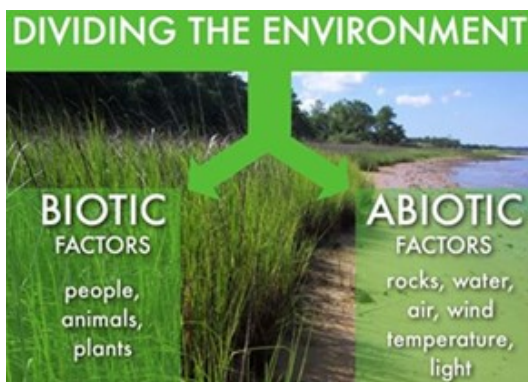


ECOSYSTEMS & DESERTS (Middle East)

KEY IDEA—Earth's Major Ecosystems are determined by a range of factors.

An **ecosystem** is a natural system in which the life cycles of living things, plants (flora) and animals (fauna) are closely linked to each other and the non-living environment



Plants trap the sun's energy through the process of photosynthesis taking in carbon dioxide and water and converting these into glucose and oxygen.

Ecosystems involve **interrelationships** between the four spheres.

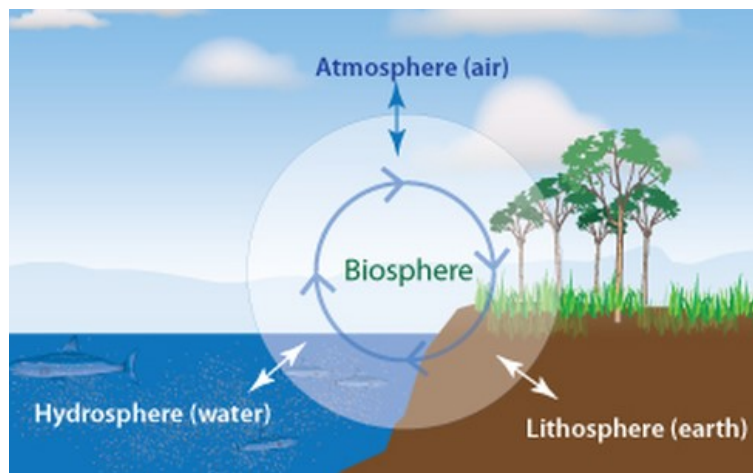
The **biosphere** consists of all living things.

The **hydrosphere** relates to all the water (fresh and salt), ice and vapour

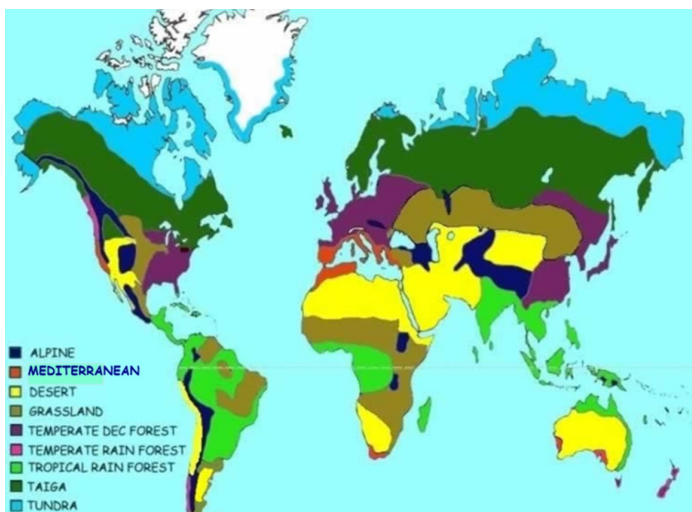
The **lithosphere**, is the earth's surface (land and ocean floor)

The **atmosphere** is the air that surrounds the planet.

See class notes to remind yourself of the interrelationships (e.g. photosynthesis / producers / consumers etc.)



A **biome** is a land-based **community** that covers a large area and is characterised by certain **climate** conditions and particular **groups of plants and animals**



The largest determinant of the major location of largescale ecosystems (**biomes**) is '**latitude**' due to two key elements.

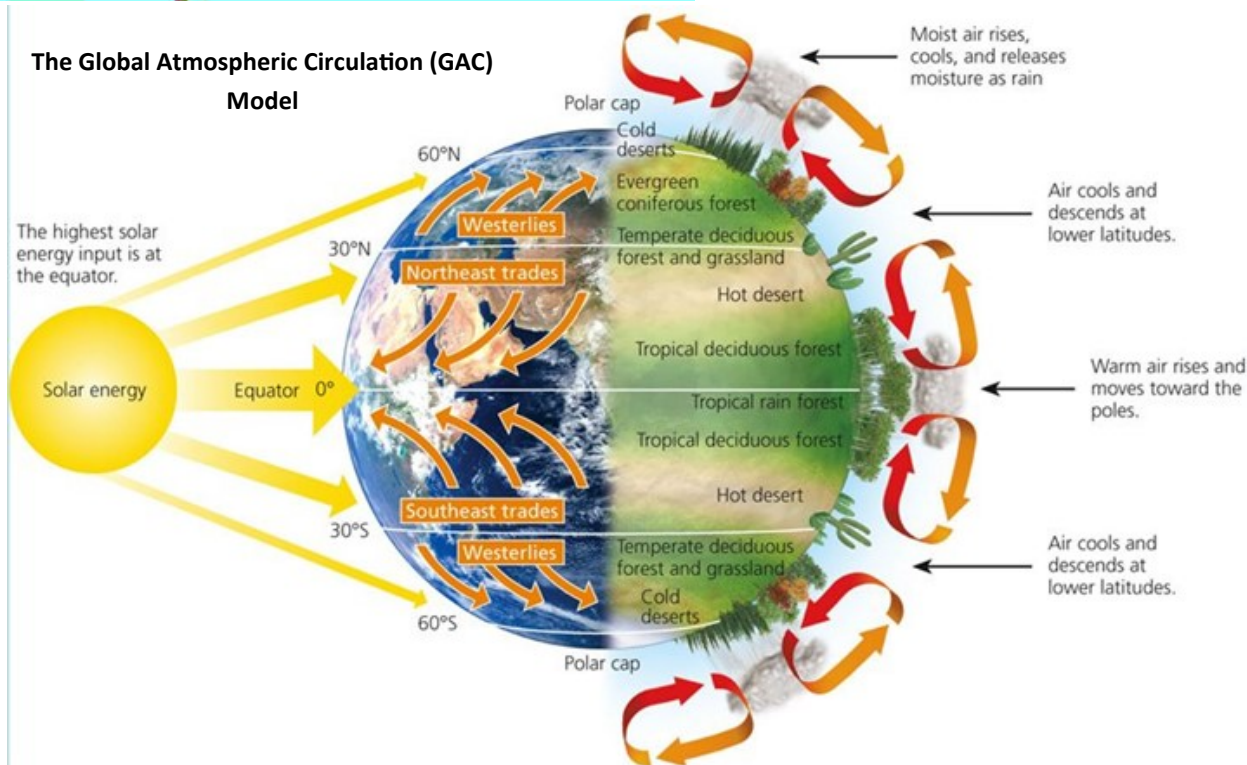
The amount of **solar energy** received determines the temperature, and the **Global Atmospheric Circulation** determines the precipitation.

There are four main climate zones:

1. ARCTIC
2. TEMPERATE
3. SUB-TROPICAL
4. TROPICAL

The location of these is determined by the amount of sunlight and precipitation (see diagram below)

The Global Atmospheric Circulation (GAC) Model



ECOSYSTEMS & DESERTS (Middle East) Continued..

KEY IDEA: HOT DESERTS AND AN IMPORTANT ECOYSTEM WITH DISTINCT CHARACTERISTICS AND ADPATIONS

The hot desert biome, like that found in The Middle East, is characterised by extreme climate, thin poor soils, and a lack of **biodiversity**.

- The climate is very hot. Summer day-time temperatures can exceed 40°C. However, at night the temperature can drop below 0°C.
- The climate is very dry with less than 250 mm of rain-fall a year.
- Hot deserts have two distinct seasons: summer, when the temperature ranges between 35-40°C, and winter, when the temperature ranges between 20-30°C.



Soil is a mixture of clay, silt, sand and rotting vegetation. The clay, silt and sand are a result of the **parent rock** being broken down by chemical **weathering**.

- CLAY—very fine particles and hold water
- SILT—medium-sized particles
- SAND—coarse grained and let water through.

In somewhere like the UK soil can take **200-400 years** for **ONE cm** of soil to form!

Soil layers, known as **soil horizons**, develop over time and have characteristics according to the parent rock type, climate, and vegetation of the region.

Horizons

O (Organic)

A (Surface)

B (Subsoil)

C (Substratum)

R (Bedrock)

The main soil layers or horizons

O Horizon - made up mostly humus (decomposed leaf litter).
A Horizon - called Topsoil . Seeds germinate and plant roots grow in this dark-coloured layer.
B Horizon - Called the subsoil - contains clay and mineral deposits (like calcium carbonate) that it receives from layers above it as water transfers them downwards.
C Horizon - Called regolith : this consists of slightly broken-up bedrock.
R Horizon - The un-weathered bedrock right at the bottom.

Desert soils (*Aridisols*) are very different to Rainforest soils (*Latosols*).

LATOSOLS

Negligible, because organic matter is decomposed and recycled quickly

Acidic, light-colored

Iron and aluminum compounds mixed with clay

Parent material

Tropical rain forest soil

ARIDISOLS

Thin, humus-mineral mixture

Thick, dry, containing variable accumulations of clay, calcium carbonate, soluble salts

Parent material

Desert soil

- Desert soils are thin, sandy, rocky and generally grey in colour.
- Desert soils are very dry. When it does rain they soak up the water very quickly.
- The surface of the soil may appear crusty. This is due to the lack of rainfall.
- As it is so hot water is drawn up to the surface of the soil by evaporation. As the water evaporates, salts are

ECOSYSTEMS & DESERTS (Middle East) Continued..

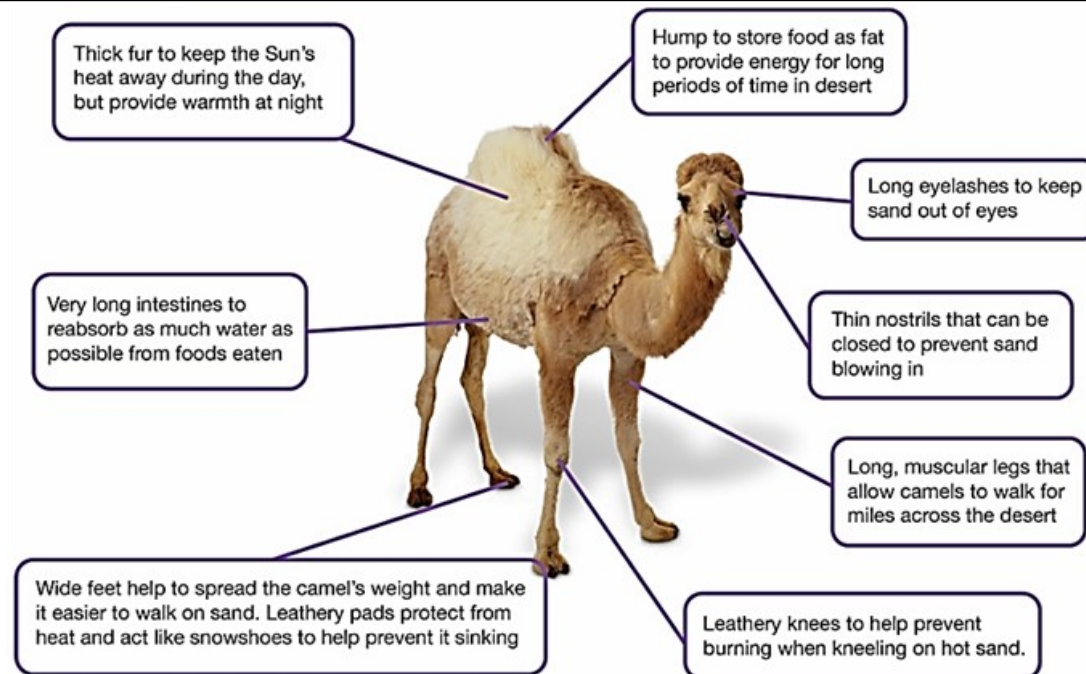
KEY IDEA: ANIMALS AND PLANTS HAVE ADAPTED TO THE EXTREME CONDITIONS OF THE ARABIAN DESERT

Animals: Example—THE CAMEL

Behaviourally – some burrow or are nocturnal to avoid heat in the day. Some move quickly across the sand.

Physically - storing water in their fatty tissues, long ears to dissipate heat and thick outer covering to reduce the loss of moisture and keep warm at night. Sandy coloured.

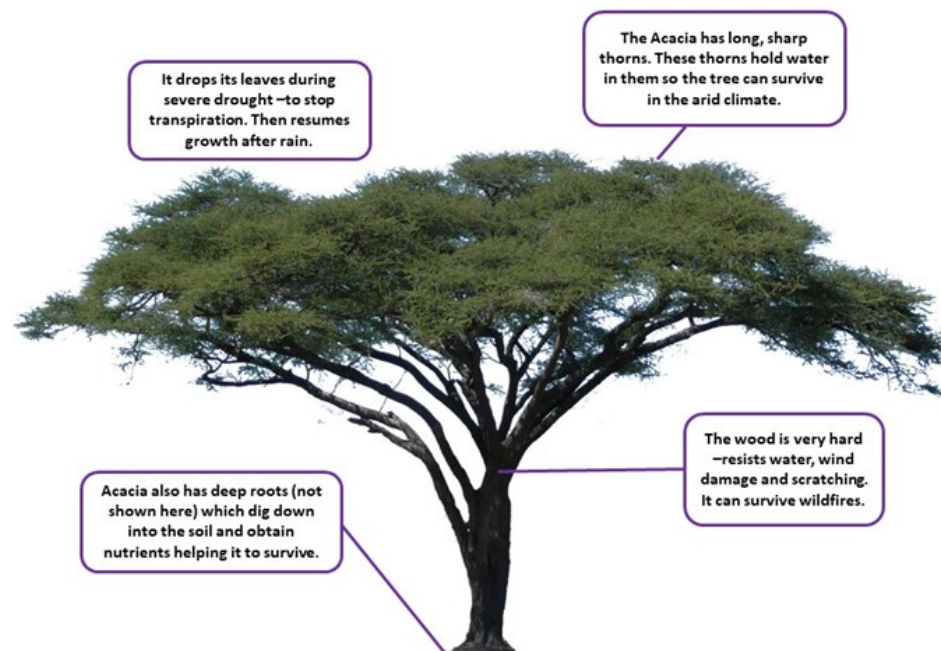
The camel has very specific adaptations.



Plants: Example—THE ACACIA TREE

Plants living in the Arabian desert are **Xerophytic**. This means that the plants living in this location have adapted to not need large amounts of water. Some plants are also **halophytic** or 'salt-tolerant'.

There are no cactus species native to the desert here. Most plant species here are characterised by long roots, short spiny shoots, and fleshy, (succulent) or needle-like leaves; all of which help them adapt to the harsh conditions of the Arabian Desert. The Acacia tree is found in the Arabian desert and has specific importance and adaptations.



ECOSYSTEMS & DESERTS (Middle East) Continued..

Key idea: The Middle East is a diverse region



The Middle East is a geographical and culturally similar region made up of 17 countries (although this varies) located mostly in south-western Asia on the Arabian **Peninsula**, but also in parts of northern Africa and south-eastern Europe.

Most of the Middle East region is characterized by a hot, **arid** and **semi-arid** desert climate. The Arabian Desert is the largest sand-only desert on the planet and receives as little as 30 millimetres) of rainfall per year). The coastal regions of the North have Mediterranean climate, much like Greece and Italy, and the higher altitude regions are more like the cooler grasslands of the Russian Steppe.

Key physical geographical features:

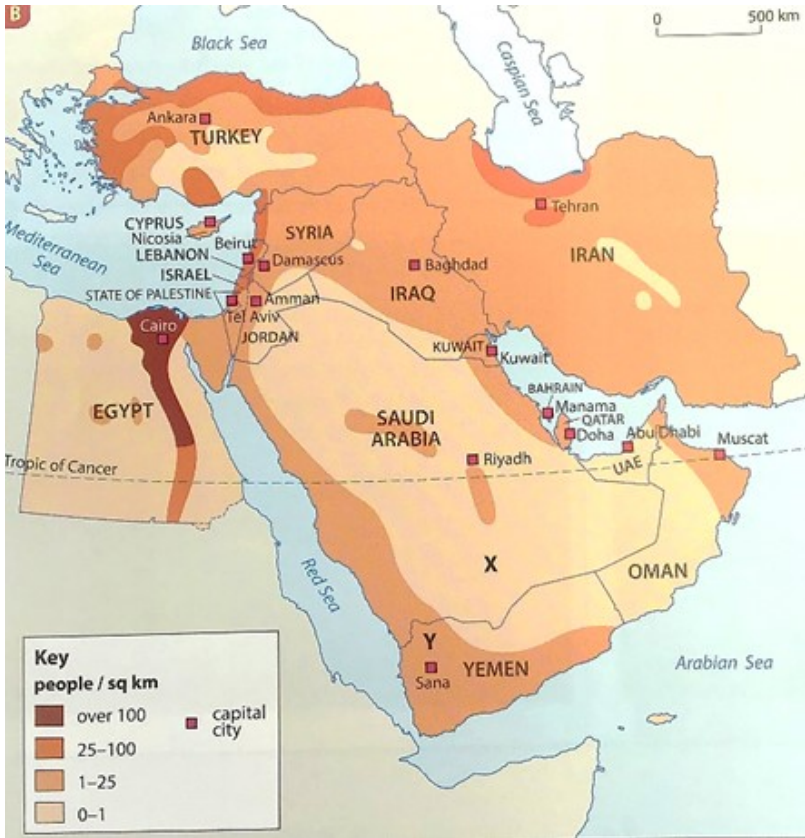
Deserts	Mountain Ranges	Rivers	Seas/Gulfs	Tectonic Profile
Arabian An Nafud Syrian Dash e-lut Eastern Sahara	Taurus Zagros Caucasus Azir and Hejas Hadramawt	Euphrates Shatt Al Arab Tigris Amu Darya Suez Canal*	Red Sea Mediterranean Sea Persian Gulf Gulf of Oman Arabian Sea	Earthquakes Volcanoes Fold Mountains Arabian Plate Eurasian plate



There are many very important & famous cities in the region:

RANK	CITY	COUNTRY	METROPOLITAN POPULATION
1	Cairo	Egypt	20,439,541
2	Tehran	Iran	16,672,000
3	Istanbul	Turkey	15,519,267
4	Baghdad	Iraq	8,500,000

Key human geographical information:



The Middle East has a population of about 246 million; nearly as many people as the United States.

The **population distribution** varies widely. The fertile regions, such as the Nile Delta, are very densely settled; many others are only lightly populated; while others, particularly in the deserts, are completely empty of human life.

The most populous Middle Eastern countries are Turkey, Egypt, and Iran, each with more than 50 million people. Bahrain and Qatar have the smallest populations, about 400,000 each.

Saudi Arabia, although greatest in area, has a relatively small population for its size, a little more than 10 million, because much of its land is de-

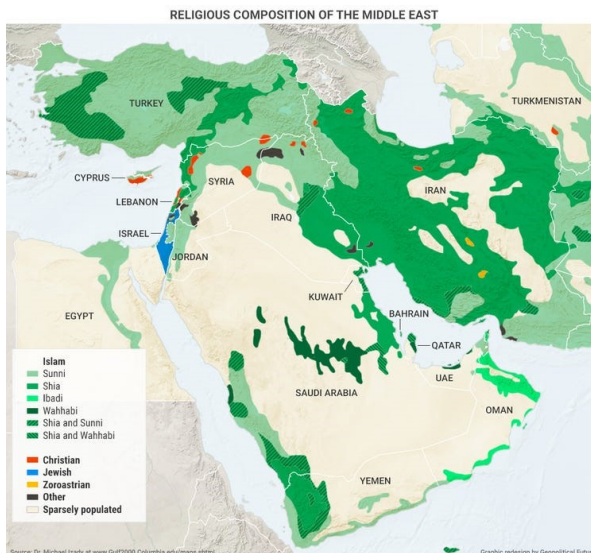
ECOSYSTEMS & DESERTS (Middle East) Continued..

Key idea: The Middle East is a diverse region

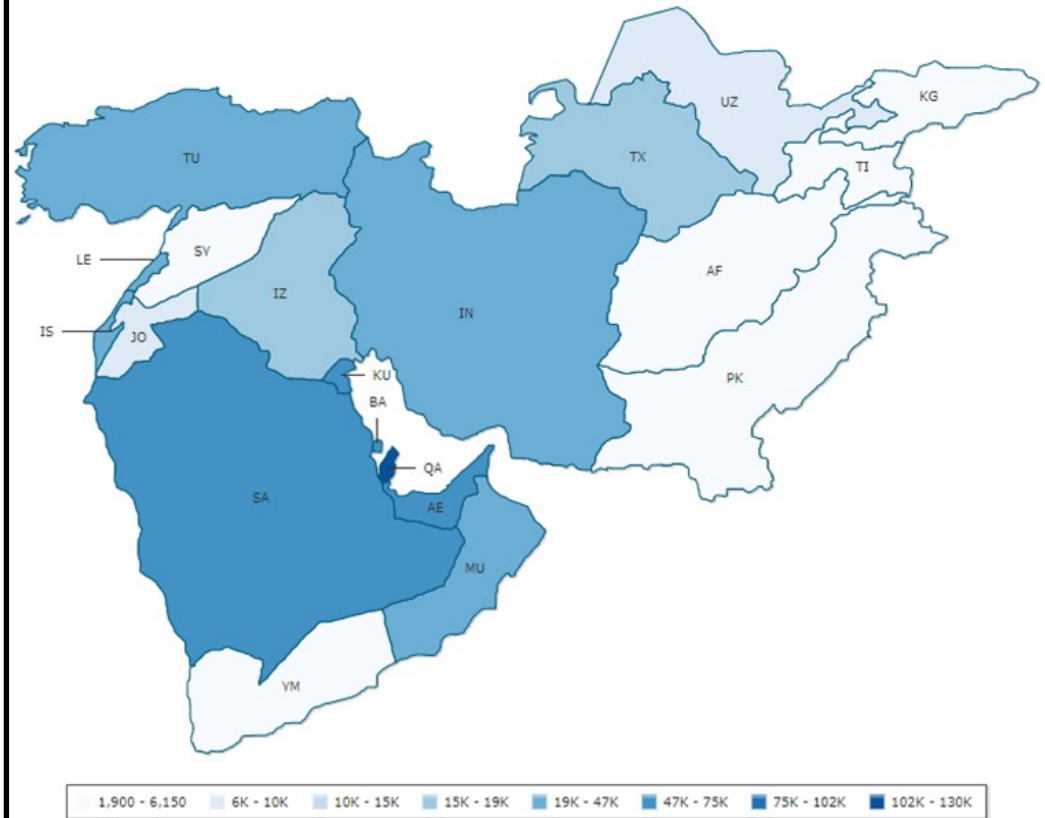
Since ancient times, the Middle East has attracted migrating peoples. Mixing with the earlier inhabitants of the region, they produced the diverse ethnicities we see today. Most countries are multi-ethnic. Even though ethnic diversity leads to the cultural richness of a society, it unfortunately may lead to political conflict. The Kurds, for example, do not have their own nation-state, but are instead spread across Turkey, Iraq, Iran, and Syria. Their political and military attempts to create an **autonomous Kurdistan** have been strongly resisted by those states.

The region is the birthplace of three main religions of Judaism, Christianity, and Islam. About 20% of the world's Muslims live in the Middle East. A major source of conflict in the Muslim Middle East is between the two main sects of Islam: Sunni and Shi'a. Although these two sects agree on the fundamentals of Islam and the teachings of the Quran, they are in conflict about who would lead the Muslim community after Muhammad's death.

There are also military conflicts in the Middle East. It has been an historically unstable political region. The British and French Empires divided the lands of the Ottoman Empire between themselves, creating artificial borders and political conflicts in the region. With such vast **oil deposits**, many countries had an interest in how the region operated.



Key Idea—There are significant variations in wealth & poverty across the region



More than half of the world's known oil reserves are found in the region, although they are not equally distributed. This has created a disparity of wealth and power in the Middle East. Gulf countries with relatively small populations have the most oil and are increasingly **West-ernised**.

Qatar is the wealthiest nation and has **GDP per capita of 124,000 USD** whereas Yemen is the poorest nation with a GDP of 2,500 USD per capita.

Key Idea—Desertification is becoming a problem in the Middle East

Desertification is the term use to describe when an area of fertile land becomes degraded so much that nothing will grow there. 85% or the Middle eastern land has been degraded. Desertification has several causes, mainly related to human actions.



Human Actions causing Desertification

Tree and plant clearance:

the plant roots that bind and dead leaves that enrich the soil is cleared for fuel-wood and timber, or to clear land for cultivation



Overgrazing herds of cattle and goats eat the binding grasses and compress/erode topsoil with their hooves.



Intensive arable farming

depletes the nutrients in the soil – the soil is unable to rest and recover. Continued watering, also damages soil by making it saline.



Wind and water erode and carry away topsoil and leaving behind an infertile dust and sand



It is the combination of these factors that transforms degraded land into desert.

Desertification has significant impacts on the people of these places. Infertile soil means crops cannot grow. Food shortages will increase prices and may lead to hunger, poverty, and migration. Soil erosion and lack of plant cover leads to flash floods and mudslides when there is rain. The nature of the area may disappear because of a lack of habitat. Those living in cities, already rely on imported food, but those living in rural areas, will now have to pay higher prices for imported food.

APPLYING YOUR KNOWLEDGE...

- What does the abbreviation GAC refer to?
- Describe the global distribution of desert biomes.
- How much rainfall does an arid region receive each year?
- Name a country of the Middle East with a Mediterranean climate.
- Identify at least 10 countries of the middle east.
- Name a river, mountain range, desert and Gulf found in the Middle East.
- List the countries in order of wealth from most to least GDP
- What 4 things lead to desertification?
- Give 2 ways animals/plants adapt to the climate of the desert.

Now Challenge yourself even further!

- Explain why Alpine climates do not follow a latitudinal pattern.
- Create a country profile and comparison for Yemen and Qatar to find out the main differences between the two places and their wealth.

OTHER RESOURCES

Interactive climate regions
<https://www.climateypesforkids.com/semi-arid-climate>

Soil classification information
<https://www.britannica.com/science/soil>

Countries of the Middle East quiz <https://online.seterra.com/en/vgp/3049>

Interactive map of GDP <https://www.indexmundi.com/map/?t=0&v=67&r=me&l=en>

KS3 Schoology



SCAN ME

Key Term	Definition
Adaptation	How something changes its behaviour or characteristics to fit surroundings
Arid / Semi-arid	Arid means 'dry'. Less than 250mm of rain per year. Semi-arid climate is found on the outer edge of Arid climate areas. Can be hot or cold dry areas.
Aridisols	Soils found in very dry areas that have very low organic content
Atmosphere	The protective layer of gases surrounding the earth
Autonomous	(of a country or region) having the freedom to govern itself or control its own affairs.
Biodiversity	The total 'variety' of living things in an area
Biome	A large naturally occurring community characterised by certain climate conditions and associated flora (plants) and fauna (animals).
Biosphere	All the living things on the planet (plants, animals, microbes)
Consumer	Living things that either eat green plants or animals that have eaten plants
Decomposers	Bacteria that breakdown living matter.
Desertification	The process of fertile land becoming infertile and degraded so it is unable to support growth of vegetation.
Ecosystem	A community of living things and the interactions between them and the non-living environment
Ethnic Groups	People of the same race or nationality that share a distinctive culture
GDP / USD per capita	(Gross Domestic Product) a measure of the income of a country. This is usually given in American (US) Dollars and given as a figure divided by the population.
Global Atmospheric Circulation	The world-wide system of air movement and winds that distribute heat
Gulf	A type of bay, a body of water mostly enclosed by land with a strait connecting it to a larger body of water such as a sea or ocean.
Hydrosphere	All the water on the planet, ice, water vapor or liquid salt and fresh water)
Interrelationships	The way in which two or more things are connected or linked
Latosols	Deeply weathered, infertile soils found under the tropical rainforests
Lithosphere	The rocks, soil and mineral component of the Earth's land and ocean floor
Middle East	A geographical region comprising much of southwest Asia and north Africa
Parent Rock	The original rock type in the area influence how and what soil forms
Peninsula	An area of land that juts out into the sea.
Producer	Green plants which can photosynthesise and produce their own food
Soil Horizons	The different horizontal layers in a soil profile
Solar Energy	The sunlight (short and longwave radiation) that heats the Earth
Weathering	The breaking down of rock by wind, rain, sun, and chemical actions

Key Terms—To test yourself Read, Cover, Write, Check OR try this quizlet

<https://tinyurl.com/Ecosystems-Deserts>