



Why are deserts dry?

DESERTS GENERALLY lie in regions roughly grouped around the Tropic of Cancer and the Tropic of Capricorn — that is, between latitudes of around 15° and 35° north and south of the equator. These regions are typically dry. Deserts tend to form in the rain shadows of mountain ranges, in the centres of landmasses and on western coastal strips next to cold ocean currents.

Because of the way the Earth rotates around the sun, areas around the equator receive more direct sunlight than anywhere else on Earth. This means the air there is always very hot. Hot air can hold much more moisture than cold air, so the **humidity** in these areas is always very high. Hot air also rises. As it heads upwards into the atmosphere above the equator, it drifts away, heading north and south.

The higher the air gets, the cooler it becomes. Cool air can't hold as much moisture, so it releases it as rain. Areas around the equator and to the immediate north and south of it (the subtropics) receive frequent heavy downpours.

With its moisture gone, the cool, dry air continues moving north and south away from the equator until it hits zones of high **air pressure** around the **tropics**. Here, it is

condensed and forced downwards. The more the dry air descends, the warmer it gets. This means it can hold more moisture. Hence, it is likely to absorb what moisture already exists in this environment.

Rain shadow deserts

Rain shadows form on the **lee-ward** side of a mountain range (opposite to the **windward** side that faces rain-bearing winds). Deserts commonly form in rain shadows. This is how it happens:

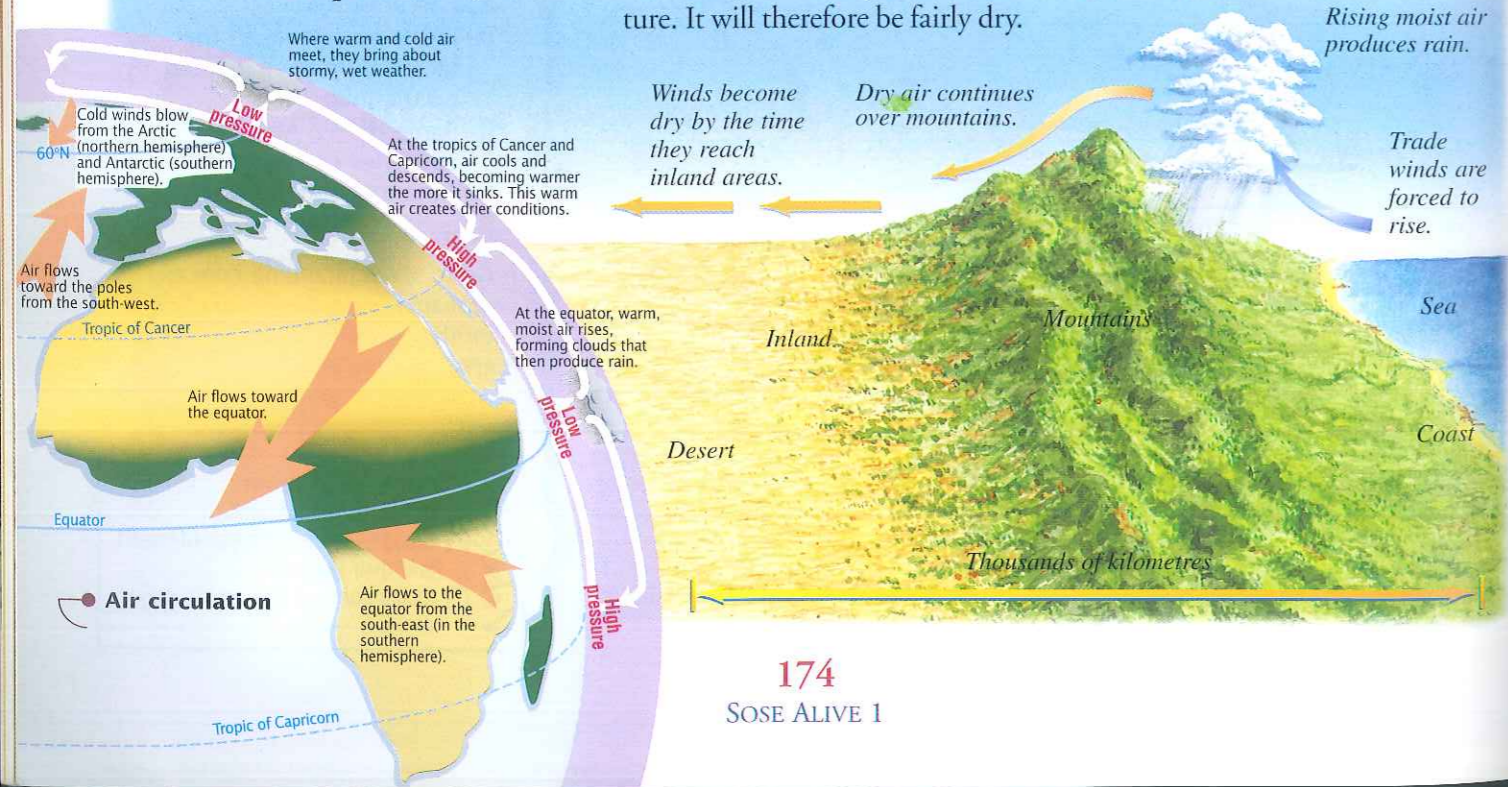
- Moist air blowing in from the ocean is forced to rise up when it hits a range of mountains. This cools it down. As cool air cannot hold as much moisture, it releases it as **precipitation**.
- By the time the air moves over the top of the range and down the other side, it is likely to have lost most, if not all, of its moisture. It will therefore be fairly dry.

- The more the air descends on the other side of the range, the more it warms up. Hence, it can hold more moisture. So, as well as not bringing any rain to the land, the air absorbs what little moisture the land contains.
- In time, as this pattern continues, the country in the rain shadow of the mountain range is likely to become arid.

Inland deserts

Some deserts form because they are so far inland that they are beyond the range of any rain relief. By the time winds reach these dry centres, they have dumped any rain they were carrying or have become so warm they cannot release any moisture they still hold.

How rain shadow deserts form



Deserts near cold ocean currents

Currents in the oceans are both warm and cold, and are always moving. Cold currents begin in polar and **temperate** waters, and drift towards the equator. They flow in a clockwise pattern in the northern hemisphere, and in an anticlockwise pattern in the southern hemisphere. As they move, they cool down the air above them.

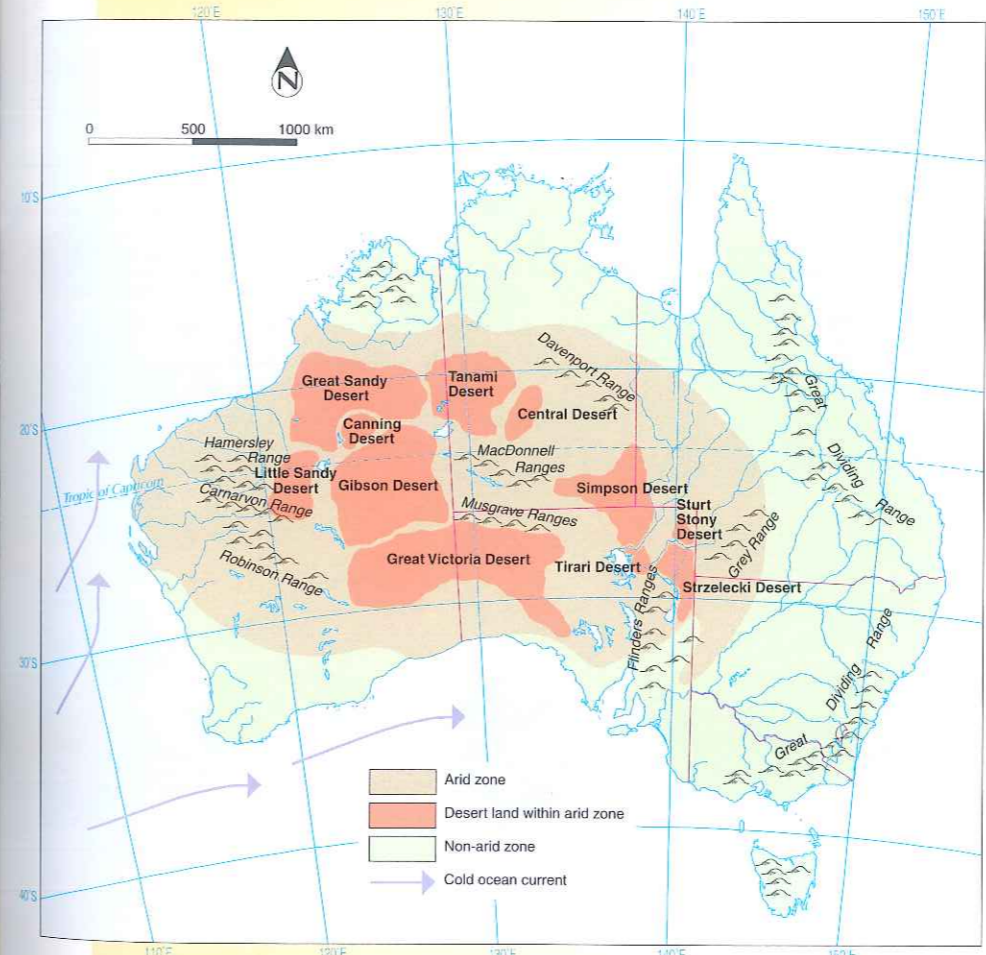
Sometimes cold currents flow close to the western sides of warm landmasses. If the cool air they create blows in over warm land, it warms up. This means it can hold more moisture. It is therefore not likely to release any moisture it contains unless it is forced up by a mountain range. Hence warm, flat coastal lands (e.g. the Namib Desert in Africa) often become arid when they are near cold currents.



Draw conclusions from a map

Geographers use maps to explain about phenomena such as deserts.

Are there any cold currents flowing near the edge of the land? See if there is any arid country nearby. Where is the desert (driest) country in relation to the landmass?



Note where the prominent mountain ranges are. Use this information to help you locate where any rain shadows might begin to form.

Check where the Tropic of Capricorn is in relation to the arid country.

Activities

REMEMBER

- Decide whether the following statements are true or false.
 - The cooler the air, the more moisture it can hold.
 - Rain shadows often contain dry areas of land.
 - Cold ocean currents cool the air above them.
 - Deserts do not form along coastlines.

UNDERSTAND

- Use the diagram of air circulation to explain why deserts form around areas adjacent to the tropics.
- Use the illustration of rain shadow deserts and any other information in this spread to explain in a paragraph why deserts tend to form in rain shadows.

Draw conclusions from a map

- Study the map of Australia and complete the following.
 - Which are Australia's three largest deserts?
 - Estimate the width of the Great Victorian desert, using the **scale**.
 - What influence do you think the Great Dividing Range has on areas to the west of it?
 - How does the ocean current flowing along Australia's western coast affect the coastal climate?

CONNECT

- To explore some interesting information about precipitation, go to www.jaconline.com.au/sosealive/sosealive1 and click on the Climate and weather weblink for this chapter.

I can:

- locate Australia's major deserts
- use an Australian map to understand how deserts are formed
- understand that natural processes affect the formation of deserts.

✓checklist