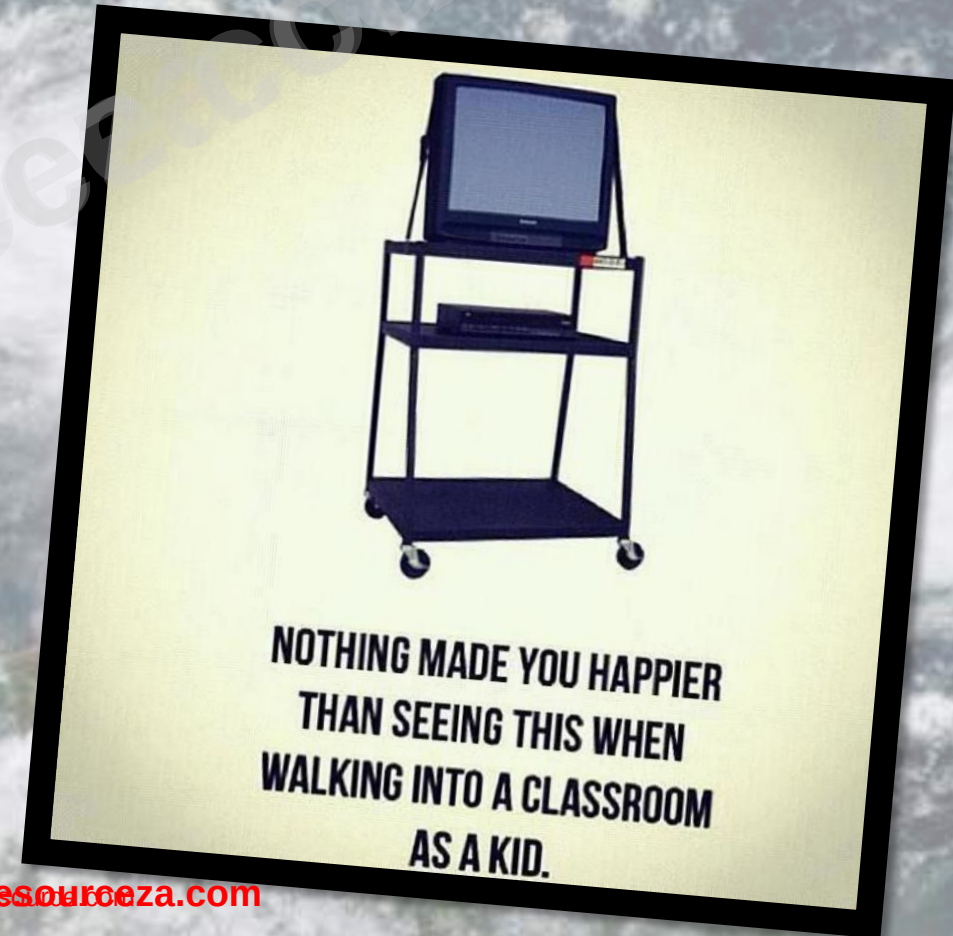
- Traditional Lifestyle
- Slash and Burn cultivation
 - Area of land cleared by hand
 - Debris burned
 - Ash ploughed into soil for fertiliser
 - Crops grown
 - Land loses fertility
 - Move site, begin again



Video Clip

- <https://www.youtube.com/watch?v=yXAM2D3GXYMY>
- <https://www.youtube.com/watch?v=oPNvit4hHIM>

***Please fill out the
video response
sheet!***



TASK - the impact of human activities on tropical rainforests

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Cause of deforestation	Economic impacts	Social and political impacts	Environmental impacts
Mining			
Road/Rail building			
Shifting agriculture			
Logging			
Plantation agriculture			
Transmigration			
HEP			

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Starter!



Write it down!
**Explain the term
Shift Cultivation?**

Hot Desert Biomes

Learning Objectives

ALL – can recognise the characteristics and distribution of hot deserts

Most – can explain the process of how hot deserts changing

Some – can discuss how human activities causing this change

Extension – The UAE has a Hot Desert Climate, give 3 reasons and explanations why it is such a prosperous country, even though it suffers from drought, and poor soils etc.







Quick Quiz!



1. Name the World's driest desert:
2. Name the World's oldest desert:
3. Name the World's largest hot desert:
4. Name the World's largest sand dune area:
5. Name the World's largest polar desert:
6. Name the World's lowest spot:
7. Name the World's highest temperature:



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Quick Quiz Answers!

- World's driest desert:

The Atacama

- World's oldest desert:

The Namib

- World's largest hot desert:

The Sahara

- World's largest sand dune area:

The Empty Quarter

- World's largest polar desert:

Antarctica

- World's lowest spot:

In the Negev Desert

- World's highest temperature:

In the eastern Sahara



The Characteristics of Hot Deserts

1. An area that receives an average annual precipitation of less than 0.25 m.
2. An area in which more water is lost to evaporation than falls as precipitation.
3. Large diurnal and seasonal temperature range.
4. Plants are almost all ground-hugging shrubs and short woody trees.



What is causing this change?

In pairs discuss and write down your ideas...

Physical Causes:

- Natural climate change
- Shifts in monsoon rains?
- Dust storms (in the short term)



Human Causes:

- Population growth / urbanisation
- Overgrazing
- Overcultivation
- Deforestation
- Monocultures
- Lack of a fallow period
- Anthropogenic global warming

Something to think about...

How is human activity affected by these changes to the desert?

- Forced migration
- Malnutrition and famine

What possible solutions exist?

- Agroforestry
- Irrigated agriculture
- Mixed species grazing
- Agri-tourism





The SAHEL

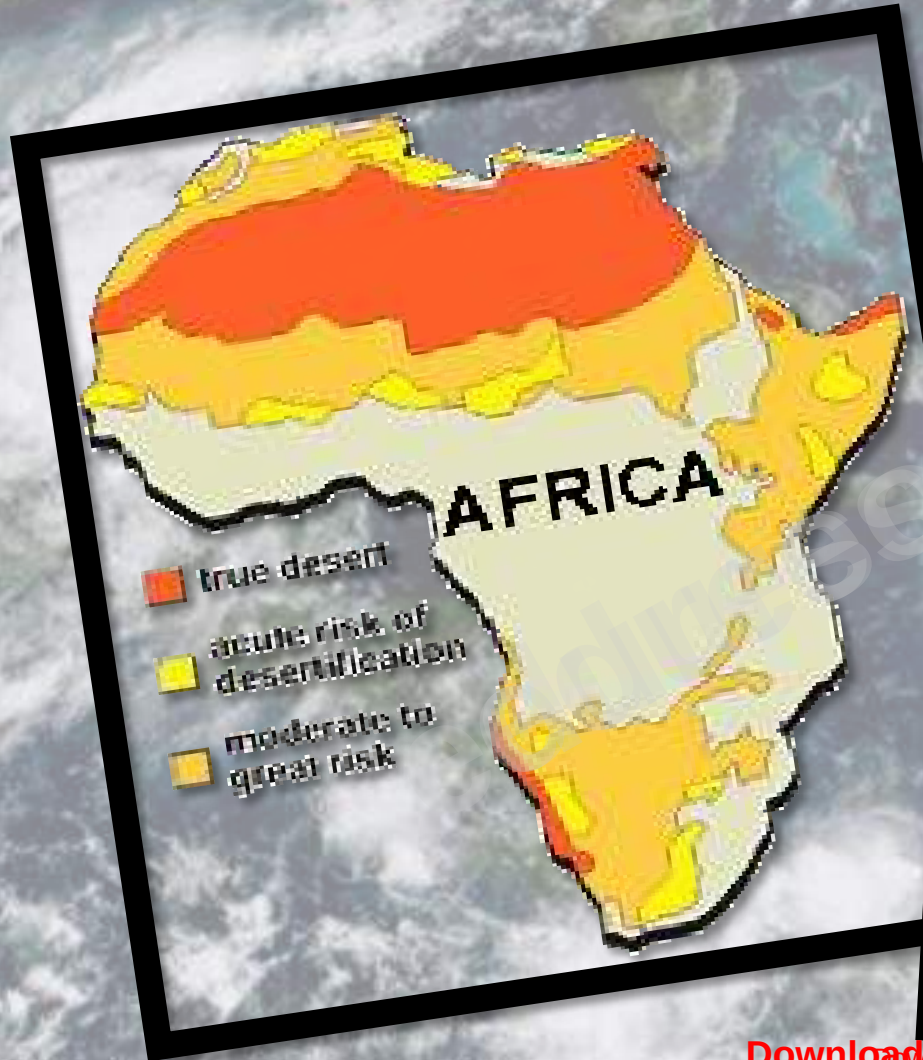
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How would you describe the location of the Sahel?



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The area of greatest risk: The Sahel



South of the Sahara desert / North of the savanna grasslands

DESERTIFICATION

- What is **desertification**?
- See if the photo below can give you any clues?

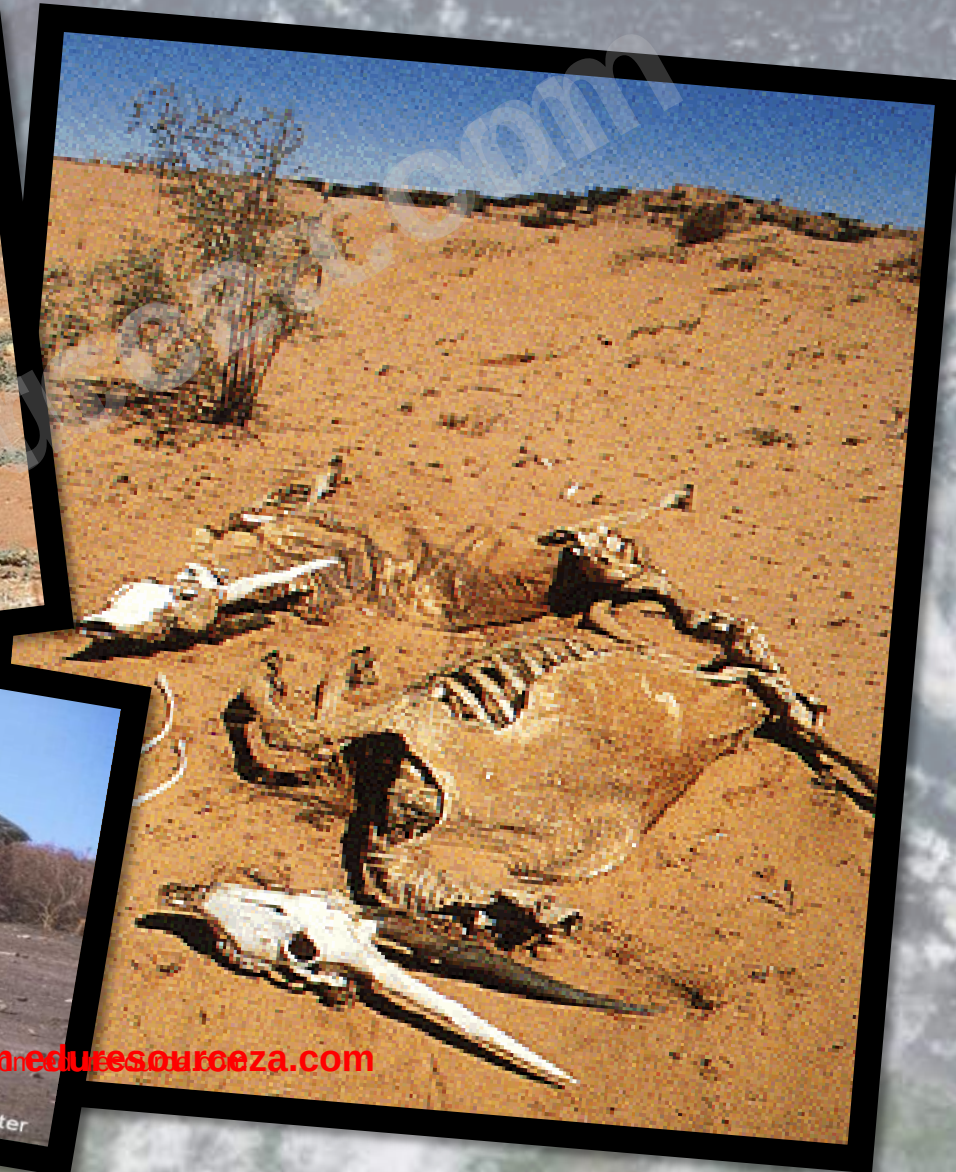


“Desertification is when a desert gradually spreads to the surrounding areas of semi-desert”

The Sahel regions are areas which experience desertification

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How would you describe this landscape?



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(C) M. Akthar-Schuster

Causes of desertification

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Drought

A long period without rainfall, causes crops to die, lack of food, may have to move to find food



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Causes of desertification

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2) Overgrazing

- Too many animals grazing on the land
- animals eat all the vegetation
- vegetation fails to grow
- soil is exposed to rain and wind, soil is washed or blown away



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Causes of desertification

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3) Overcultivation

- Many crops being grown on the land year after year, taking all the nutrients from the soil
- The soil becomes infertile and nothing can grow
- Because there are no crops to protect the soil the soil is again easily eroded by the wind and rain.



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Causes of Desertification

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4) Removal of trees for fuel and shelter

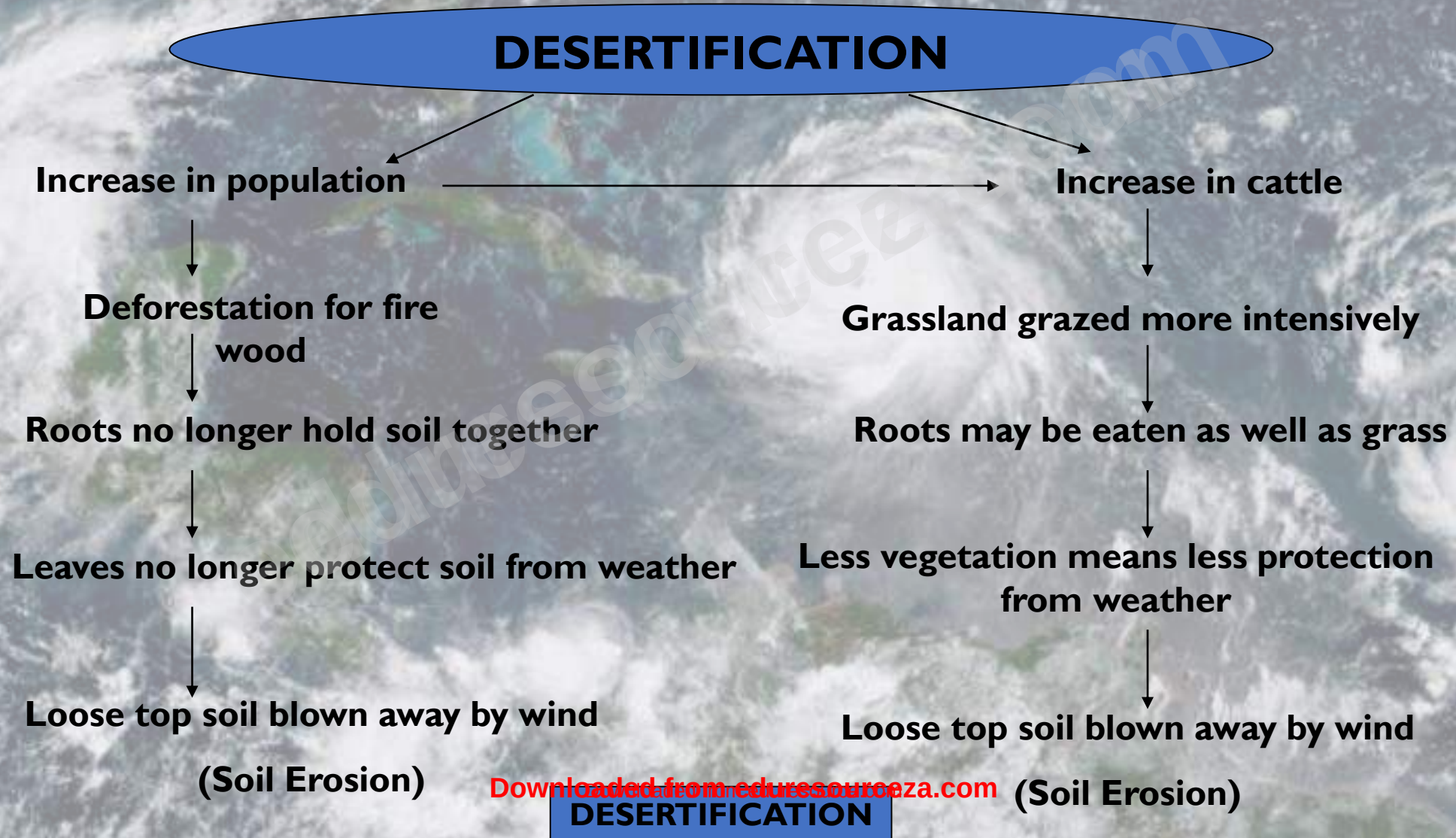
- There are few trees in the desert and their roots hold the soil together
- When the trees are removed for firewood or to build shelter the roots die and the soil becomes loose

Yet again this means the soil can be easily blown or washed away.

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Causes of Desertification



Solutions to Desertification

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In the short term:

- Refugee Camps
- Medical Aid
- Food and Clothing Aid

Things to Think About!

- Where does the aid come from?
- Does the aid reach the people who need it?
- Advantages and disadvantages of refugee camps
- How long might people stay in these camps?
- What happens after the news story?

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Solutions to Desertification

In the long term:

- Fence off areas to prevent animals grazing there
- Introduce drought resistant crops e.g. Millet
- Plant trees and bushes to provide cover for soil and stop it being blown or washed away
- Rotate crops and water them using irrigation techniques

Can you think of any other solutions?

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TASK - Desertification Drag & Drop Exercise

- Put the words/statements under the appropriate headings
- You should be able to define/describe the Key Words that are underlined and be able to explain your decisions
- Some may under more than one heading

Possible Causes

Possible Effects

Possible Solutions

soil
compaction

burning
vegetation

reduced
biodiversity

overgrazing

climate
change

Increase in
tribal
conflicts

terracing of
slopes to
stop run off

digging
moisture
traps
(hollows)

cutting
trees for
fuel wood

national &
international
political discussions
& negotiations

exposure &
erosion of soil
by wind & rain

exposure & erosion of
soil by wind & rain

Increase
in land
conflicts

death of
livestock

sand dunes
forming on
valuable land

rise in human
population

reduced moisture in
the atmosphere (less
transpiration)

planting legumes
to increase soil
fertility

loss of
vegetation

vehicle
track

trampling of
vegetation
by large
animal herds

grazing
control or
rotational
grazing

climate
change
(reduced
rainfall)

increased
poverty

evaporation
followed by
salinisation

tree planting to
make wind
breaks &
provide fuel
wood

education &
consultation
with local
populations

increased
poverty

Improved
livestock
marketing