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DESERTS

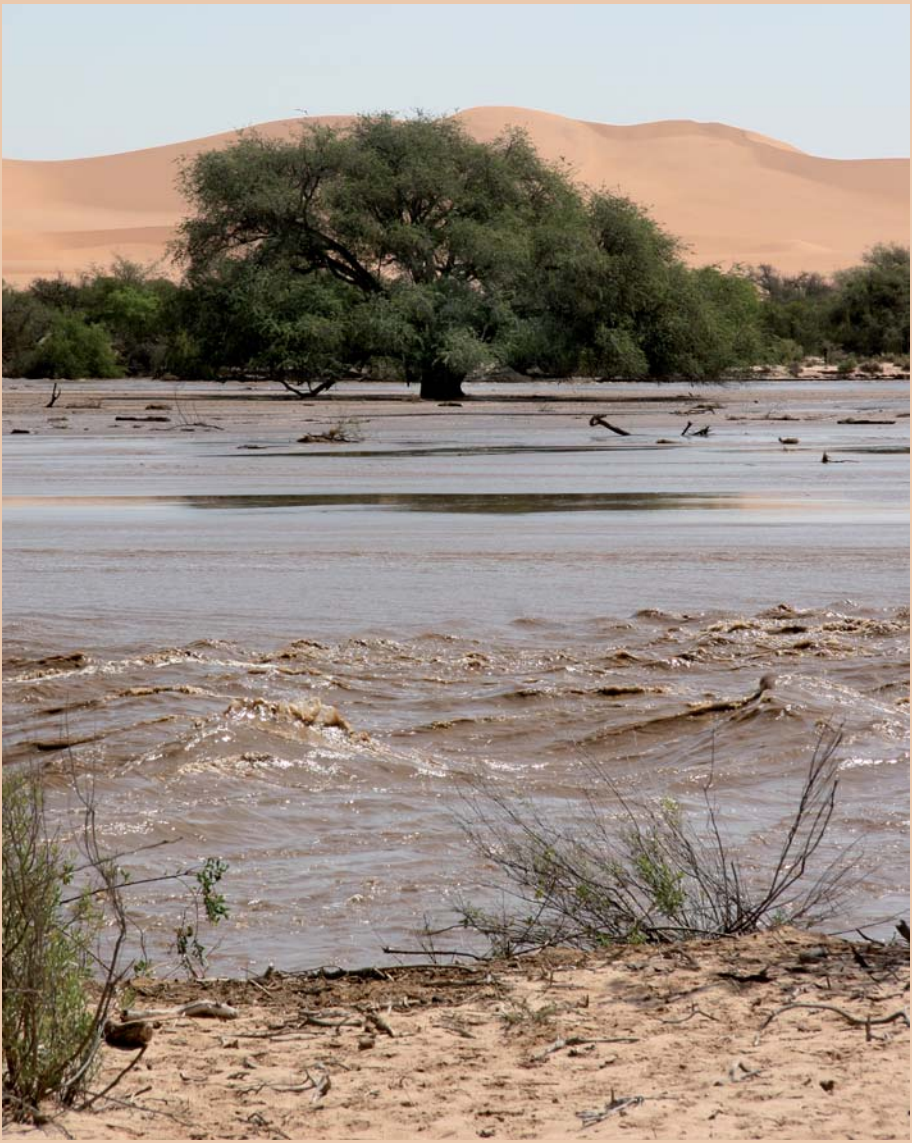


Photo: U Bader (DHPL)

PLACES OF EXTREMES

DESERT DEFINITIONS

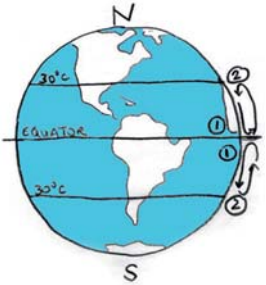
What comes to mind when you think of a desert? Sand dunes? Heat? Thirst? Just nothing? That is not entirely wrong although not completely true either. There are many different deserts around the world. In general, deserts have the following climatic conditions:

- Extreme temperatures
- High evaporation
- Very little or no rainfall or snowfall
- Very strong prevailing winds

Deserts however have a variety of different landscapes as well as plants and animals. All deserts are defined by their climate, but that does not determine what they look like or what lives there.

HOW ARE DESERTS FORMED?

Three main effects can cause deserts to form. These effects are primarily determined by factors such as temperature, water and wind.



Equatorial wind belt:

① Warm air at the equator blows north or south.

② At the boundary to temperate regions, it lowers making the air too dry for clouds to form.

Example: Sahara Desert across northern Africa

Rain shadows:

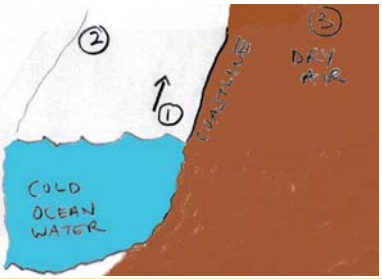
① Mountains block the passage of rain clouds.

② Incoming warm and moist air is "pulled" by the wind towards the top of the mountains.

③ Here it condenses and falls as rain before it crosses the top.

④ Air remains dry creating a "rain shadow".

Example: Gobi Desert in Mongolia/China



Cold current:

① Cold ocean currents move along the coastline.

② Air over the cold oceans is cooled, keeping moisture to the lower atmosphere.

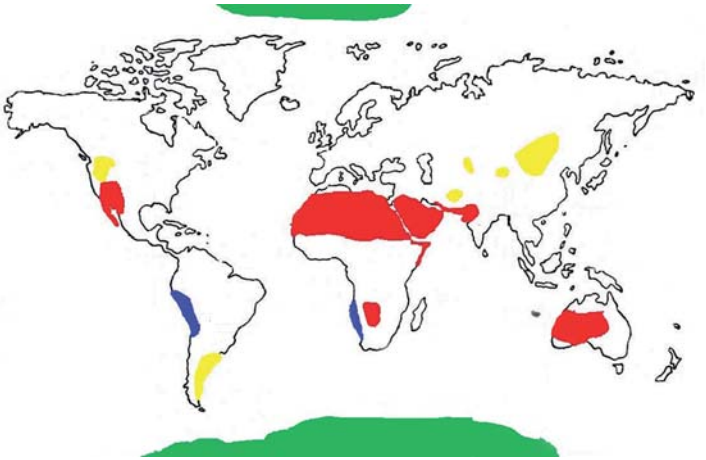
③ Here (inland) air remains dry.

Example: Atacama Desert in Chile

It's a Fact: Evaporation rates in deserts are often 20-100 times the annual precipitation, (i.e. rain, fog, snow).

DESERTS OF THE WORLD

Deserts are very special places found all over the world. There are over 50 deserts in the world with more than 25 found in Africa. They take up about 33% of the Earth's land surface. Study the map on the right to find the locations of deserts in the world and to complete the activity below.



EXPLORE THE FOUR MAIN TYPES OF DESERTS:

Cool coastal deserts: Rainfall ranges between 0mm to 85mm annually. Temperatures are very cold in winter (below 0°C) and very hot in the summer (over 40°C). Wind blows mostly to the east.


Atacama Desert


Gobi Desert

Cold winter deserts: Summers are hot and dry (50°C). Winters are cold (-30°C) with low rain or snowfall. Rainfall hardly reaches these deserts because they are blocked by high mountains.

Polar deserts: Rainfall is less than 250mm. They are cold throughout the whole year. Temperatures never really go above 0° C because sunlight is reflected by snow and ice.


Antarctic region


Sahara Desert

Subtropical deserts: Rainfall is mostly in short bursts. High atmospheric pressure generates hot, dry winds that prevent cloud formation. During the hottest months, temperatures exceed 50°C. Due to the dry air, sometimes rain evaporates before it even reaches ground!

ACTIVITY:

1) Name a continent that does not have deserts: .....
2) Name any other desert you know in the world (apart from those already mentioned on this page): .....

It's a Fact: The Earth's polar deserts are changing. Polar ice caps are breaking up, melting and the sea level is rising.

ARID BIOMES OF NAMIBIA

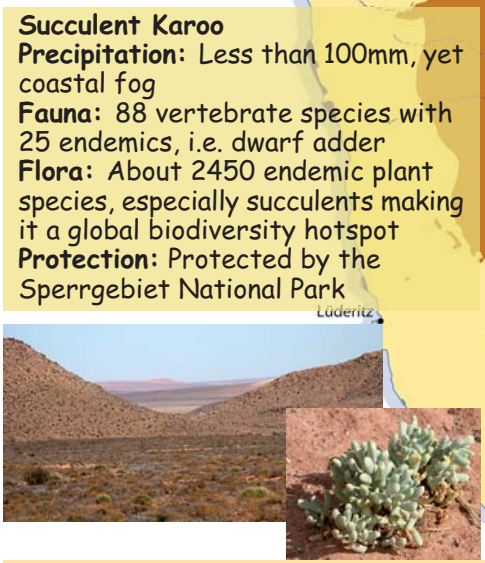
Namibia is the driest country in Sub-Saharan Africa with cold coastal and subtropical deserts occupying much of the country. These can be classified into four main desert biomes. A biome is an ecosystem that contains communities of plants and animals that have adapted to the conditions in which they occur. Let us find out more about Namibia's dry biomes! Do you live in one?

THE DESERT BIOME

Precipitation: Extremely arid; less than 100mm yet coastal fog
Fauna: 89 vertebrate species with 29 endemics, i.e. the golden mole
Flora: Dominated by annual grasses *(Stipagrostis)* and dwarf shrubs
Protection: Protected through a series of parks

ARID SAVANNAH BIOME

Rainfall: 200-450mm
Fauna: 72 vertebrate species with 15 endemics, i.e. the Damara mole rat
Flora: Dominated by *Acacia* species and the mopane tree and a wide variety of grasses
Protection: Under private and communal land ownership



Succulent Karoo

Precipitation: Less than 100mm, yet coastal fog
Fauna: 88 vertebrate species with 25 endemics, i.e. dwarf adder
Flora: About 2450 endemic plant species, especially succulents making it a global biodiversity hotspot
Protection: Protected by the Sperrgebiet National Park

Nama Karoo

Rainfall: 100-200mm
Fauna: 131 vertebrate species, with 16 endemics i.e. birds such as the Sclater's Lark
Flora: Vegetation dominated by 'Karoo bushes' and annual grasses such as *Stipagrostis* species
Protection: Less than 1% of Nama Karoo is protected

It's a Fact: The Succulent Karoo is one of only two entirely arid ecosystems to earn hotspot status in the world!

NAMIB DESERT LANDSCAPES

The Namib Desert is often referred to as the world's oldest desert. It is a big area of moving gravel plains and dunes of all shapes and sizes. There are ephemeral rivers flowing unexpectedly across the desert. The dunes, plains, rivers and a foggy coast have all become vital components to support an outstanding and fascinating desert flora and fauna.

LET'S HAVE A LOOK AT THE NAMIB SAND DUNES

Did you know that the Namib has some of the tallest dunes in the world? Some are as tall as 300m! There are two major dune fields that occur in the Namib from:

- **Orange River** to the Kuiseb River
- Torra Bay to the Curoca River in Angola

Here are three main types of dunes that are common in the Namib:

Barchan dunes are created by winds blowing from one direction, at right angles to the dune.
Example: dunes near Walvis Bay.

Parabolic dunes are created by winds blowing from one constant direction during the year.
Example: dunes near Sossusvlei.

Linear dunes are created by equal wind from two opposite directions.
Example: dunes along the Kuiseb River at Homeb.

WHERE DOES THE NAMIB SAND COME FROM?

There are different theories to explain as to where the Namib sand originally came from. Most believe that it is from the Orange River catchment, which extends as far as Drakensberg Mountains of Lesotho/South Africa. Here, weathered rocks are washed down the Orange River to the sea as sand. Ocean currents move the sand northwards and deposit it on the coast. The sand is blown inland by the southwest wind. This process happened over millions of years and continues today.

It's a Fact: The name Namib comes from a Nama word meaning 'vast place', which is also the name origin for Namibia.

NAMIB DESERT LANDSCAPES

GRAVEL PLAINS

The gravel plains of the **Namib** lie north-east of Walvis Bay. These are large rocky areas with little vegetation that is mostly only seen after good rains. The important lichens are found in the gravel plains making them a very sensitive **landscape.** Lichens are important in keeping the soil together.

EPHEMERAL RIVER

Most **rivers** in Namibia only flow after good rains and flow westward for a few hours, days or over a few weeks. Many hardly reach the ocean as water quickly evaporates or seeps into the ground. Some rivers such as the Swakop River manage to flow to the coast about every five years. The rivers are 'linear oases' as they provide underground water year round which supports plant and animal life.

INSELBERGS

An **inselberg** is a German word used to describe an isolated hill or mountain that stands above well-developed plains. Inselbergs were left behind as softer, surrounding desert materials eroded away. Due to their height, inselbergs catch fog or rainwater easily. The water then runs off and accumulates in cracks and crevices. As a result, inselbergs support a richer diversity of fauna and flora than the surrounding gravel plains.

ACTIVITY: Unscramble the words below. All words are highlighted **(bold and black)** in the text above.

revisr.....

sinbelrge .....

afuan .....

pedsalnac.....

mabin.....

DESERT MIRAGE

Is it a pool of water? It may look like a 'pool', however when you get closer you realise there isn't any water. A mirage is a visual impression in which distant objects are manipulated by layers of hot atmospheric air. On a very hot day in the desert, a mirage can be seen clearly from a distance.

It's a Fact: The Namib Desert is known as a living desert because it has a higher biodiversity compared to any other desert due to factors such as coastal fog.

PERSONALITIES IN CONSERVATION

Name: Dr Mary Seely
Number of years on the job: 45 years (Director of the Gobabeb Centre, 1970-1998 and of the Desert Research Foundation of Namibia, 1990- 2006).
What made you interested to spend your life researching and protecting the Namib Desert? It is a fascinating landscape with incredible adaptations. It has everything from white beetles, to the golden mole, to fog basking beetles and grasses, to moving dunes, to a variety of colours. This array of interesting questions attracted a variety of researchers with whom I had the opportunity to learn and work further.
What would you say has changed between the time you first came to the Namib and today? When I first arrived, the desert was mainly a barren stretch while rushing from Windhoek to Swakopmund. Now people may be in a similar hurry but many more know about the unique fauna and flora of the Namib. Every advertisement, from transport to paint, has a picture of the Namib dunes. The fact that Namibia has nominated the Namib Sand Sea as a World Heritage Site would never have happened when I first came to the Namib.
Tell us about Gobabeb: Gobabeb is a fascinating oasis of knowledge and interaction attracting researchers and students alike. The questions people ask, the wonders of the dune habitats, the constant fascination of an ephemeral river at the doorstep, the animals and plants that come and go with the rain, fog or drought - all are key attributes of Gobabeb. Located at the intersection of three habitats: dunes, river, plains and the transition between fog and rain as the dominant water source. Opportunities for comparative research, e.g. the side-winding adder in the dunes, the puff adder in the river and the horned adder on the plains offer potential for research and training unequalled elsewhere in Namibia.
What has been most challenging in your career to understand and protect the desert? Most challenging has been convincing people that are primarily interested in cattle and crop farming that the desert has many values. These range from tourism opportunities (Sossusvlei is either the most or second most frequented tourism attraction in Namibia), conservation values, sense of place to research and training opportunities. Yes, it provides mining opportunities as well but these are only one of a range of values that contribute to Namibia's image and suite of opportunities.

What is your message to the Namibian youth? Keep your horizons wide while critically thinking about your ideas, your plans, your environment. Even if your first attempts don't succeed, continue applying yourself to go forward.

TAKING ACTION: Fighting against Land Degradation

UNDERSTANDING LAND DEGRADATION AND DESERTIFICATION

Land degradation is the loss of biological or economical productivity of land. It is caused by human activities such as overgrazing, deforestation or soil erosion and natural activities such as prolonged droughts or floods. Therefore, desertification is the degradation of land in drier areas. Desertification then leads to barren areas that look like deserts. What we often don't understand is that a desertified area is not necessarily a desert. A desert has been in existence for many years thus organisms have adapted to living in such conditions, WHILE in a desertified or degraded area, environmental change is too fast for life to adapt.

THE INTERNATIONAL COMMUNITY TAKING ACTION

United Nations Convention to Combat Desertification

Desertification has been a subject of global concern for a long time. In 1994, the United Nations Convention to Combat Desertification (UNCCD) was established.

- Improve land productivity;
- Restore or preserve land;
- Establish more efficient water usage and to introduce sustainable development in affected areas;
- Improve the living conditions of those populations affected by drought and desertification.

The United Nations launched the United Nations Decade for Deserts (UNDDD) and the Fight Against Desertification which runs from 2010-2020 which seeks to:

UNITED NATIONS DECADE FOR DESERTS AND THE FIGHT AGAINST DESERTIFICATION

- Promote actions that will protect the world's drylands from further deterioration and degradation into deserts.

NEW UNCCD POLICY FRAMEWORK 'Zero Net Land Degradation' (ZNLD)

This policy was introduced to give clear targets and widen stakeholder involvement. It aims to secure the contribution of our planet's land and soil to sustainable development, including food security and poverty eradication. To achieve this, degradation of productive land should be avoided and already degraded lands need to be restored.

Targets:

- zero net land degradation by 2030,
- zero net forest degradation by 2030 and
- drought preparedness policies implemented in all drought-prone countries by 2020.

It's a Fact: The 17th June is the World's Day to Combat Desertification. Remember it and play your part!

TAKING ACTION: Sustainable Land Management

When faced with land degradation, people often respond by making use of land that is even less productive, transforming rangelands into cultivated land, or moving to cities or to other countries. This leads to unsustainable land practises, further land degradation and many socio-political problems.

THE NAMIBIAN GOVERNMENT TAKING ACTION

Seven government ministries collaborated to developed the Country Pilot Programme-Integrated Sustainable Land Management (CPP-ISLM). CPP was established to help "Combat land degradation using integrated cross-sectoral approaches which enable Namibia to reach its Millennium Development Goal #7: "Environmental sustainability" and assure the integrity of dryland ecosystems and ecosystem services".

The project ran for 5 years and ended in 2012. Some of the successes were:

- Development of action plan to take best practices and upscale them for wider implementation
- Capacity building of communities and students
- Implementation of improved practices such as conservation tillage (CONTILL), rotational grazing, fuel-efficient cooking, tree planting and more.

What is Contill?

Conservation tillage (CONTILL) is a method used by some farmers in the northern Namibia in soil cultivation. Plant residues are left on fields after harvesting and are ploughed into the soil before planting the next crop. This method applies three basic principles: minimum disturbance of the soil, keeping the soil covered as well as mixing and rotating crops.

Environmental benefits:

- Reduces soil erosion
- Improves soil and water quality through the decomposition of plants.
- Conserves water by reducing evaporation rates on the soil surface.
- Crop residue provides food for wildlife.

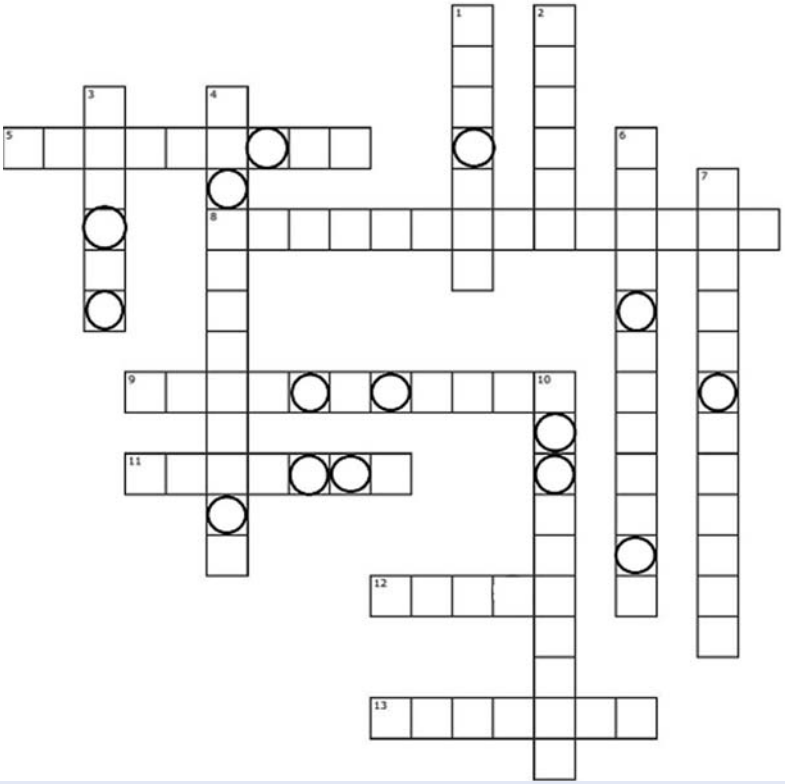
Currently the Ministry of Environment and Tourism is developing a new strategy for post CPP-ISLM.

To find out more about CPP, simply like their Facebook page CPP.ISLM

It's a Fact: CPP reviewed 18 Natural Resources Management policies and came up with incentive measures to improve how multiple sectors work together.

TEST YOUR DESERT KNOWLEDGE

Directions: Complete the crossword below. All the answers to the clues below are highlighted throughout the text on all pages. When done unscramble the circled letters and fill them in to find out what to take action against.



Across

5. Dune shape created by winds blowing one constant direction
8. Namibia's only biodiversity hotspot
9. Forms the border between Namibia and South Africa
11. Condition of atmosphere over a long period of time
12. Young people
13. Make better

Down

1. Oldest training and research centre in the Namib Desert
2. Takes up much of Namibia's land surface
3. Washed or blown away
4. Protection of the natural environment
6. East of Walvis Bay, where lichen fields are found
7. Found at the northern and southern poles
10. Created by dry air behind mountains

Taking Action Against:

__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

HOLDEN'S HANG-OUT

Holden Mole is the name. NaDEET's my hangout spot. I love Namibia. My number one job is to get the basics – my food, water and shelter. "Education is the key"- I know everyone says it, but it is true. So if you don't know, ask me.

Holden Mole, NaDEET, PO Box 31017, Pioniers Park, Windhoek
email to admin@nadeet.org or post them on NaDEET's Facebook page

Dear Holden

I would like to know more about snakes. Why do they not have legs and why do they lose skin?

From Franky, Maltahöhe

Dear Franky,

Snakes have evolved over many years. As snakes adapted to their environment, they had less need for arms and legs. They developed other means of moving. Snakes have no arms or legs, yet they can move fairly well through grass, sand and in some cases water, and they can easily climb. On the other hand, like most reptiles snakes shed their skin to allow for growth, as well as to remove parasites along with their old skin.

Holden Mole

Dear Holden,

Do ostrich lay 24 eggs at once or one by one?

From Cordelia, Lüderitz

Dear Cordelia,

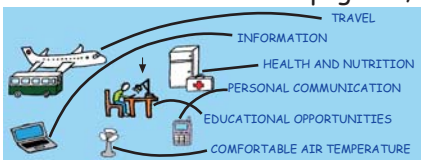
A healthy ostrich hen lays between 12 and 15 eggs during the breeding season, which starts in March and ends in September. However, it only lays one egg during a 48 hour period.

An ostrich egg compared with a normal chicken egg

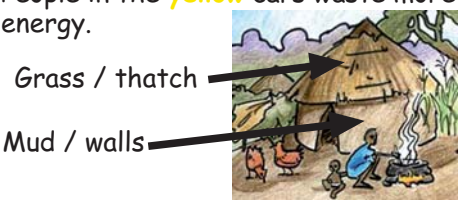
Holden Mole

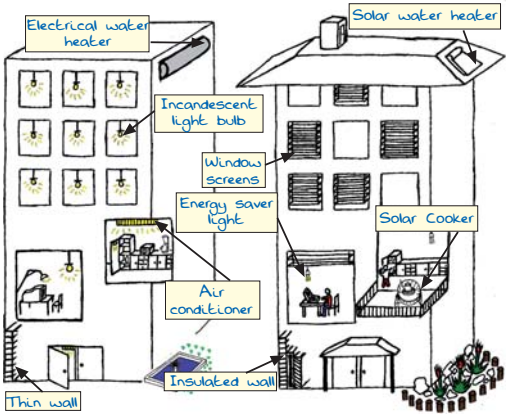
UPDATE FROM LAST ISSUE

Answers to activities on pages 3, 4 and 10



Public vs private transport activity: People in the **yellow** cars waste more energy.





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NaDEET Centre offers week-long programmes for school, youth, educator & adult groups in the Namib Desert.

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