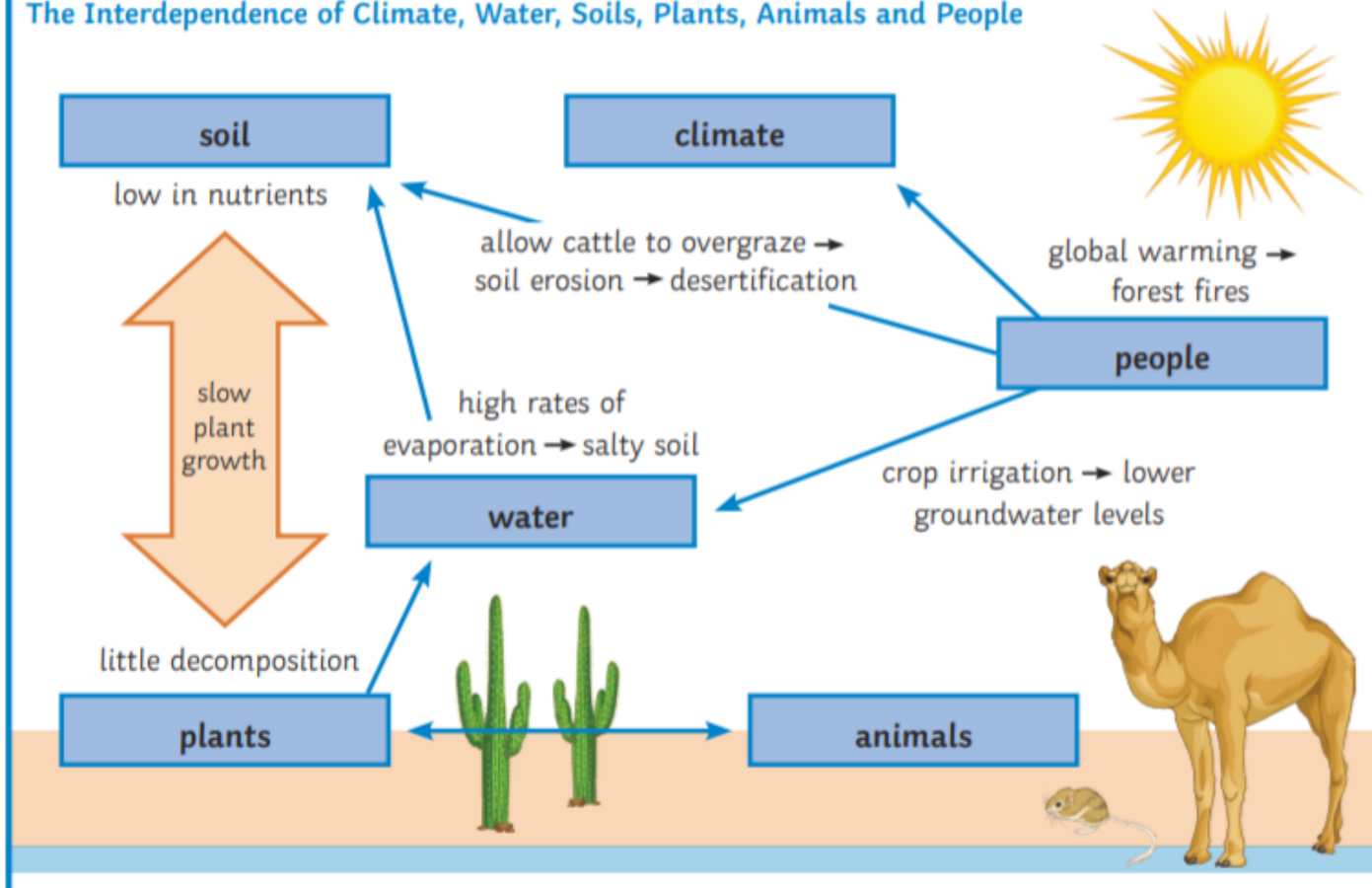
The Living World: Hot Deserts Knowledge Organiser

The Physical Characteristics of a Hot Desert

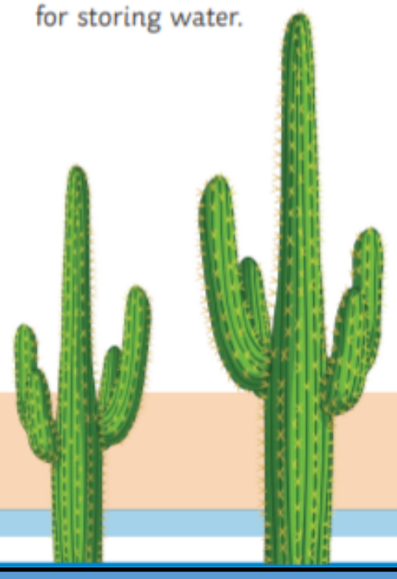
Climate	Water	Soils	Plants	Animals
• Very hot during the day (e.g. 45°C). • Cold at night (e.g. 5°C).	• Very little rainfall (less than 250mm a year). • Rain is infrequent.	• shallow • lacks nutrients (due to lack of humus) • dry	• sparse • low bushes • cacti • Many hot desert plants only appear after the rain.	• 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).

Key Terms:

Ecosystem: A biological community of interacting organisms and their physical environment (abiotic and biotic factors).

Adaptation: changes in an organism to suit its environment.

A named case study town: Jaisalmer (wind farm, tourism, limestone minerals).

Desertification: The process of semi-arid land becoming desert.

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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.

Case Study: Challenges and Opportunities in the Thar Desert

Mineral Extraction: gypsum, feldspar, phospherile and kaolin are mined from the area and sold. Limestone is also extracted from Jaisalmer and is widely used in India's steel industry.

Tourism: the extreme desert environment provides beautiful landscapes and adventure activities for tourists. Camel rides are a popular excursion from Jaisalmer.

Energy: Coal can be found in the Giral area and oil has transformed the Barner regions economy. In 2001 the Jaisalmer wind farm was constructed to become India's largest. Bhaleri provides land for a solar farm which enhances the vast cloudless skies provided by the desert environment.

Farming: Most people in hot desert regions are involved in subsistence farming (providing food for just themselves and their family) and often included rearing sheep and growing vegetables.
In 1958 the Indira Ghandi Canal allowed irrigation and commercial farming took of, growing crops such as cotton.

A Location of the Thar Desert

Extreme temperatures

The Thar Desert suffers from extremely high temperatures (graph **A**), sometimes exceeding 50 °C in the summer. This presents challenges for people, animals and plants living in this environment.

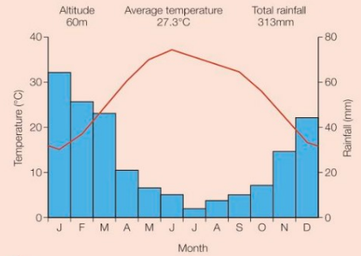
- Working outside in the heat of the day can be very hard, especially for farmers.
- High rates of evaporation lead to water shortages which affect people as well as plants and animals.
- Plants and animals have to adapt to survive in the extreme heat. Some animals are nocturnal, hibernating in the cooler ground during the daytime. Livestock, such as cattle and goats, need shade to protect them from the intense sun.

The landscape is mainly sandy hills with extensive mobile sand dunes and clumps of thorn forest vegetation – a mixture of small trees, shrubs and grasses

Accessibility

Due to the very extreme weather and the presence of vast barren areas there is a very limited road network across the Thar Desert. The high temperatures can cause the tarmac to melt and the strong winds often blow sand over the roads.

Many places are accessible only by camel, which is a traditional form of transport in the region. Public transport often involves seriously overladen buses (photo **D**).



A Climate graph for the Thar Desert

Challenges

Rainfall is low, between 100 and 240 mm per year, and summer temperatures in July can reach 53 °C

Water supply

Why are there water shortages?

Water supply has become a serious issue in the Thar Desert. As the population has grown and farming and industry have developed, demand for water has increased. Water in this region is a scarce resource.

The desert has low annual rainfall, high temperatures and strong winds. This causes high rates of evaporation.

What are the sources of water?

There are several sources of water in the Thar Desert.

- Traditionally, drinking water for people and animals is stored in ponds, some of which are natural (*tobas* – photo **B**) and others are man-made (*johads*).
- There are a few rivers and streams that flow through the desert, such as the River Luni which feeds a marshy area called the Rann. But these are intermittent, and flow only after rainfall. Most settlements are found alongside these rivers.
- Some water can be obtained from underground sources (aquifers) using wells but this water is salty and not very good quality.

Desertification in the Badia, Jordan

The Badia is a dry rocky desert in eastern Jordan. Its average annual rainfall is less than 150 mm and summer temperatures exceed 40 °C. The lack of water in this region is a major problem affecting the people who live there.

Much of the land has been traditionally grazed by the nomadic Bedouin who herd sheep, goats and camels on the rough shrubby grassland. An influx of sheep from Iraq following the 1991 Gulf War led to overgrazing and desertification.

Desertification made the land unproductive and people moved away from the area. Without vegetation, soil erosion became a major problem too.