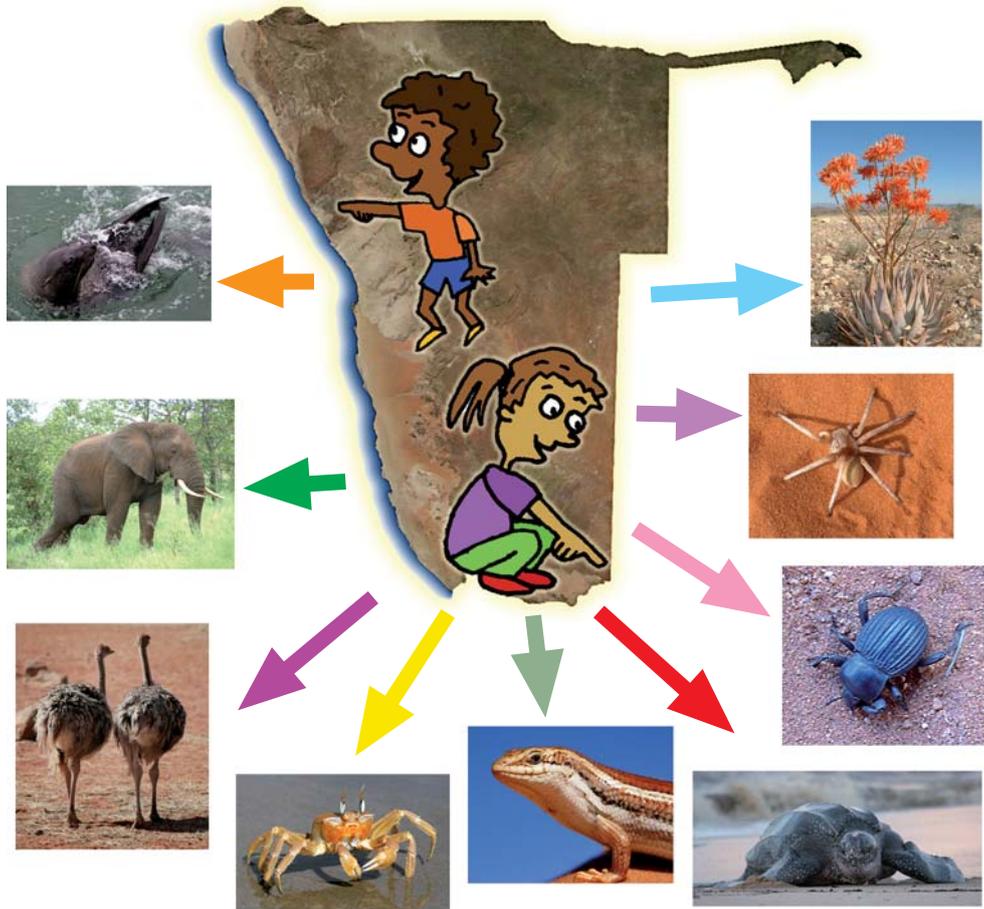


# BIODIVERSITY



**Biodiversity is Life ~ Biodiversity is OUR Life**

## BIODIVERSITY: The BIG Picture



As a part of nature, humans are woven into the web of life. We depend on Earth's biodiversity to provide us with the food, water, shelter and the ecological processes we need to survive. The complexity of life forms and their interactions with each other and the environment is what makes our planet fit for humans!

### GETTING TO THE ROOTS

**Bio** means "life" and **diversity** means many different types. So **biodiversity**, or biological diversity, refers to the complicated and fascinating variety of all life on Earth.

#### **Biodiversity is:**

- ~ all the millions of different species (living things) on Earth
- ~ the genetic differences within each species
- ~ the different types of biomes on Earth

To celebrate the diversity of life on Earth and to honour its importance to our lives, the United Nations has declared 2010 the International Year of Biodiversity. Around the world, people are learning about how biodiversity supports life. They are taking action to reduce biodiversity loss and protect our life-support systems. For more information, go to [www.cbd.int](http://www.cbd.int)



### BIODIVERSITY AT RISK

Population growth and human activities are threatening this rich diversity! Unsustainable development, pollution and habitat loss put local plant and animal communities in danger and can disrupt important ecological processes!



**Here's an example:** Namibia's vultures are endangered due to human activities like disturbance of nesting sites, shooting and in particular poisoning. We need vultures in our ecosystems. As scavengers, they "clean up" after other animals to prevent spread of disease and flies.



**Biodiversity loss harms our quality of life and that of future generations.**

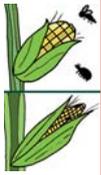
In this issue, you will explore the web of life and learn about some of the ways that humans, other organisms and ecological processes are connected. Biodiversity is life. Biodiversity is our life!

# BIODIVERSITY: A CLOSER Look

**SPECIES DIVERSITY** Scientists think there are about 13 million different species on earth, but only 1.75 million have been identified. Organizing species based on similarities is called **taxonomy**. Can you add more examples to the table?

	Name	Key Features	Examples (Write more below!)	
	PLANT	Produces energy from sun	Trees, algae... grasses, herbs, reeds	
		FUNGUS	Reproduces with spores	Yeast, mould...
ANIMALS		Fish	Live in water, have gills/scales	Tilapia, anchovy...
		Insect	Has 6 legs, 3 body parts	Ant, cricket...
		Crustacean	2-part limbs, often aquatic	Crab, shrimp...
		Bird	Feathers, eggs	Vulture, lark...
		Arachnid	Has 8 legs	Spider, scorpion...
		Mammal	Babies drink milk, have hair	Lions, cow...
		Amphibian	Born in water, can live on land	Frog, toad...
		Reptile	Scaly skin, cold-blooded	Snake, turtle...

**GENETIC DIVERSITY** All humans have different appearances and abilities. Animals and plants are the same! Even if you plant the very same type of mealies, genetic diversity explains why some are bigger, some smaller, some more resistant to pests and some more resistant to drought. Genetic diversity makes it more likely that a species will survive environmental crisis or change.



**BIOME DIVERSITY** Each colour on the Namibian map represents a different biome. Do you know which is which?

**Biomes** are areas with similar climates and landscapes. Each biome has a different type of animal and plant diversity. The different biomes around the world are what make Earth so biologically diverse!



**Directions:** Colour in the squares below. Karoo has been done for you.

Karoo 

Woodland

Wetland

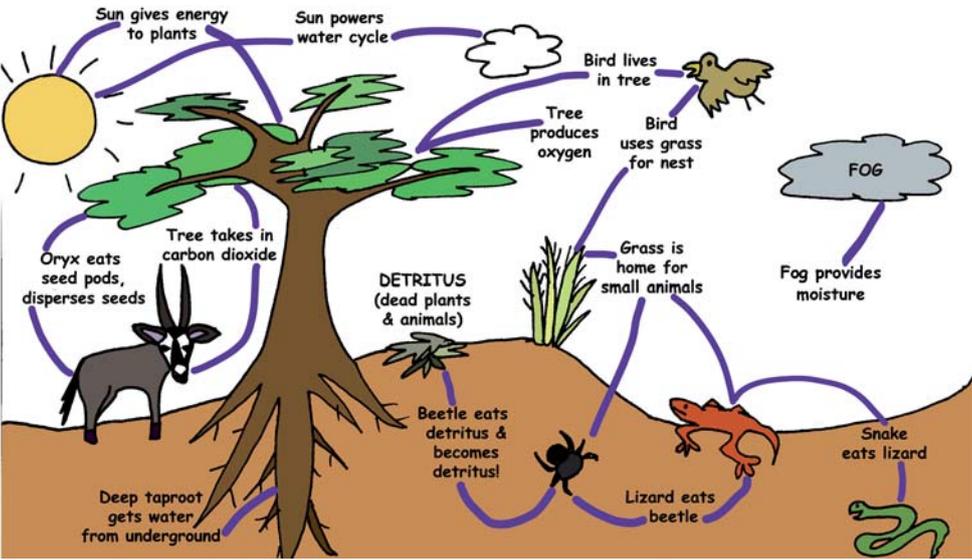
Savanna

Desert

# ECOSYSTEM: The Web of Life

In nature, everything connects. Organisms interact with each other and their environment in different ways to maintain the flow of food and energy and the cycling of nutrients. A group of **biotic** (living) organisms and **abiotic** (non-living) factors is called an **ecosystem**. Here is an example of a desert ecosystem:

## DESERT ECOSYSTEM



What happens when an animal or plant population is harmed by overexploitation or habitat destruction? The balance of nature is upset and the entire web must readjust, if it can adapt quickly enough. Change is a natural process, but human-caused change is unnatural and often too quick for species to adapt in time.



What if the **lizard** disappeared from the desert ecosystem?

**Directions:** Circle all the directly connected organisms on your web of life above. Then, fill in below:

What did the lizard eat? .....

Now what might happen to that species? .....

.....

Who ate the lizard? .....

Now what might happen to that species? .....

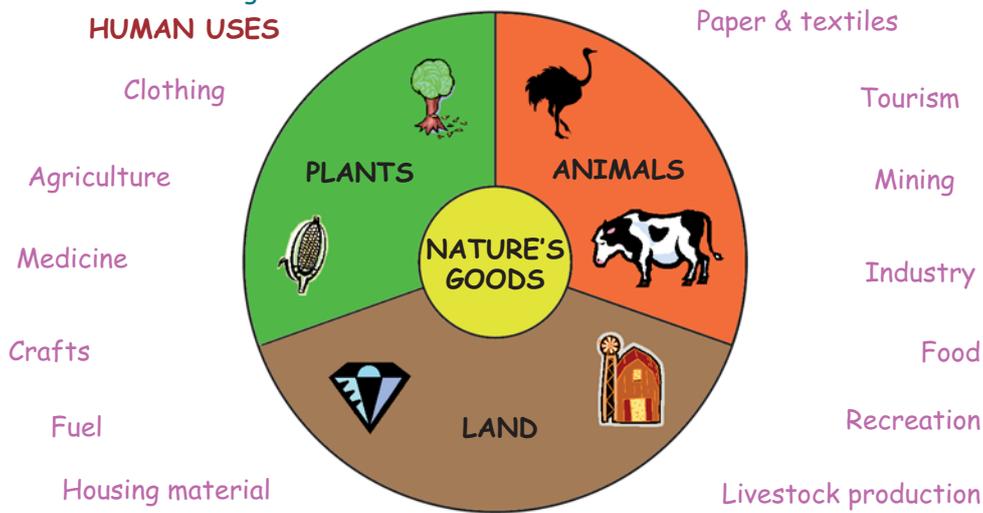
.....

.....

## Why is Biodiversity Important to Humans?

In addition to our role in the web of life, we rely on diverse **natural resources** to provide us with many things: we call these "**nature's goods**." These include: food, medicine, paper, building materials, fuel, shelter and more!

**Directions:** Draw lines to match each section of the circle with all the human uses around the edges.



What about non-living natural resources?

They still relate to biodiversity, because they are often homes for living things. If we use clay to build, we must also think of the animals and plants that live there. A resource like water is **abiotic**, but all living things need it!

What if we only had ONE type of plant and animal, like goats and pumpkins?

We would have to eat goat and pumpkin all the time! How boring! And if a disease or drought came and killed all the pumpkins — then we would have NO plants at all. A diverse ecosystem is more stable because different species can survive different diseases and environmental change.



# Decade of Education for Sustainable Development: Biodiversity

Currently, biodiversity is at risk - largely due to unsustainable development

Namibians rely on natural resources for income and well-being. However, we are currently using more resources than our planet can sustain! Follow the chart to see what happens with different threats to biodiversity loss.



- ~ Deforestation
- ~ Overgrazing
- ~ Water & air pollution
- ~ Climate change
- ~ Invasive species
- ~ Urbanisation
- ~ Monoculture

- ~ Habitat loss or destruction
- ~ Land degradation
- ~ Depleted natural resources
- ~ Disrupted ecological processes

Reduced biodiversity



In order to protect biodiversity and ensure that our natural resources and ecological systems continue to exist for future generations, sustainable development will be essential.

"There can be no long-term economic or social development on a depleted planet." - UNESCO

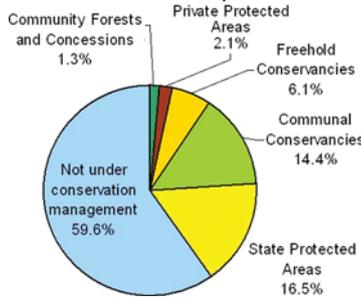
United Nations Millennium Development Goal 7: Ensure Environmental Sustainability.  
**Target 2:** Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss.

The environment is one theme of the Decade of Education for Sustainable Development (DESD). Environmental education teaches people how to conserve natural resources and develop sustainable and environmentally-friendly lifestyles.

DESD is led by the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

For more information:  
[www.unesco.org](http://www.unesco.org)

One way to protect biodiversity is to set aside land for conservation. Namibia has set 40% of the country aside.



## Personality in Conservation

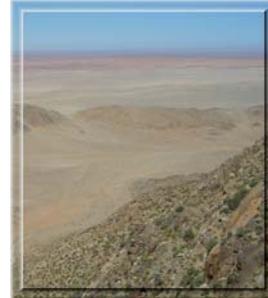
**Name:** Succulent Karoo

**Identity:** Biome

**Claim to fame:** One of the world's 25 "Biodiversity Hotspots." A hotspot is a place that is extremely important to conserve because many of its plants and animals are **endemic** — found **nowhere else on earth!**

**Biodiversity:** The Succulent Karoo biome has the highest diversity of succulent plants in the world!

A **succulent** plant is adapted to the desert and is able to store water in its thick stems, roots or leaves. See pictures below! The Succulent Karoo has nearly 2,500 different endemic plants. There are also many endemic insects and reptiles. If they go extinct here, they are lost forever to the world.



**Biggest threats:** The Succulent Karoo is very sensitive to land degradation. More than 90% of the biome is used for communal or commercial grazing, and overgrazing has already degraded nearly two-thirds of the area. Also, when alien invasive species are introduced, they compete with the native plants. Sometimes collectors will illegally harvest rare plants, putting wild populations at risk.

**Protection:** The Sperrgebiet National Park protects 26 000 km<sup>2</sup> of the northern part of the Succulent Karoo. In the past, this area

was declared a diamond mining zone. It was off-limits to most people and it is still well preserved as most of the diamonds were actually found along the coast. However, most of the Succulent Karoo biome lies in South Africa, unprotected.

**Advice to Namibia's Youth:** Learn as much as you can about this unique and fragile area, especially about ways to protect it. It is recognized by the world as one of a kind!



Bush Telegraph

## For the BEGINNER READER

I understand why we want to protect biodiversity in general. But what about creatures like flies, spiders or snakes? They're yucky!



Hey! I may annoy you, but I help pollinate many plants, like the smelly shepherd's bush in the Namib Desert. That plant is too stinky for most other insects, but not for me! You humans like to eat its fruit, which would not exist without me! You also use the root, bark and leaves for preservatives, drinks and as medicine for inflamed cattle eyes. It is also food for many animals that you raise to sell or eat!



I may look fierce, but I usually won't harm you! Instead, I eat pests like mosquitoes and aphids. Without me, there would be so many of these bugs! Some mosquitoes spread malaria in their saliva, and aphids like to eat crops! I also eat flies to make sure that there are not too many of them bothering you!



I also help keep things in balance. I eat mice and rats. Without me, they would run all over the place—in your kitchen and your bed! They would eat crops, contaminate water and spread disease. In the past, rodents spread a plague that killed thousands of people! Scientists are using my venom in medicines to treat cancer, arthritis and heart disease.



Can you think of other animals that many people do not like? How might these creatures actually help humans?

## For the **ADVANCED READER:** Birds as Biodiversity Indicators



Birds are the world's great connectors. They are the global travelers of the animal kingdom, often flying thousands of miles each year when they migrate. As a result, they are affected by loss of habitat, climate change and reduced biodiversity all over the world.

<h3 style="margin: 0;">BIRDS IN ECOSYSTEMS</h3> <p>Birds play all sorts of roles in ecosystems worldwide, and they are often very important in maintaining balance in the web of life:</p> <ul style="list-style-type: none"> <li>~ <b>Predators:</b> Many birds help keep insect populations under control.</li> <li>~ <b>Scavengers:</b> Like vultures, some birds "clean up" their area by eating dead animal carcasses.</li> <li>~ <b>Pollination:</b> Some birds help flowering plants reproduce.</li> <li>~ <b>Seed dispersal:</b> When birds eat fruit and defecate the seeds they are helping new trees grow.</li> </ul> <p>Think back to the web of life. Can you think of other ways that parts of the ecosystem might be affected by the loss of birds?</p> <p>A migrant bird may not be a key species in one ecosystem, but in another, its presence may be essential for avoiding extreme strain or collapse.</p>	<h3 style="margin: 0;">INDICATOR SPECIES</h3> <p>Birds can be considered an <b>indicator species</b> because they often are the first animals in which we can see the effects of human actions leading to biodiversity loss.</p> <p>Negative effects from <b>pesticide</b>, <b>pollution</b> and <b>climate change</b> often start at the bottom of the food chain with insects or small sea creatures, but it is harder to see when these populations decrease. However, birds eat these small animals, and we <b>CAN</b> see as the bird populations decrease.</p> <p><b>Climate change</b> is a particularly worrisome threat to birds. It disturbs where birds live and confuses their feeding and breeding behaviours. As global temperatures increase and patterns of rainfall shift, birds that can migrate will do so. Non-migratory birds may suffer from the competition with invasive birds, and they may go extinct if they cannot adapt to the new conditions.</p>
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### FURTHER THINKING

The Curlew Sandpiper lives in the Arctic, but spends its winters (our summers!) on the Namibian coast. As the climate changes, what is happening in the Arctic? How might the Curlew Sandpiper be affected by this change?

## ACTIVITY PAGE: Be a Bio-DETECTIVE

People come to Namibia from all over to enjoy the biodiversity in this country. It's all around you - get out and enjoy it! Biodiversity is not just talking about rhinos or ostriches! It's everything living, from grass to flies. What type of biodiversity do you have in your area? Go on a search to find out! Fill in the form and use the tips as your guide.

**BIODIVERSITY SEARCH**

Date of search: ..... Time of search: .....

Name of searcher (that's you!): .....

Location of where you searched: .....

Write down how many different things you saw in each category:

Plant: ..... Fungus: ..... Insect: .....

Amphibian: ..... Reptile: ..... Bird: .....

Mammal: ..... Arachnid: ..... Fish: .....

Crustacean: .....

Total number of animals: ..... Total number of plants: .....

Which category had the most things?  
.....

Which category had the most diversity?  
.....

Overall, did your area have much biodiversity?  
.....

Why/why not? .....

Draw one interesting plant or animal that you saw:

**TIPS FOR YOUR BIODIVERSITY SEARCH**



Be a **bio-detective**. ~ Look for **signs**. Do you see any tracks, droppings, nests, burrows (holes), or feathers? ~ Use your **ears**. Listen for humming, buzzing or chirping.  
 ~ It's okay if you don't know the **names** of what you see. You can write down what they look like, and then **ask a friend or teacher**, or look in a book. ~ Use **binoculars** or a magnifying glass if you have them. ~ **Pay attention** to colours, shapes, sizes and textures.

~ **Think small**. Bend low to the ground or lie on your stomach. ~ Do more biodiversity searches throughout the year to look at **changes**. ~ **Keep learning** about the adaptations of species around you. Ask questions! **HAVE FUN!**





## Chinga's & Nzovu's Corner



Dear friends,

We love answering your questions about the environment. If you have any, send them to: Chinga & Nzovu, NaDEET, PO Box 31017, Pioniers Park, Windhoek



Dear Chinga and Nzovu,  
Why do the seeds of weeds germinate faster than the seeds of ordinary plants?

Yvette in Walvis Bay

Dear Yvette,

We bet that farmers all over will want to know the answer to this one! It's true that the seeds of weeds **germinate** (begin to sprout) quickly, but they do other things quickly too—like grow, reproduce and spread their own seeds. The weed's speedy lifecycle is one of its **adaptations** to cope with people who are always trying



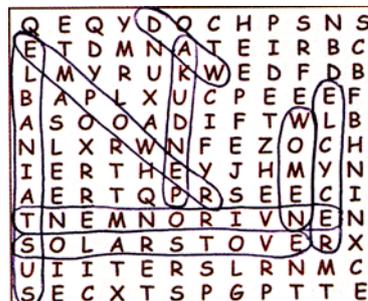
to uproot it. Another adaptation is its ability to grow in very poor soil, where other plants do not. What is a weed, anyway? It's a trick question, because there is no specific answer. A weed is anything that you find unattractive or annoying, anything that is growing where it is not wanted. Sometimes weeds actually have beautiful flowers (like the Devil's Thorn shown here!), but they annoy people with their thorns. Other weeds compete with crops for soil nutrients or sun. To answer your question, it is not so much that weeds grow faster, it is just that we usually call things that grow fast "weeds."

Chinga and Nzovu

## Updates from Last Issue

Answer from last issue: Pages 3 & 8

1. When I brush my teeth I can turn off the **tap** to save water.
2. When I leave my room I can turn off the **light** not to waste electricity.
3. I can reuse an old plastic bag by turning it into a **basket/rug/rubbish bag**.



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**NaDEET Centre: A Sustainable Living Experience**

Tel: 063-693012 Fax: 063-693013 Email: admin@nadeet.org Web: www.nadeet.org

NaDEET Centre offers week-long programmes for school, youth, educator and adult groups in the Namib Desert. The programme aims to engage participants in sustainable living through first-hand learning and living experiences.

**Join the BUSH TELEGRAPH Reader Club**



The Bush Telegraph is a mini-magazine for Namibian youth. It aims to increase knowledge of and improve attitudes towards our environment through reading. It is distributed twice a year for free. Just fill in this form and send it to this address: **Namib Desert Environmental Education Trust (NaDEET), P.O. Box 31017, Pioniers Park, Windhoek**



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Tick the correct box:

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School.....

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**Are you an educator?:** Multiple copies of the **Bush Telegraph** are available for you to use for education purposes. If you are interested, please complete the following:

yes, please send me ..... additional copies.