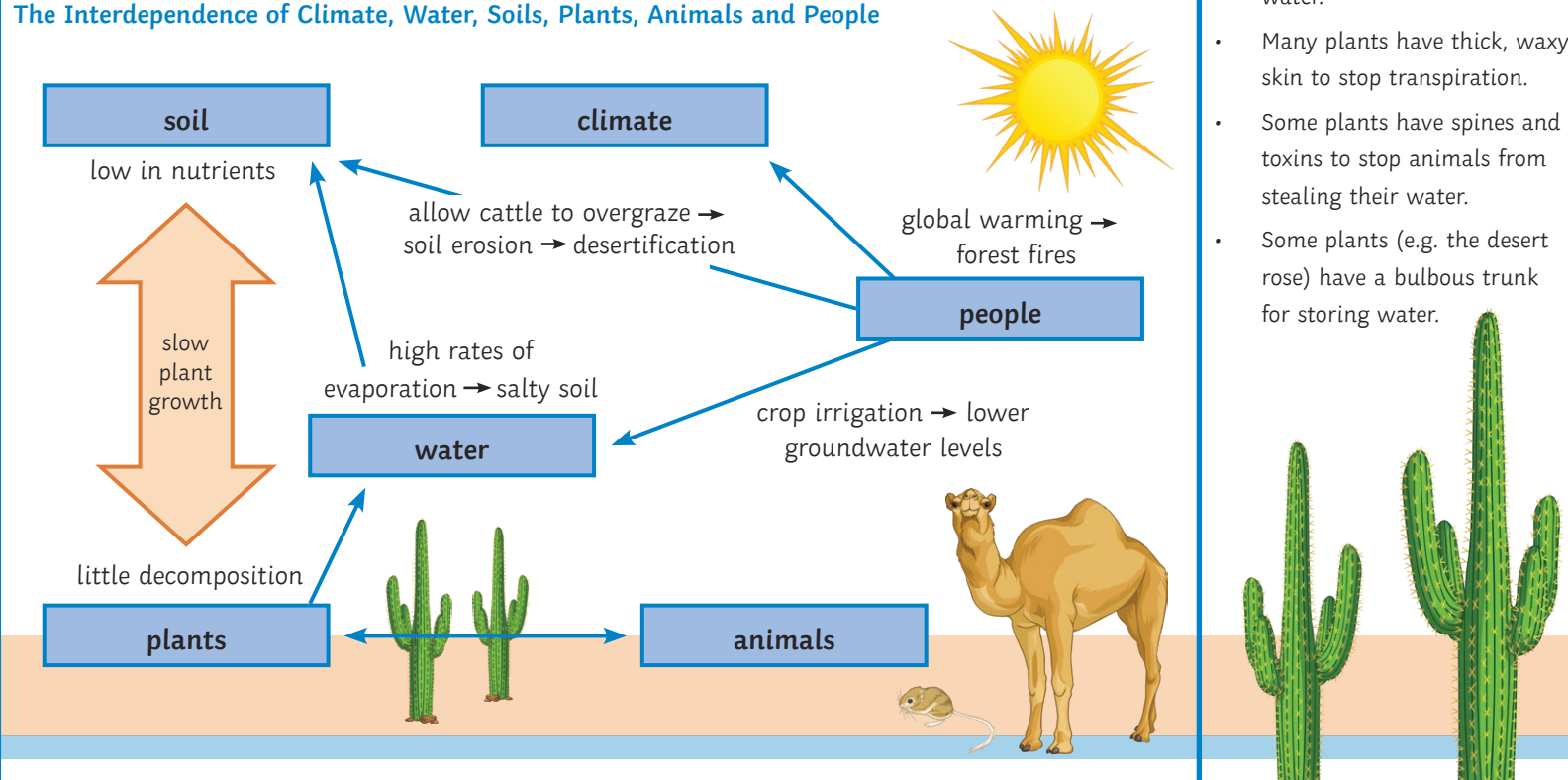


The Living World: Hot Deserts Knowledge Organiser

The Physical Characteristics of a Hot Desert

Climate	Water	Soils	Plants	Animals
<ul style="list-style-type: none"> Very hot during the day (e.g. 45°C). Cold at night (e.g. 5°C). 	<ul style="list-style-type: none"> Very little rainfall (less than 250mm a year). Rain is infrequent. 	<ul style="list-style-type: none"> shallow lacks nutrients (due to lack of humus) dry 	<ul style="list-style-type: none"> sparse low bushes cacti Many hot desert plants only appear after the rain. 	<ul style="list-style-type: none"> lizards, snakes, scorpions and insects Small, nocturnal mammals, e.g. meerkat.

The Interdependence of Climate, Water, Soils, Plants, Animals and People



Plant Adaptations

- Plants have either shallow, wide roots to catch as much water as possible when it rains or long roots to tap into deep underground water.
- Small leaves reduce the amount of water lost through transpiration.
- Succulents (e.g. cacti) have large, fleshy stems for storing water.
- Many plants have thick, waxy skin to stop transpiration.
- Some plants have spines and toxins to stop animals from stealing their water.
- Some plants (e.g. the desert rose) have a bulbous trunk for storing water.

Animal Adaptations

- Some animals have large fat stores (e.g. a camel's hump allows it to go for days without food and water).
- Many desert animals are nocturnal, coming out to hunt at night when it is cooler (e.g. fennec foxes).
- Some animals (e.g. the desert tortoise in the south western United States) spend much of their time underground.
- Some animals have large ears (e.g. fennec foxes) or long limbs to allow more heat loss.
- The jerboa, a small rodent, doesn't have to drink water. It is able to extract enough water from its foods to survive.
- Most desert birds are nomadic. They can travel long distances in search of food and water.
- The horned viper is a sidewinder species of snake. Its special movement helps it to move over the sands quickly and effectively.
- Lizards and snakes can tolerate high body temperatures (e.g. desert iguanas).
- Most desert animals minimize water loss from sweat and urine.
- Some animals are camouflaged to protect against predators (e.g. kangaroo rat).



Desertification - when area becomes a desert or the rapid depletion of plant life/loss of topsoil in semi-arid regions.

Causes of Desertification

Over Cultivation/Poor Farming Methods – land is used relentlessly for crops and does not have chance to recover. Over time, nutrients are depleted and the soil become useless.

Overgrazing – where animals eat all the vegetation, soil is left exposed and easily erodes.

Deforestation – cutting down trees exposes the soil, which is then easily eroded.

Climate Change – reduced rainfall and increased temperatures causes vegetation to die, leaving the soil exposed.

Civil War – in some countries, people are forced to remain in areas resulting in overuse of the land. Pollution to water supplies can also be an issue.

Strategies Used to Reduce the Risk of Desertification

Improved Farming Methods – farmers educated in better farming methods and soil given time to recover.

Prevent Overgrazing – manage grazing land more closely. Plant acacia trees, which provide food for animals and protection for the soil.

Afforestation – Plant vegetation which will help the soil to regenerate and prevent soil erosion.

Reduce Water Loss – small stone walls can be built which will help soil to trap/retain moisture and prevent soil erosion.



Issues Relating to Biodiversity

Biodiversity is limited in hot deserts, although biodiversity hotspots can be found in areas with more water e.g. near ephemeral (temporary) ponds or rivers. Desert plants and animals have very special adaptations which make them extremely vulnerable to introduced predators and changes to their habitat.

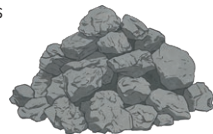
Human activity threatens biodiversity in many ways, especially on desert margins and in biodiversity hotspots:

1. irrigation (artificial watering of crops) causes desertification;
2. global warming is making deserts hotter and drier. As a result, some animals have moved to cooler climates and others risk extinction.

Western Desert, USA - Opportunities

Farming – the area produces 15% of USA's produce and livestock (e.g. Salinas Valley produces lemons, vegetables and grapes for wine production). Farmers are allocated 80% of the Colorado river's water but much is wasted through irrigation and poor choice of crop.

Mineral Extraction – the Western Desert has many minerals e.g. uranium, lead, copper, zinc and coal.



Tourism – tourism is one of the Western Desert's largest employers. 37 million tourists visit Las Vegas every year! However, many also come to visit the wilderness areas including the Grand Canyon and California's Joshua Tree National Park. Lake Mead and Lake Powell were created as part of a water management project offering sailing, water skiing and fishing, attracting 2 million visitors a year.

Energy – the Western Desert provides many opportunities with regards to energy:

- hydroelectric power (HEP) plants supply some electricity for the people living in the Western Desert;
- fossil fuels are important in the Western Desert too - there are 25 oil production sites producing oil worth US \$50 billion;
- the Sonoran Solar Project, a proposed solar energy project, in Arizona will produce energy for 100,000 homes and provide jobs for 360 workers.

Western Desert, USA – Challenges

Extreme Temperatures – daytime summer temperatures can reach over 50°C, but temperatures at night can be much lower with winter night-time temperatures reaching below 0°C.

Accessibility – some areas of the Western Desert have a low population density of less than one person per square kilometre so lack surfaced roads (e.g. areas of Nevada).

Water Supply – 30 million people depend on water from the Colorado river. The limited water supply poses many challenges for the Western Desert:

- the population of the area is expected to grow (e.g. by 2040, Colorado city's population is expected to increase by 2.2 million due to opportunities such as a second Amazon HQ which will bring 50,000 well-paid jobs);
- legal pacts of 1922 and 1948 agreed that states in the upper course and Mexico have access to more water than actually flows along the river today! So much water is taken from the river that it rarely reaches the Gulf of California;
- climate change could reduce rainfall and increase temperatures. By 2100, temperatures could be 5°C higher than they were in the 1970s.

Western Desert, USA - Strategies Used to Overcome Challenges

Extreme temperatures – improvements to air conditioning and water supplies have made living in the Western Desert much easier.

Accessibility – during the 19th century, the expansion of the railroads into the American 'Wild West', the Western Desert became much more accessible. Today, improvements to the road network fuel future developments. For example, Interstate 11 is a new \$318 million road connecting Phoenix and Las Vegas. It is expected to be completed in 2018. It is planned to eventually connect Canada to Mexico.

Air travel has also made the area more accessible - Las Vegas airport has over 40 million people travel through each year.

Water supply - the Hoover Dam and Glen Canyon Dam have created large reservoirs on the Colorado River providing a reliable water supply to many cities including Las Vegas, Phoenix, Tucson, San Diego and Los Angeles. However, dams and reservoirs can cause environmental problems in the fragile hot desert environment. 90 million tonnes of sediment (alluvium) used to be transported along the River Colorado each year. However, much of this is now trapped behind dams and in reservoirs, altering the delta and wetland ecosystem as the river travels towards the sea.