In this activity you will learn about the climate of hot deserts

A desert is a place where there is very little rain. **Hot deserts** are very hot in the day but can be cold at night.

Activities

1 Draw lines to join the 'heads' on the left with the 'tails' on the right.

It is very hot in the day	...because there may be no rain for years, then a big storm.
It can be cold at night	...because there is not much moisture in the air.
There are very few clouds	...because there are no clouds to keep in heat.
Rainfall is described as unreliable	...because the sun is overhead.

2 Desert people dress to suit the climate. Use the words in the Word box to complete the labels on the drawing.

Word box

cool • skin • mouth • nose • head • sun • white • heat

w_____ colour to reflect h_____

loose robes are c_____

protect h_____ from s____

cloth to cover m_____ and n_____ from sand

long clothes cover s_____

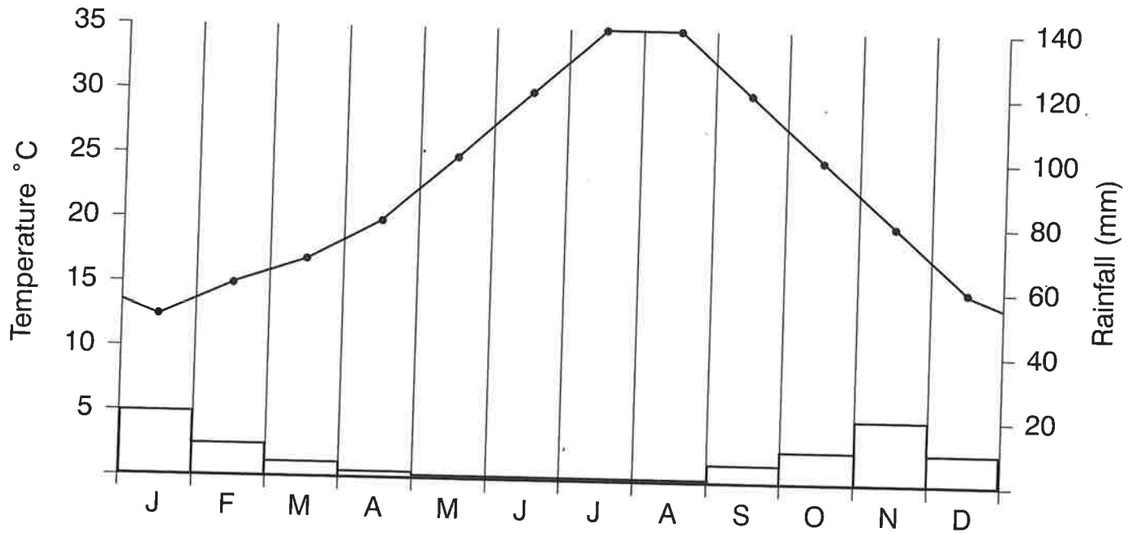
Recap *In hot* **d** _ _ _ _ _ _ *it is usually* **d** _ _ *but it is very* **h** _ _ *during the day and cold at* **n** _ _ _ _.

In this activity you will learn about the climate of hot deserts

Hot deserts have very little rain. It is very hot in the summer and during the day. It is cooler in winter. It is often very cold at night.

Activities

In the climate graph below, the line graph shows the temperature. The bar graph show rainfall.



1 Go over the **temperature line** in **red**. Shade the **rainfall bars** in **blue**.

2 Answer the following questions.

- Which are the two hottest months? _____ and _____ .
- What temperature is it in July? _____ °C
- Which is the coldest month? _____
- For how many months is the temperature 30°C or more? _____
- What is the difference, in °C, between the hottest and the coldest months? _____ °C
- Which are the two wettest months? _____ and _____
- What is the rainfall in December? ___ mm
- Which months have 5mm of rain? _____ and _____
- How many months have no rain at all? _____
- What is the total amount of rain for the whole year? _____ mm

Recap

In hot deserts it is usually very **h**___ *during the day and* **c**____ *at night. There is very little* **r**_____ .

In this activity you will learn about the climate of hot deserts

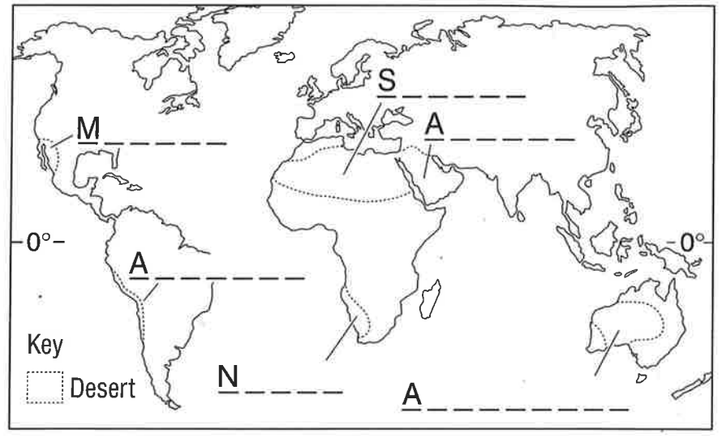
Hot deserts are very **dry**. They are **hot** during the **day** but can be very **cold** at **night**. They have very **strong winds** and **sandstorms**.

Activities

1 On the map, colour the **deserts** in **yellow**. Complete the **Key**.

2 Name the **deserts** on the map. Choose from the list in the Word box.

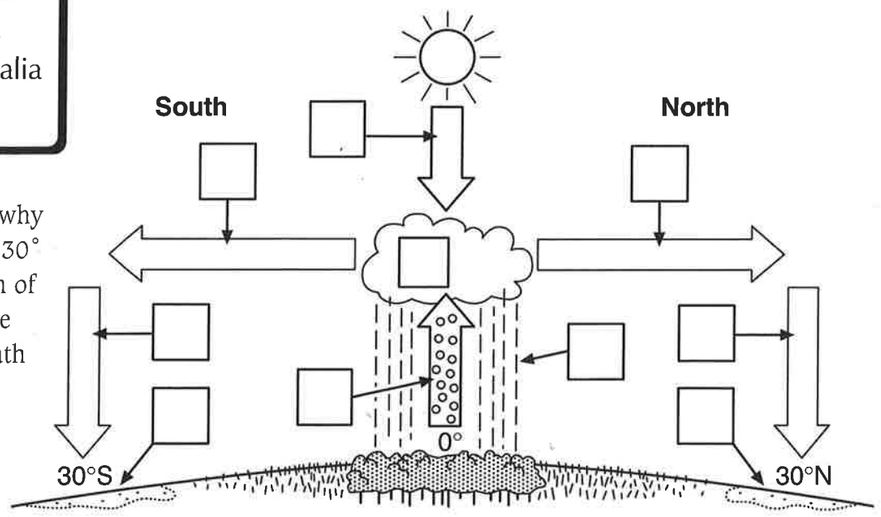
3 Draw a **red** line to show the **Equator** by joining up the 0° and 0° on the map.



Word box

Mexico • Arabia
Atacama • Australia
Sahara • Namib

4 The diagram shows why deserts are found at 30° North and 30° South of the Equator. Read the statements underneath and write the letters in the correct boxes on the diagram.



A Sun shines down **strongly** on the Equator. Water **evaporates**.

B Hot air rises and carries **moisture** up.

C Rising air **cools**. Water vapour **condenses**. **Clouds** form.

D Rain falls over the **Equator**.

E Dry air flows to the **North** and **South**. (write E in two places)

F Dry air **sinks**. No clouds form. **No rain**. (write F in two places)

G **Deserts** occur at about 30° North and 30° South. (write G in two places)

Recap

Hot deserts occur at about _____ North and _____ South of the _____ because dry air is _____ .

In this activity you will learn how animals survive in the desert

Animals have to **adapt** to living in the desert. **Camels** have to store **water** and cope with the **heat** and **dust**.

Activity

1 Read the labels below. They show how camels are adapted to life in the desert. Write the letter for each label in the correct place on the drawing.

A Long **eyelashes** keep out dust.

B Can close **nostrils** to keep out sand.

C Tough **mouth** for eating thorny plants.

D Large padded **feet** stop it sinking into the sand.

E Stores water in **stomach**.

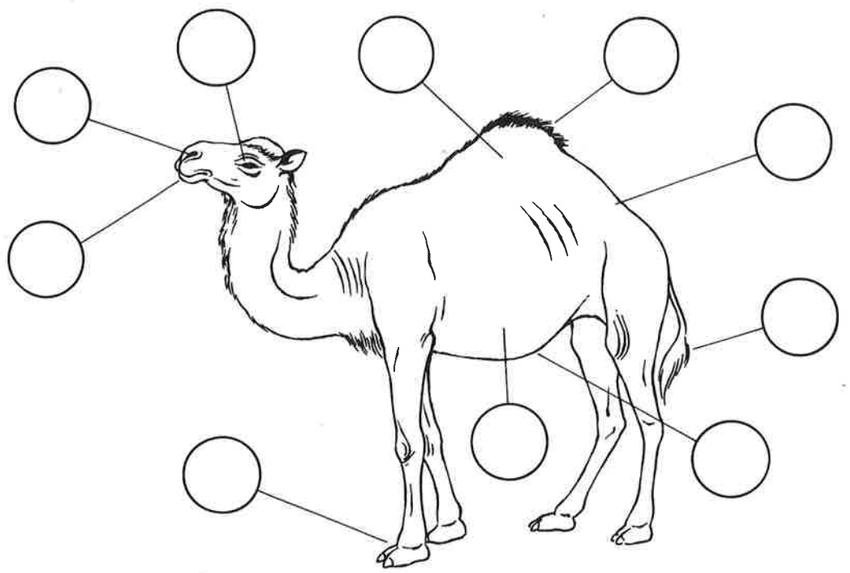
F Stores fat in **hump**.

G Light **colour** to reflect heat.

H Bare skin on **belly** to keep cool.

I Hair on **back** for shade.

J **Tail** scares away flies.



Recap

A camel is one of the animals that can ***a*** *_ _ _ _ to live in the* ***h*** *_ _ and* ***d*** *_ _ conditions of the deserts.*

In this activity you will learn how plants survive in the desert

Desert plants have to **adapt** to the dry climate and the unreliable rainfall.

Activities

1 Fill the gaps in the sentences below using the words in the Word box. They describe **ephemeral** plants.

Word box

quickly • rain
years • insects

Seeds sprout after _____.

Flowers have to grow _____.

Seeds can lie in the soil for _____.

Bright colours attract _____.

2 Fill the gaps in the sentences below using the words in the Word box. They describe **perennial** plants.

Long, shallow roots soak up rain water as soon as it _____.

Deep roots collect water from _____.

Plants have spikes or thorns instead of _____.

A cactus can store water in its _____.

Some plants store water in bulbs in their _____.

Shiny skin on a cactus stops loss of _____.

Word box

leaves • under ground • falls • stem • roots • moisture

3 Tick true or false after each sentence in the table below.

	True	False
Ephemeral plants only grow after rain.		
Ephemeral plants have to produce seeds quickly.		
A cactus is an ephemeral plant.		
Perennial plants only grow after rain.		
Perennial plants can store water in their stems and roots.		
Long roots collect water from a wide area.		

Recap

*Desert plants have to **a**_____ to **d**___ conditions. They **c**_____ water using their **r**_____ and some **s**_____ water. One desert plant is a **c**_____.*

Making Animals

Resource 1

Choose from the list of animal characteristics below to design an animal adapted to the natural environment that you have been given. You will be told about one or more important characteristics which the animal *must* have. Consult your teacher if you think your animal should have additional characteristics that are not listed. They must be characteristics that could occur in the natural world.

fast runner	can get fat	powerful digging claws
migratory	thick skin	spotted fur
can stand on 2 legs	large ears	long neck
striped fur	sharp claws	grinding teeth
sharp incisor teeth	swims	thick fur
climbs trees	thick pads on paws	nocturnal
good eyesight	webbed feet	can hibernate
can close nostrils	agile	slippery skinned
good sense of smell	gives off bad smell	stores water in body
strong skeleton	loud voice	gregarious (lives in groups)
stamina	brown fur	prehensile (gripping) tail
large body	very thin body	whiskers
can hold breath for ½ hour	sociable	fierce growl

Resource 2 Making Plants

Choose from the list of plant characteristics below to design a plant adapted to the natural environment that you have been given. You will be told about one or more important characteristics which the plant *must* have. Consult your teacher if you think your plant should have additional characteristics that are not listed. They must be characteristics that could occur in the natural world.

drought resistant	loves water	stores water
wide root system	deep root system	lives on other plants
floats	survives under water	dies back seasonally
waxy, pointed leaves	deciduous	evergreen
broadleaves	needle leaves	stunted (close to ground)
thick bark	rough bark	wind-blown seeds
heavy-weight seeds	fragments take root	seeds with velcro-like hooks
runners put down roots	climber	likes strong sun
likes shade	tall	salt tolerant
bears fruit (nuts & berries)	flowering	pollinating
eats insects	branching	sticks to rocks
lifecycle within days	colourful	drab
pleasant smell	awful smell	changes colour
buttress roots	flexible branches	sticky surfaces

4.9 » The Australian outback

On this spread you'll find out how hot deserts provide opportunities for economic development in a richer part of the world.

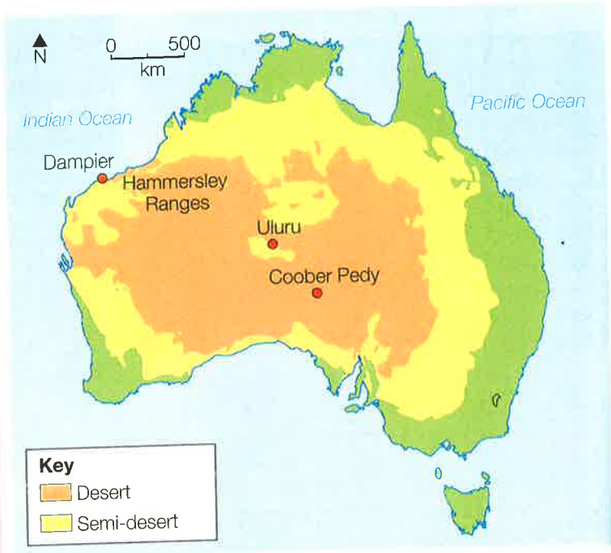
Tourism

Watching the sunset at Uluru in Australia's outback is on the BBC's list of '50 things to do before you die'. It's the most visited spot in Australia, and a sacred site for the aboriginal Anangu people. The surrounding environment is very sensitive, but – despite this – the number of visitors has risen dramatically from 5000 in 1961 to 400 000 in 2005.

Tourists do bring economic benefits to the local people, e.g. when they buy aboriginal arts and crafts, but there are problems too:

- Aboriginal culture is often exploited and adapted to provide entertainment.
- People come for the 'experience' of the sunset at the sacred rock, but may learn nothing about aboriginal culture or beliefs while they're there.
- The Anangu have no role in the management or development of the tourist resort where most visitors stay.

▼ *Several kilometres from Uluru, the view is spectacular at sunrise and sunset*



Farming

It can be difficult to make a living from farming in the outback. The soils are poor, with little organic matter to retain moisture, and plants are low in nutrients. If water is available, there's just about enough grass to feed cattle or sheep – but only in quite low numbers. So, in order to make any money, farms are huge – some the size of Wales!

Hunting and gathering

Australia's aboriginal peoples have traditionally survived by **hunting and gathering** – finding edible plants and animals in the outback.

- They created conditions in which grubs could live and breed.
- They built dams across rivers to catch fish, and to make pools where birds would gather.
- They used fire to drive out animals for hunting, to clear wood, and to allow grass to grow. As a result, fire-tolerant plants (eucalyptus trees) came to dominate the landscape.

Australia now has a growing 'native food' industry, based on traditional aboriginal knowledge of what's edible in the outback.

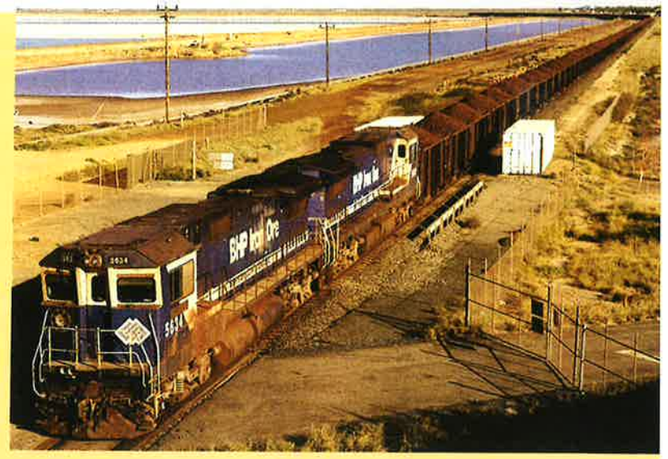
▲ *For aboriginal groups who live in the desert, there's a huge variety of food available, including seeds, grubs, and meat such as kangaroo and crocodile. Witchetty grubs are the larvae of moths and beetles, which can be eaten raw or cooked. They taste like scrambled eggs and peanut butter with a crispy 'chicken skin' coating.*

Mining

Most people in the outback work in mines. Australia has some of the world's largest reserves of quality iron ore, silver and gems (such as opal). Coober Pedy in South Australia is the opal capital of the world – an estimated 70% of the world's opal comes from there.

Most of Australia's iron ore is sold to China. Every day, several trains (each one 2.2 km long) run from the Hammersley Ranges in Western Australia to the port of Dampier. Huge ships are then loaded up with 250 000 tonnes of iron ore each before they head for China.

The world's three largest mining companies control 80% of the iron ore market. In 2008 – because China's demand was so great – they raised the price of iron ore by 70%.



▲ *Australian wagons filled with iron ore heading for port and then China. In 2007, China took as much iron ore as Australia could provide.*

your planet

Coober Pedy is an English form of an aboriginal name that means white man in hole or burrow. It's so hot there that most people live below ground to keep cool.

Retirement

The Sonora Desert in the USA attracts retired people moving to places like Phoenix for the sunny climate and open spaces. This movement is called **retirement migration**. In Australia, most retired people who move go to the coast, but there are some retirement villages in the outback, at Whyalla and Mount Gambier in South Australia.

YOUR QUESTIONS

1. Add these terms to your dictionary of key terms for this chapter, along with a definition: retirement migration, hunting and gathering.
2. Draw a mind map to show how the activities on this spread (mining, etc.) provide opportunities for economic development.
3. Describe how tourism in the outback is changing, and the benefits this could bring.
4. Is hunting and gathering sustainable? Make a table to show ways in which it is and isn't sustainable. Do the same for farming and compare your tables.

Managing the challenges

Farming

Farming in the outback is very challenging, because of the lack of water. Farmers there have two main water sources:

- Most farms have dams and reservoirs to store water for sheep and cattle.
- The farmers also use boreholes to tap into underground water supplies.

Although farmers can currently meet the challenges of the harsh desert environment, recent droughts in Australia have put pressure on the land and water supplies. This has led people to question whether both water and land are being used sustainably.

Tourism

The new Uluru Aboriginal Cultural Centre educates visitors about aboriginal culture and history. Its displays include photos, spoken histories, aboriginal language learning, videos and artefacts. Aboriginal guides also lead outback walks to inform visitors about bush food, as well as the significance of Uluru as a sacred site and other cultural subjects.

The new Cultural Centre provides economic as well as cultural benefits. The income from the admission fees goes to the Anangu community. Today over 30 aboriginal people work in the park, and the park's management is dominated by aboriginal owners.

4.10 » The Sahara Desert

your planet
The flares burning off the extra oil and gas at the Hassi Messaoud oilfield can be seen from space.

On this spread you'll find out how hot deserts provide opportunities for economic development in a poorer part of the world.

Energy

There are believed to be large oil and gas reserves underneath the Sahara Desert. But they're difficult to find – and extracting and transporting the oil and gas is even harder. For Algeria, though, oil and gas are big business – half of the money the country earns comes from them. However, drilling for oil and gas at the Hassi Messaoud oilfield isn't easy:

- It's difficult to get there for a start, because the oilfield is deep in the desert, so the workers have to travel in and out by plane.
- 40 000 people work at Hassi Messaoud. They have to pump their water supplies from underground aquifers and fly in their food.
- Then they have to drill hundreds of metres down to reach the oil and gas supplies.
- Finally, pipelines carry the oil for hundreds of kilometres across the Sahara to ports on the North African coast.

Preparing for a sustainable future

Most people agree that our use of fossil fuels like oil and gas is not sustainable. So Algeria is beginning to prepare for a future without them. Work has begun on constructing the country's first solar power plant in the Sahara Desert. The plan is to cover large areas of desert with solar panels to turn the sun's energy into electricity. The aim is to export solar power to Europe through cables below the Mediterranean Sea.

Farming and irrigation

Egypt is hot and dry. It also has a soaring population, which has grown from 20 million to 79 million in the last 25 years – and is expected to keep on growing rapidly. Most Egyptians live in the heavily **irrigated** Nile Valley. The irrigated land means that farmers can grow more food, both to feed Egypt's growing population and for export. 13% of Egypt's GDP comes from farming, and it employs 32% of the labour force.

your planet
Egypt is 95% desert and gets less than 125 mm of rain a year.

▲ *Solar panels in the desert*

Salinity

However, Egypt's irrigated land is increasingly suffering from salinity. Irrigation water contains mineral salts. When the water evaporates from the surface of the soil, the salt crystals are left behind. Most plants then die, and the land that irrigation was meant to improve is destroyed (see the diagram on the right).

Preparing for the future

Because Egypt's farmland is increasingly being lost to urbanization, wind-blown sand and salinity, the Egyptian government has begun a scheme to irrigate more land away from the Nile Valley. The Toshka Project will cost $70 billion, and will use pumps and canals to transfer water from Lake Nasser into the Western Desert. It will:

- increase Egypt's irrigated land area by 30%
- enable high-value crops, such as olives, citrus fruits and vegetables to be grown
- provide food, electricity and jobs for 16 million Egyptians in new towns in the desert
- improve roads, railways, and telecommunications
- promote tourism.

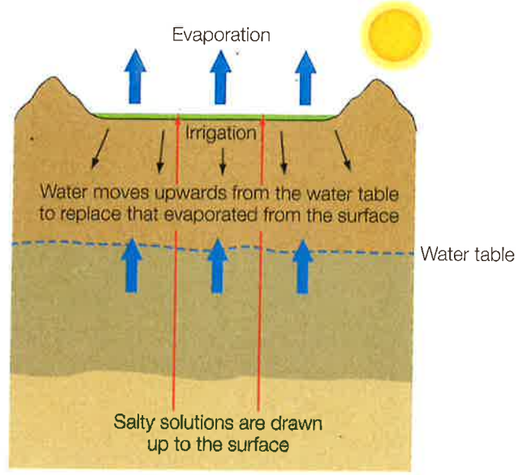
Farming and desertification

The Sahel is a belt of land south of the Sahara. It is under intense pressure, and in some places the quality of the land has declined so much that it's turned into desert. This process is called **desertification**, and the main causes are shown on the right.

Sustainable farming

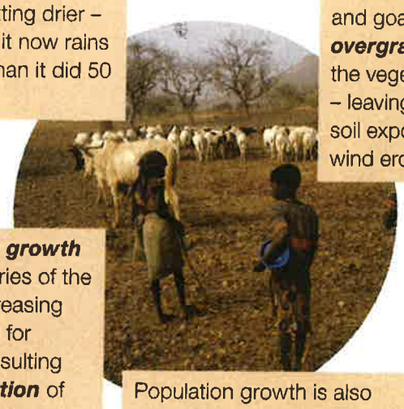
There are ways in which desertification can be stopped – and even reversed. The following examples have been tried successfully in the Sahel:

- Reducing the number of farm animals. This stops overgrazing and allows the protective vegetation to grow back.
- Growing crops as well as keeping animals. The animal manure is used to fertilise the soil and help the crops to grow.
- Planting more trees to protect the soil from wind and rain. The tree roots help to hold the soil together and prevent erosion.
- Building earth dams to collect and store water in the wet season. The stored water is then used to irrigate crops in the dry season.



▲ *How salinity destroys irrigated land*

The ***climate*** in the Sahel is getting drier – on average it now rains less there than it did 50 years ago.



Cattle, sheep and goats are ***overgrazing*** the vegetation – leaving the soil exposed to wind erosion.

Population growth in the countries of the Sahel is increasing the demand for food. The resulting ***overcultivation*** of crops is using up the nutrients in the soil, so eventually nothing will grow.

Population growth is also increasing the ***demand for fuel wood***, so the land is being cleared of trees that bind the soil together and prevent soil erosion.

YOUR QUESTIONS

1 Write a definition for irrigation and desertification. Then add them to your dictionary of key terms.

2 Draw two spider diagrams – one to show the causes of desertification and the other to show how it can be stopped.

3 a Describe the different economic activities in the Sahara Desert.

b Choose one and describe the challenges and problems that it faces.

4 a Describe how ***either*** Egypt ***or*** Algeria are preparing for the future.

b Which approach is more sustainable? Explain your answer.