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Biodiversity Showcase Garden (BSG) Green Point Urban Park

Lesson Plans and Activities for
Grades 1 – 7

This project was initiated by the Environmental Resource Management Department of the City of Cape Town, as part of the 2010 FIFA World Cup Host City Cape Town's Green Goal Programme.

This resource was developed and piloted by Wendy Hitchcock.



October 2011

The Biodiversity Showcase Garden (BSG): a place for people to be inspired by biodiversity

About the BSG

The Green Point Urban Park and the BSG were developed by the City of Cape Town in preparation for the 2010 Soccer World Cup. The redevelopment of the Green Point Common into an urban park, that is freely accessible to the citizens of Cape Town, is one of the City's Local Action for Biodiversity Projects.

The aim of the Biodiversity Garden is to showcase the amazing diversity of plants and animals in the Greater Cape Town area. A variety of colours, smells, textures and shapes of our local fynbos diversity has been tastefully recreated for the visitors to experience, enjoy, and value. The garden is a green, safe and peaceful place to sit, relax, and enjoy being outside where people can reconnect to nature and all that it gives us.

The concept of biodiversity is easy to understand by walking around the themed areas and reading the carefully designed information boards. Gardeners can see how local indigenous species thrive in the demonstration gardens. There are many useful tips on simple ways to make gardens that support biodiversity by taking local soils and climate into consideration. It is also a place of exploration where people can find out how the San and Khoi khoi people used to live and used the natural environment to provide all their needs. The garden is also designed for children and they are able to explore the garden and find the animal sculptures that represent the live animals of this area.

The ultimate aim is that the people of Cape Town will learn to value our local biodiversity and feel inspired to make changes in the way they live to ensure that future generations can also benefit from it.

About this resource

The activities in this resource were developed and piloted with a range of different learners from local schools between February and June 2011. Feedback from the learners was used to adapt and improve the activities presented here. The new curriculum documents were consulted to make the lesson content relevant for each grade. However, the activities are not grade specific and teachers are encouraged to use the ideas presented and adapt them for their own specific needs. Biodiversity is a topic that has many dimensions and there are endless different possibilities for exploring it. I hope that you have as much fun using these activities as I did.

Acknowledgments and thanks to:

- Lindie Buirski from ERMD, City of Cape Town, for initiating and funding this project
- Marijke Honig from Eco-Logic who designed and planted this inspirational garden
- Pete van Heerden and other staff from the City of Cape Town who had the vision for the project and made it happen
- The teachers and learners from the following pilot schools who took part in the pilot programme
 - Gr R to Gr 7 classes from Ellerton Primary
 - Gr 4 to Gr 7 classes from Sea Point Primary
 - Gr R to 5 Home schoolers
 - Gr 3 and Gr 7 from JS Klopper Primary

Contents Page

Planning a lesson in the BSG	5
• Behaviour expected in the BSG.....	5
• Do's and Don'ts worksheet.....	6
• What is biodiversity?	7
• Why is biodiversity important	8
• Interesting facts about Green Point	9
Gr 1 Lesson Plan: Using my senses to find out about biodiversity	10
• Using my senses.....	11
• Finding colours	12
• Animals.....	13
Gr 2 Lesson Plan: Sensory Introduction to biodiversity	14
• Using my senses.....	15
• What is biodiversity?	16
• Recording colours.....	17
• Animals.....	18
Gr 3 Lesson Plan: How did the Khoi khoi use biodiversity to survive?	19-20
• Where does water come from?	21
• The Magic Bird.....	22
• Story of the Magic Bird.....	23-24
• Feeling plants.....	25
• Animals with names.....	26
• Family life.....	27
• Edible plants.....	28
Gr 4 Lesson Plan: Looking closely at biodiversity	29-30
• Water is constantly recycled.....	30
• Sorting what you see.....	31
• What is biodiversity?	32
• Plant structure.....	33
• Describing plants.....	34
• Name the Animals	35
Gr 5 Lesson Plan: Who eats who?	36-37
• What is biodiversity?	38
• What do plants do all day?	39
• Who eats who?	40
• BSG food web.....	41
• Reference sheet of animals in the BSG.....	42

Gr 5 Lesson Plan: Khoi khoi people and biodiversity	42-43
• Did you know? Reference sheet.....	44
• What is biodiversity for Gr 5.....	45
• Needs and wants.....	46
• Tools to make life easier	47
• Language links	48
• Living by the seasons	49
• Useful plants	50
• Evidence.....	51
Gr 6 Lesson Plan: Adapting to survive	52-54
• Life giving water.....	55
• Weather and climate.....	56
• Biomes and biodiversity	57
• Fynbos Survivor.....	58
• Adaptations to survive.....	59
• Soils and veld types.....	60-61
• What can I do?	62
Gr 7 Lesson Plan: Threats to biodiversity	63-65
• Human needs and wants.....	66
• What is biodiversity?	67
• How are you connected?.....	68
• What is a species?	69-71
• Climate Change Game.....	72
• Measuring Biodiversity.....	73
• Biodiversity Game	74
• The Threats of modern life.....	75
• What do you think?	76
Appendix 1: The seven life processes	77
Appendix 2: Reference list of animals in BSG	78-79
Appendix 3: Animal cards and information sheets	80-94

Planning a lesson in the BSG

Eight different lesson plans are presented here, one for each grade except Gr 5 that has two. All lessons outlined are planned to last three hours and consist of an introduction, a set of activities and a consolidation and evaluation session.

The information from pages 5 to 9 can be used to structure an introduction that is relevant to the age group of the learners and the theme of the lesson. Teachers are encouraged to use and adapt the lesson plans and activities presented for their grade or use ones from other grades if relevant. It is important to visit the garden before the outing so that you are familiar with the layout and where each activity can be carried out.

At the beginning of the outing make sure to inform the learners where the toilets are, which parts of the garden you are allowing them to visit, and make sure to go through expected behaviour.

The BSG is a special place

The BSG is a special place that has been created for the people of Cape Town to see the wonder of plants natural to Cape Town. It is like an outside church and there are some very specific behaviour codes expected if everyone is to benefit now and in the future from this garden. Remember, plants are living things and cannot get up and run away when threatened by stampeding children!

Dos and don'ts

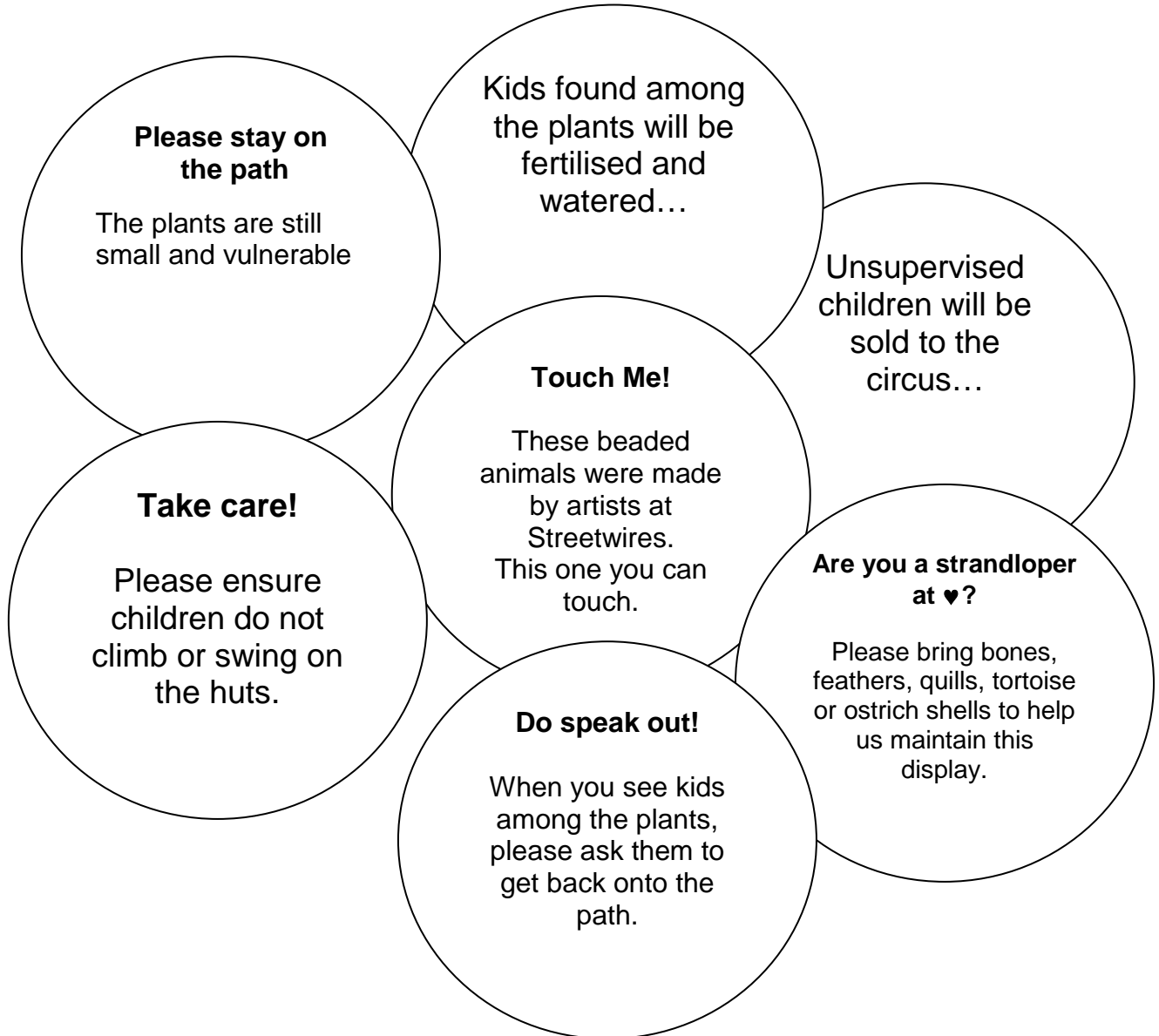
- Look, explore, enjoy
- Take time to sit still, close your eyes and listen
- Keep to the paths at all times
- Plants can be gently touched to feel the texture or leaves and smell them
- Touch the beaded animals at the edge of the beds
- Read the story boards
- Explore the different areas of the garden
- Young children must be monitored at all times
- Keep your litter and dispose of it in the recycling bins at the gate

- Do not trample on any plants, especially ones at the edge of the beds
- Do not run or take short cuts.
- Do not pull leaves and branches off plants
- Do not bring toddlers on plastic bikes
- Do not bring dogs into the BSG
- Do not lean or write on the story boards.
- Do not scratch or write on sculptures or stone work
- Do not throw your litter under the plants

Do's and don'ts



The information in these circles encourages correct behaviour in the Biodiversity Showcase Garden



Write in your own words how visitors to the BSG should behave. Write an explanation if you can

What is biodiversity?

Biodiversity is the amazing variety of life on earth. It includes the many different animals and plants in the world, the habitats and landscapes where they live and the variety that occurs within each species. It is also the interactions between different organisms

- **Species variety** is the different kinds of animals and plants that can be found in an area. It includes all organisms, even ones that you cannot see such as bacteria and fungi. Humans are just one of the many species on earth.
- **Genetic variety** is the genetic differences that occur within a single species and may not be easy to see.
- **Ecosystem variety** is the variety of habitats or landscapes where animals and plants live.
- South Africa has an extremely diverse range of landscapes, ranging from rivers to seas, mountains, wetlands, desert and semi-desert areas, forest and savannah and grassland areas. Each of these areas supports different plants and animals and scientists use this information to define different kinds of biomes and veld types. South Africa therefore has a very rich biodiversity, with the fynbos biome being particularly rich having about 9000 different plant species.
- Cape Town is a hot spot of biodiversity because it has many species that are endemic and occur nowhere else in the world. In addition, many of these species are endangered and could become extinct because of human activities namely urban development, farming, uncontrolled fires and invasive alien species.
- The BSG has 300 different plant species chosen to represent the flora of the Greater Cape Town area from Atlantis to Gordon's Bay. 34 metal sculptures and wire and bead animals have been made by local artists to illustrate the species of animals that can be found in this area. The garden is already attracting a wide variety of birds, reptiles and insects.

Why is biodiversity important?

- **Biodiversity is life**

Biodiversity is life and no living thing can survive in isolation from other living things. Everything is connected in a complex web of life and without the connections biodiversity creates, ecosystems fall apart

- **Biodiversity is also about connections**

Biodiversity is about interactions between different living organisms. Natural ecosystems are self-sustainable because all resources are constantly recycled and reused and there seems to be no waste products accumulating. This is because the

'waste' generated by one set of organisms is used as a resource by another. This connects all organisms together in a dynamic pulsating web of life.

- **Animals (including humans) obtain everything they need from biodiversity**

Humans obtain everything they need to survive from biodiversity. We can trace the air we breathe, the food we eat, the clothes we wear and the houses we occupy back to the source: animals and plants living in a natural ecosystem. Humans have taken for granted the ecological services that ecosystems provide, such as clean air and water and pollination of fruit trees. Understanding the complexity of the interactions between different organisms and how they contribute to the functioning of healthy systems will assist humans to make wise choices about how they use biodiversity.

- **Climate Change and human societies**

Human societies are realising that it costs less to keep healthy ecosystems intact than trying to rebuild damaged ecosystems. Life on earth has survived many catastrophes where the climate has changed radically and was once very different from what it is now. The earth has provided a relatively stable climate for humans to flourish over the last 10 000 years. Human activities, especially burning fossil fuels, are affecting the earth on such a large scale that it is threatening the stability of the climate. The increase in carbon dioxide levels can be ameliorated by conserving biodiversity and ensuring that large areas of natural vegetation are maintained and are able to support a healthy population of local plants and animal species. Some forward thinking countries like Costa Rica are paying local communities to keep their areas of forest intact rather than felling them.

Adapting the way we use the environment to create a win-win situation will enable humans to become part of biodiversity again. It is up to each one of us to start making small changes in how we live our lives.

- **Biodiversity gives us inspiration**

Imagine a world without wild unspoilt places where you can sit quietly and think and ponder on the variety and beauty. Biodiversity gives us inspiration and stimulates our creativity. Humans have devised many wonderful technologies to make life easier but many of these machines are also destructive. Biological systems have had millions of years of trial and error through the process of evolution. Organisms that are not able to adapt and develop partnerships and live alongside each other in changing environments will eventually not survive. Investigating the dynamics of natural systems could assist the development of more sustainable technology that fits in with nature rather than destroying. Humans are naturally curious about nature and now it is even more important for us to use biodiversity to learn from and gain inspiration on ways to adapt.

Interesting facts about Green Point

- The area of Green Point Common is a wave cut platform. In a time when sea levels were higher than they are today, the waves broke where the buildings of Sea Point are and they cut away at the underlying shale rock. That is why the area is so flat.
- The underlying rock is shale with a thin layer of clay or windblown sand on top. It used to be covered in rolling dunes and supported a range of different plant species, including the rare kukumakranka. According to historical records, in spring time it was ablaze with flowers as is the rest of the West Coast today. Traditionally, the grazing was good in this area as the soil is richer than the Cape Flats and supports more grasses.
- During the Anglo-Boer War of 1899-1902, two British prisoner of war camps were established on the Green Point Common after 4000 Boers were taken prisoner at the Battle of Paardeberg and could not all be housed at the Simon's Town camp. Life was not easy for prisoners as they were given little food and 103 prisoners died from a variety of illnesses related to unsanitary living conditions.
- The first tramway service in Cape Town started in 1863 and ran from the foot of Adderley Street, out along Somerset Road to Green Point. The trams ran on rails and were drawn by horses.
- In winter, water does not drain easily from this flat area and it quickly turns into a marshy wetland. Locals in the last century made good use of this and organised canoeing races and regattas on the vleis that developed. The area was filled in to construct sports fields for the local schools and surrounding communities as flat land was difficult to find in the growing city. The area has been used for many different sporting codes and, up until the recent developments, there were a myriad of cricket, rugby, tennis, soccer and athletics clubs using the area, and of course the golf course. There was once even a race track in Green Point.
- Table Mountain has many natural springs that occur where the porous sandstone meets granite or shale that is impermeable to water. The sandstone of Table Mountain can be likened to a giant sponge slowly releasing water all year round. These springs were known to local San and Khoi khoi inhabitants and they used to roam this area, hunting game, herding their sheep and cattle, and digging up edible plants.
- The Cammissa Spring behind the Mount Nelson Hotel was an important source of water for sailors who needed to stop somewhere after their long sea voyages from Europe to get fresh water and food. The settlement at Cape Town grew up around this perennial source of clean water but fell into disuse when it could no longer supply the needs of a growing city. This source has been reopened and is now piped into the fountain in the park where it bubbles up like a natural spring and flows into a system of constructed wetlands. These ponds now supply all the water needed for the Green Point Urban Park including the Golf course and the Biodiversity Showcase Garden.

Lesson Plan for Gr 1: Using my senses to find out about biodiversity

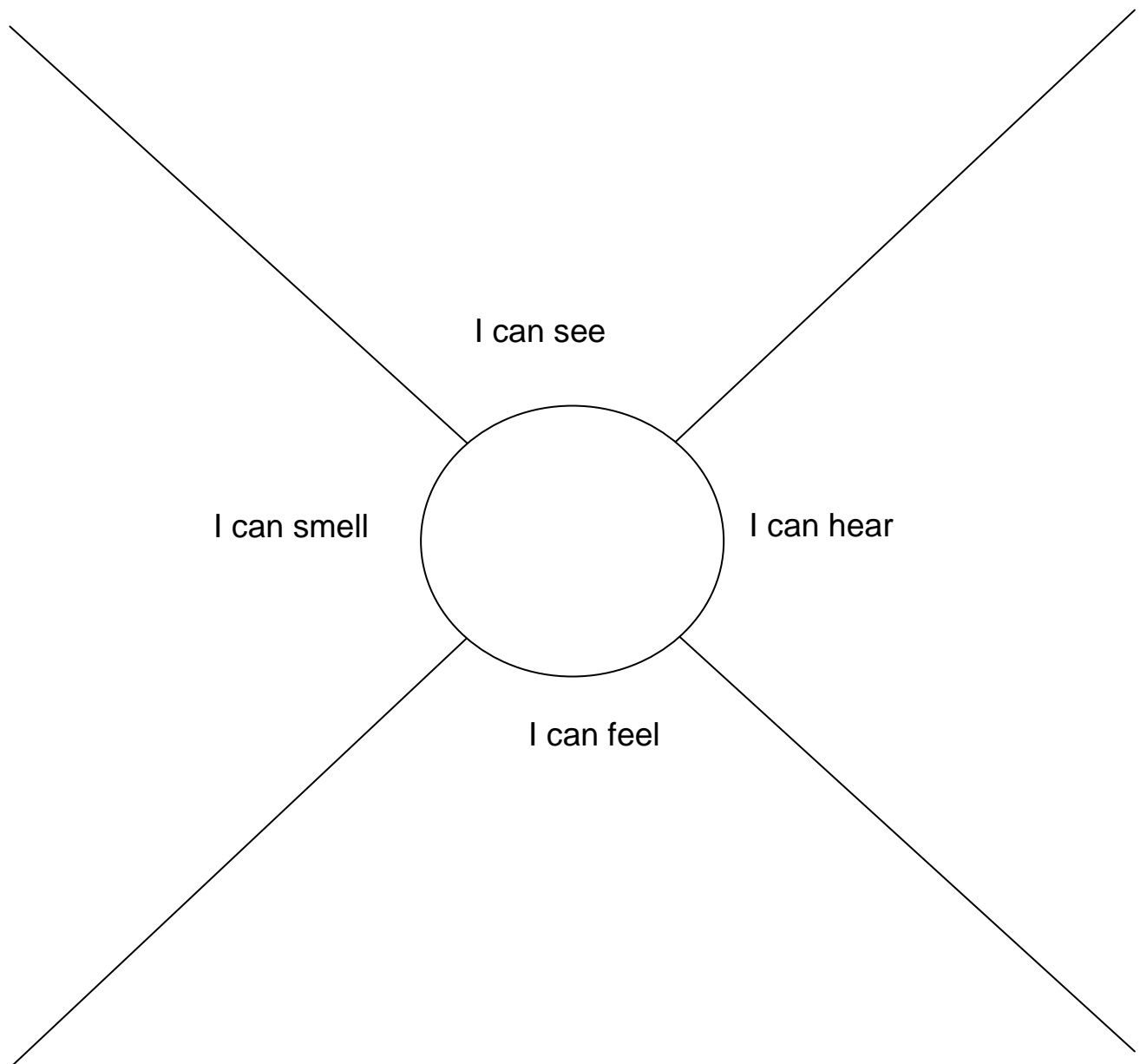
Time	Activity	Key concepts	Equipment
9h00-9h15 15 mins	Welcome and introduction	<ul style="list-style-type: none"> • Bio = life • Diversity = differences • Biodiversity is the amazing variety of life on earth and includes all animals and plants in the world. 	
9h15-9h45 30 mins	Using our senses <ol style="list-style-type: none"> 1. Find somewhere to sit. 2. Go through the 5 senses and why we have them. 3. Explain that we will use 4 of the 5 senses to find out about biodiversity. 	<ul style="list-style-type: none"> • Five senses that give us information about the world around us. • Sight, smell, hearing, touch but not tasting because some plants are poisonous. 	<ul style="list-style-type: none"> • 'Using our senses' for Gr 1 worksheet. <p>NB: Put coloured dots on worksheet or colour top of relevant block with koki</p>
9h45-10h15 30 mins	Finding colours	<ul style="list-style-type: none"> • Animals, plants and flowers have many colours to assist them in their life processes. 	<ul style="list-style-type: none"> • 'Finding colours' worksheet • Pencil crayons in red, blue, yellow, green, orange and purple
10h15-10h45	Break	<ul style="list-style-type: none"> • 	
10h45-11h15 30 mins	Finding animals	<ul style="list-style-type: none"> • We recognise animals by their shapes and colours. • See Appendix 2 for list of animals 	<ul style="list-style-type: none"> • 'Finding animals' worksheet
11h15-11h30 15 mins	Discussing <ol style="list-style-type: none"> 1. Allow children to talk about what they have seen and ask questions 		
11h30-12h00 15 mins	Consolidation and close <ol style="list-style-type: none"> 1. Shared writing. Ask children to give sentences to explain what they have learnt and write them up. Everyone to read together 		<ul style="list-style-type: none"> • Large piece of paper • Koki • Masking tape to put paper up



Using my senses

We use our senses to find out about the world around us.

1. Draw a picture of yourself in the circle below.
2. What can you see, hear, smell and feel in the biodiversity garden?
3. Draw pictures in the spaces below.



Finding colours



Animals and plants have many colours.

1. Look at the coloured dots in the blocks
2. Find an animal, plant or flower that has the same colour as the dot and draw a picture using the correct colour

yellow	red
blue	green
orange	purple


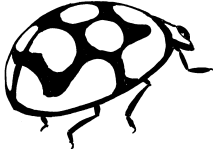







Animals



We look at the outline of an animal to identify it

1. Look for the sculptures of these animals in the garden
2. When you have found the animal put a tick in the box
3. Use the letters in the box below to complete the animal names
4. Cross off each letter as soon as you have used it

s l m t o p s d s

 ___nake	 ___ady bird	 ___ongoose
 ___ortoise	 ___wl	 ___raying mantis
 ___teenbok	 ___ragon fly	 ___unbird

Lesson plan for Gr 2: Sensory Introduction to Biodiversity

Time	Activity	Key concepts	Equipment
9h00-9h10 10mins	Welcome and introduction	<ul style="list-style-type: none"> • BSG is a special place, a place of respect like a church. • Look, learn, be curious. • Do not run, shout, stamp on plants, destroy, litter, and keep to the paths. • Bio = life , diversity = differences. • Biodiversity is the amazing variety of life on earth. 	
9h15-9h30 15 mins	Using our senses <ol style="list-style-type: none"> 1. Find somewhere to sit. 2. Remind them of the five senses and why we have them. 3. Explain why feelings in our heart are also important. 	<ul style="list-style-type: none"> • Our senses give us information about the world around us and indicate if it is safe or not. 	<ul style="list-style-type: none"> • 'Using our senses' for Gr 2 worksheet.
9h30-10h00 30 mins	What is biodiversity? <ol style="list-style-type: none"> 1. Time limit of 10 mins to make a list of animals and plants and then record total number of each. 2. Sit in a circle. Consolidate alphabet throwing a ball across to each other saying the first letter of animals or plants on their list. 	<ul style="list-style-type: none"> • All animals and plants are part of biodiversity. • Animals and plants depend on each other to survive. 	<ul style="list-style-type: none"> • 'What is biodiversity?' worksheet for Gr 2. • Large ball.
10h00-10h15 15 mins	Biodiversity of Cape Town <ol style="list-style-type: none"> 1. Put a circle around the animals and plants that are indigenous to South Africa 2. Explain indigenous and endemic 3. Explain the connections between different animals and plants. 	<ul style="list-style-type: none"> • Indigenous animals and plants come from a given area - in this garden are from the Greater Cape Town area. • Some do not occur anywhere else in the world = endemic species. 	
10h15-10h45	Break		
10h45-11h05 20 mins	Recording colours <ol style="list-style-type: none"> 1. Look in the garden to find and record the different colours 		<ul style="list-style-type: none"> • 'Recording colours' for Gr 2 worksheet.
11h00-11h40 20 mins	Recording animals <ol style="list-style-type: none"> 1. Look for the animals and see if you can find all of them 	<ul style="list-style-type: none"> • See Appendix 2 for list of animals 	<ul style="list-style-type: none"> • 'Recording animals' for Gr 2 worksheet.
11h40-12h00 20 mins	Consolidation and close <ol style="list-style-type: none"> 1. Shared writing. 2. Discuss what they have learnt and ask for sentences to summarise their experience. 3. Everyone to read together. 		<ul style="list-style-type: none"> • Large sheet of paper. • Koki pen. • Masking tape.

School: _____ Gr: _____ Date: _____

Name : _____



Using my senses

We use our senses to find out about the world around us. They tell us if something is safe for us or if it is dangerous. We also have another sense and that is a sense of belonging in our heart. We feel love and care with our heart.

1. Put your left hand on this page and draw around your hand with a pencil.
2. In each finger, write one of your senses: eyes, ears, nose, tongue and skin.
3. In the middle of your hand draw a heart.
4. Next to the finger where you have written eyes, write or draw something that you can see.
5. Do the same with the other fingers.

What is biodiversity?



Biodiversity is the amazing variety of life on earth

Bio = life

Diversity = differences

1. Draw a picture or write down as many different animals and plants that you can think of. You can look at the animals in the garden.
2. How many animals did you record? Write your answer here _____
3. How many plants did you record? Write your answer here _____

B I O D I V E R S I T Y



Recording Colours



Animals and plants have many colours. We look for different shapes, colours and patterns to tell the difference between species (or kinds) of animals and plants.

1. Look at all the plants with flowers and decide what colour each one is.
2. Put a tick in the correct row below for each different kind of flower.
3. Record each kind of flower only once.
4. There is space for other colours that you see.
5. Count the number for each colour and record it in the last column.
6. Turn your worksheet sideways. This is a graph showing flower colours in the garden.

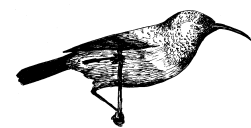
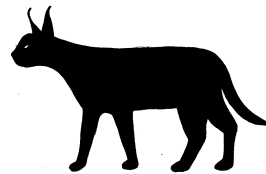
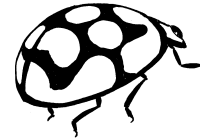
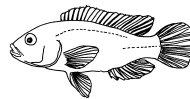
red											
orange											
yellow											
bright green											
green											
dark green											
light blue											
dark blue											
purple											
pink											
white											
brown											
black											

Animals



We look at the outline of an animal to identify it.

1. Look for the sculptures of these animals in the garden.
2. When you have found the animal put a circle around it.
3. If you can, write the correct name of each animal beneath it.



Lesson plan for Gr 3: How did the Khoi khoi use biodiversity to survive?

NB this lesson requires at least 4 adults to supervise the 4 different activities

Time	Activity	Key concepts	Equipment
9h00-9h10 10 mins	Welcome and introduction	<ul style="list-style-type: none"> Bio = life, diversity = differences. Biodiversity is the amazing variety of life on earth. Biodiversity is also about connections. 	
9h10-9h30 20 mins	The importance of Water in the Camissa Spring <ol style="list-style-type: none"> Walk to water fountain and explain where the water comes from and why the spring is important The Camissa Spring was important for the San and Khoi khoi people and for the first sailors who stopped here from Europe. 	<ul style="list-style-type: none"> Water is constantly recycled. All life depends on water. Humans have to get fresh water to live a healthy life. 'Camissa' means 'the place of sweet waters'. 	<ul style="list-style-type: none"> 'Where does water come from?' worksheet.
9h30-10h00 30 mins	Story Time: The Magic Bird <ol style="list-style-type: none"> Tell them a story with props about the San and Khoi khoi people e.g. the Magic Bird. Other stories could also be used 	<ul style="list-style-type: none"> San and Khoi khoi people knew the local biodiversity intimately. In order to live their lives, they had to use what they could find around them. Sharing resources was a way of life. 	<ul style="list-style-type: none"> Copy of the story. Optional extra is an ostrich egg shell and a stick.
10h00-10h20	Break		
<ul style="list-style-type: none"> Divide the class into four equal groups and allocate one adult per group to supervise the four different activities in different parts of the garden. Each group has different colour clipboards. See schedule of group activities below: 			
10h20-10h40 20 mins	Feeling plants - near the dome <ol style="list-style-type: none"> Peg the bags in suitable places near the dome. Find words to describe what is in the bags. Can you find plants that feel the same? Work in partners to feel the plants and record 	<ul style="list-style-type: none"> We use our nose to smell different plants and hands to feel the texture. 	<ul style="list-style-type: none"> '1: Feeling Plants' worksheet. Blindfolds. 6 pegs. 6 bags with numbers. 6 different plants inside.
10h40-11h00 20 mins	Animals – from the dome outwards <ol style="list-style-type: none"> Find animals and write their names 	<ul style="list-style-type: none"> San and Khoi khoi knew their animals very well. 	<ul style="list-style-type: none"> '2: Animals' worksheet.

		<ul style="list-style-type: none"> • See Appendix 2 for list of animals. 	
11h00-11h20 20 mins	Family life- in the hut area <ol style="list-style-type: none"> 1. Show them how stones can be ground into a fine powder to make paint. 2. Put some in a shell and mix with water with a match or small stick. 3. Paint a picture of what you think the family life of khoi-khoi herders was like. 	<ul style="list-style-type: none"> • San and Khoi khoi made things from around them such as wood, stone egg shells. 	<ul style="list-style-type: none"> • '3: Family life' worksheet. • Bottles of ground ochre or black, red-brown and yellow-ochre powder paint. • Sticks or matches. • Bucket of water. • Towel to dry hands.
11h20-11h40 20 mins	Edible plants- in the food garden <ol style="list-style-type: none"> 1. Read the signs in the food garden. 2. Find one to draw or write about. 3. Find the sour fig plant and draw the leaves, flower and the fruit. 4. Eat a fruit. 	<ul style="list-style-type: none"> • San and Khoi khoi knew their plants very well and the season they could be harvested. 	<ul style="list-style-type: none"> • '4: Edible plants' worksheet. • Bag of sour figs. • Bottle of sour fig jam.
11h40-12h00 20 mins	Discussion and Consolidation <ol style="list-style-type: none"> 1. Shared writing. 2. Discuss what they have learnt and ask for sentences to summarise their experience. 3. Everyone to read together. 		<ul style="list-style-type: none"> • Large sheet of paper. • Koki pen. • Masking tape.

Schedule of group activities

Group name or colour	First 20 mins 10h20-10h40	Second 20 mins 10h40-11h00	Third 20 mins 10h40-11h00	Last 20 mins 11h20-11h40
Green	1 Feeling plants	2 Finding animals	3 Finding edible plants	4 Family life-painting
Red	4 Family life-painting	1 Feeling plants	2 Finding animals	3 Finding edible plants
Black	3 Finding edible plants	4 Family life-painting	1 Feeling plants	2 Finding animals
Yellow	2 Finding animals	3 Finding edible plants	4 Family life-painting	1 Feeling plants

Activities for each area

	Area	Activity
1	Dome	Feeling plants
2	Whole garden	Finding animals
3	Food garden	Finding Edible plants
4	Khoi khoi huts	Family life- painting

School: _____ Gr: ___ Date: _____
Name : _____



Where does water come from?

Water is constantly reused and recycled. Rain falls from clouds in the mountains and runs in streams and rivers down to the sea. This fresh, clean water is precious. All animals and plants need access to clean water to live a healthy life. The water in the spring in the BSG flows in a pipe from the original Camissa Spring in Gardens in Cape Town.

1. Look at the mountain and draw a picture showing Table Mountain, Signal Hill and Lion's Head.
2. Draw the Table Cloth (cloud) that hangs over Table Mountain.

3. Write a sentence to explain why the Camissa Spring was important in the history of Cape Town.

The Magic Bird



Communication is important in all cultures. Story telling is an age old way for elders to share knowledge and wisdom gained through living life. Listening to a story is a wonderful way to learn about society's traditions and rituals. Stories inform family members about taboos and acceptable behaviour and of course the consequences of ignoring the acceptable rules. Most important of all, stories entertain and create a strong sense of belonging.

Thank you to the researchers Bleek and Lloyd who spent 20 years in the late 1800's listening to the stories of these Khoisan people and writing them down. These stories give a glimpse of what life was like as a hunter gatherer or herder living in the veld. Keep these stories alive and retell this story when you get home

Draw a picture to illustrate your version of the Magic Bird.

The Story of the Magic Bird

Written based on the original story told by Bushmen (in Cape Town where they had been imprisoned for stock theft in the late 1800's) and documented by Bleek and Lloyd.

Once upon a time, a long time ago when people were animals, Mantis lived with his wife Dassie and grandson, Mongoose. One day, Mantis took his hunting gear and went out hunting. He walked and he walked and he walked and he did not see any animals. And then far in the distance he saw a large bird that looked like an ostrich but it was different. He had never seen a bird like this before. She was sitting on her eggs and was facing downwind and did not see him until he was right upon her. He lifted up his bow and arrow and got ready to aim when suddenly she said "Don't shoot me, I am the Magic Bird and I will always be able to provide you with food for your family if you save my life now. Take only the small eggs from my nest and when you come back tomorrow there will be more eggs for you"

Mantis was confused. He had never heard a bird talking before but what she said made sense so he carefully took the small eggs from the side of her nest and placed them in his net made of twisted bark. He started back towards his home but his curiosity got the better of him and he hid behind a bush to watch the Magic Bird. She fluffed herself up looked around and then walked off into the veld leaving her nest unattended. Mantis could not believe his luck. He waited to see if she would return but she didn't. Stealthily, he crept up to the nest again and carefully picked up all of the eggs and placed them in his bag. It was very heavy but he balanced it on his shoulder and strode off as fast as he could.

He walked and walked and the sun rose higher and higher in the sky and he sat down in the shade of a tree to rest. He was thirsty and hungry and decided to eat one of the eggs. He chose a small stone and carefully tapped a hole in one of the eggs and used a stick to stir the contents. He dripped delicious egg mixture into his mouth with the stick but as he moved it back to get some more, the stick stuck to his mouth and he couldn't pull it off. He tried tipping the egg mixture into his mouth from the egg but that stuck to the side of his mouth as well. He pulled and he tugged but no matter what he did, the stick and the egg were stuck fast to his face. When he tried to take the sack of eggs off his back, he discovered that they too were stuck fast and would not budge from his back.

He trudged home in despair, and arrived home just as the sun was setting, tired hungry and thirsty. He hoped that his wife would know what to do because he was fed up. Mongoose saw him before his wife did and jumped up and down with glee. "Mantis Mantis you silly fool. You have stolen the Magic Birds eggs. She told you not to take the big eggs but you didn't listen. Now you will have to suffer."

“What can I do? Oh poor me,” wailed Mantis.

“Don’t come crying to me husband, you can sleep outside. There is no space in this hut for a silly fool who doesn’t do what he is told.”

Dejected and uncomfortable, Mantis lay down outside the door of his hut and tried to sleep. He watched the stars come out and eventually fell into an uneasy sleep and dreamt that he was out hunting again. Again he met the Magic bird and again she asked him to spare her life in exchange for the small eggs on the edge of her nest. He jumped up, wide awake, knowing exactly what he had to do. Impatiently, he waited for the sun to rise and as the first streaks of purple and pink stretched across the sky he set off across the veld to find the nest of the Magic Bird. The bag of eggs were still stuck to his back as was the stick and the egg was stuck to his mouth.

He walked and he walked and it seemed ages before he saw the familiar outcrop of trees where he knew he had seen the Magic Bird. He searched and searched for the nest going round and round in circles but couldn’t find the exact spot. He sat down in despair and closed his eyes and suddenly the Magic Bird appeared in front of him and there was the nest right where he had been looking. She said nothing but just looked at him sternly. Carefully he lifted the net of eggs off his back and gently placed them back in her nest. He was relieved to find that the stick and the egg were no longer stuck to his face and he could drink the rest of the egg. He wiped the back of his hand across his face and sighed with satisfaction.

“Take only the small eggs from the edge of my nest but leave the large ones. There will always be enough eggs for you and your family,” the Magic Bird said again.

Mantis was so ashamed that he could not look her in the eye and merely nodded meekly. Strangely, he never saw the Magic Bird again but whenever he found a clutch of ostrich eggs he always lifted the eggs to check which ones were heavy with a developing chick inside and which ones were newly laid and could be taken. Usually these ones were on the outside of the clutch. He had learnt his lesson not to be greedy and his family was never hungry again.

1. Feeling plants



We use our senses to tell the difference between plants. The colour of the leaves and flowers and the size of a plant are important. We can also use our noses to smell plants and use our fingers to see what they feel like.

1. Work in partners, taking turns to wear the blindfold.
2. The person who can see must guide the person wearing the blindfold.
3. Feel and smell the plants in the bags and find a word to describe each one. For example you can say “ it smells like..... “or “it feels like.....”
4. See if you can find plants in the garden that smell and feel like the ones in the numbered bags.
5. If you have time, look at each plant and draw a leaf of each one.

Bag 1
The leaves in bag 1
feel/smell like....

Bag 2
The leaves in bag 2
feel/smell like....

Bag 3
The leaves in bag 3
feel/smell like....

Bag 4
The leaves in bag 4
feel/smell like....

Bag 5
The leaves in bag 5
feel/smell like....








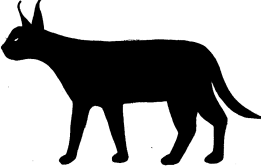






Bag 6
The leaves in bag 6
feel/smell like....

2. Animals



The San hunter gathers and the Khoi khoi herders knew the animals that lived in their environment and which ones were good to hunt and eat.

1. Look for the sculptures of these animals in the garden.
2. Draw a line to connect the correct name to each animal.
3. Which animals do you think were hunted? Put a circle around them.

Caracal / rooikat				Spotted genet
Owl				Cape hare
Cow				Steenbok
Cobra				Cape grysbok
Mole rat				Sheep
	Cape Fox	Tortoise	Honey badger	Mongoose

3. Family Life



Khoi-khoi herders built huts made of sticks and mats woven from reeds. Family members worked together to make string from plant fibres, bows and arrows from sticks and sharp stones and water bottles from ostrich egg shells. Soft stone called ochre was ground into powder and mixed with fat, water or egg white to make paint which could be used for decorating ostrich eggs shells or for body paint.

1. Use a stick to mix a little bit of ground ochre in a mussel shell with a few drops of water.
2. Make a picture of the Khoi khoi huts with your stick and mud paint.
3. You can draw other things and the people if you want to.

NB: Khoi khoi people did not know how to write so choose a picture to record your name

4. Edible plants



The San hunter gatherers and Khoi khoi herders knew where to find plant foods. They also knew which the best season to collect them was. Some plants have edible leaves and stems, flowers, fruits or berries that can be picked and eaten immediately. Other plants have underground roots or bulbs that can be dug up. These need to be roasted on hot ash before eating.

1. In the food garden, read the story boards and find out about edible plants that can be picked and eaten raw, made into a stew or has to be cooked in a fire.
2. Draw a picture in the space below of one of each of these plants. Remember to write the correct name.

<p>A plant that can be picked and eaten raw</p>	<p>A plant that can be added to a stew</p>	<p>A plant that must be roasted in a fire</p>
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3. Find the sour fig plant and draw a diagram of the leaves, the flowers and the fruit.

4. Taste one of the sour fig fruits. Write a sentence to describe what it tastes like.

Lesson Plan for Gr 4: Looking closely at biodiversity

Time	Activity	Key concepts	Equipment
9h00-9h10 10 mins	Welcome and introduction 1. Walk to the fountain area. 2. Explain biodiversity and BSG.	<ul style="list-style-type: none"> • BSG is a special place, a place of respect like a church. • Look, learn, be curious. • Do not run, shout, stamp on plants, write on story boards or drop litter, • Keep to the paths. 	
9h10-9h25 15 mins	Water is constantly recycled 1. Explain that water for this park comes from the Camissa Spring.	<ul style="list-style-type: none"> • Water is constantly being recycled in the water cycle, evaporating, condensing, raining, and forming streams. 	<ul style="list-style-type: none"> • 'Water is constantly recycled' worksheet
9h25-10h00 35 mins	Sorting what you see 1. Show them the egg, rounded pebble and beans. They seem dead but which ones could come alive again? 2. How can you tell if something is living or not? If the item can do some life processes then it is alive. 3. Are there some things that once were alive but now are dead?	<ul style="list-style-type: none"> • The environment has living and non-living components. • Living and non-living parts of a system are interdependent and affect each other. • All organisms carry out the 7 life processes. (See Appendix 1 on p.77 and refer to MRS GREN) • If these life processes can be observed in an organism this indicates that it is alive. • Some organisms have a resting phase such as an egg or a seed. 	<ul style="list-style-type: none"> • 'Sorting what you see' worksheet • whistle • container with egg, rounded pebble and beans
10h00-10h15 15 mins	What is biodiversity? 1. Explain biodiversity and then give them a time limit to write down their names. 2. Role play of being a seed and needing water to grow	<ul style="list-style-type: none"> • Bio = life • Diversity = differences Connection with sun energy and need for water for life – all our food comes via plants from the sun 	<ul style="list-style-type: none"> • 'What is biodiversity?' for Gr 4 worksheet
10h15-10h35	Break	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> •
10h35-11h05 30 mins	Plant structure 1. Choose a plant to draw. 2. Find the name on a label or ask for the name.	<ul style="list-style-type: none"> • Plants have roots, stems, leaves, flowers, fruits, seeds. • Plants have a common name and a latin name. 	<ul style="list-style-type: none"> • 'Plant structure' worksheet
11h05-11h25 20 mins	Describing plants 1. Explain that plants have structural adaptations to survive.	<ul style="list-style-type: none"> • Plants have adaptations to help them survive dry conditions such as succulent leaves, small leaves. 	<ul style="list-style-type: none"> • Blindfolds • "Describing plants" worksheet.
11h25-11h45 20 mins	Animals 1. Find animals and label <i>NB: there is no porcupine in the BSG only quills!!</i>	<ul style="list-style-type: none"> • We recognise animals by the shape or outline. Animals also have adaptations to survive. • See Appendix 2 for list of animals. 	<ul style="list-style-type: none"> • 'Animals for Gr 4' worksheet
11h45-12h00 15 mins	Consolidation 1. Discuss the adaptations plants have to survive. 2. Shared writing	<ul style="list-style-type: none"> • Animals and plants are living and have to be adapted to survive in their habitat and carry out their life processes. They are interdependent 	<ul style="list-style-type: none"> • Flip chart paper. • Koki • tape

School: _____ Gr: ____ Date: _____

Name : _____



Water is constantly recycled

- **Water is a non-living substance but life cannot exist without it. All animals and plants need access to clean water to live a healthy life.**
 - **Water is constantly recycled in the ecosystem. Rain falls from clouds in the mountains and runs in streams and rivers down to the sea.**
 - **This fresh, clean water is precious.**
 - **The supply of water for the Green Point Urban Park and the BSG flows in a pipe from the original Camissa Spring in Gardens in Cape Town.**
1. Look at the mountain and draw a picture showing Table Mountain, Signal Hill and Lion's Head.
 2. Draw the Table Cloth (cloud) that hangs over Table Mountain.

3. Do you think water is living? Explain your ideas.

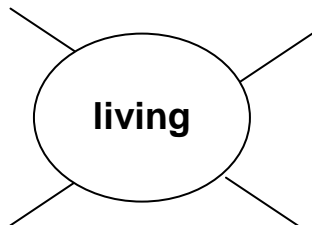
Sorting what you see



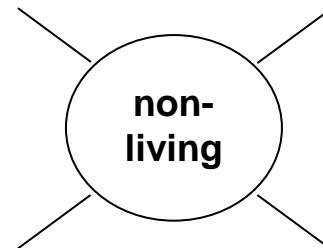
Everything around you is part of the earth and its environment. Some parts are living and some are non-living. Some things were living but now are not living. Living animals and plants are all part of the amazing variety of life on earth called biodiversity.

1. Look at the garden around you and name the things that you can see.
2. Decide if they are living or non-living.

3. Make a mind map of the **living** things here



4. Make a mind map of the **non-living** things here



5. Are there any things that you can see or that you can think of that you are not sure if they are living or non-living?

6. How would you decide if something is living or non-living? What processes is a living organism able to do that a non-living item is not able to do?



What is biodiversity?



Biodiversity is the amazing variety of life on earth. It includes the many different species of animals and plants in the world and the places where they live.

Bio = life and Diversity = differences.

Plants and animals that occur naturally in South Africa are indigenous to South Africa

How many different animals and plants can you write down? Look in the garden for examples. Underline the ones that are indigenous to South Africa

Animals

Total no. of animals

Plants

Total no. of plants

B
I
O

D
I
V

E
R
S
I
T
Y

Plant structure



Plants have roots, stems, leaves, flowers, fruits and seeds. The only way a plant can move is when the seed is dispersed. Once a seed has germinated, and grows into a seedling, that plant has to stay rooted in the ground in that position. Plants are not able to move about and must have adaptations to survive the environmental conditions and carry out their life processes.


1. Choose one plant that has flowers, fruits or seeds.
2. Make sure you choose a plant that has a label near by or ask what the name is so that you can label your plant.
3. Draw a life size diagram of your plant.
4. Label the stem, leaves, flowers, fruit or seed (Do not pull plants up to see their roots!).
5. Write at least one sentence to explain a special feature of your plant that you have noticed.

Describing plants



The weather in Cape Town is hot and dry in summer and cold and wet in winter. Wind and fire also make it hard for plants to survive. Many fynbos plants have special adaptations to help them save water.

1. Work in threes, one wearing the blindfold, one leading and one recording
2. Take turns to wear the blindfold, lead and record.
3. What different kinds of leaves can you find?
4. Use the leaf shapes to record as many descriptions of leaves as you can.
5. Can you find the descriptions listed around the edge?



Fat leaves that store water

Spiky leaves

Thick, leathery leaves

Shiny leaves

Leaves with a red edge

Hairy leaves

Smelly leaves

Small leaves

Leaves with thorns

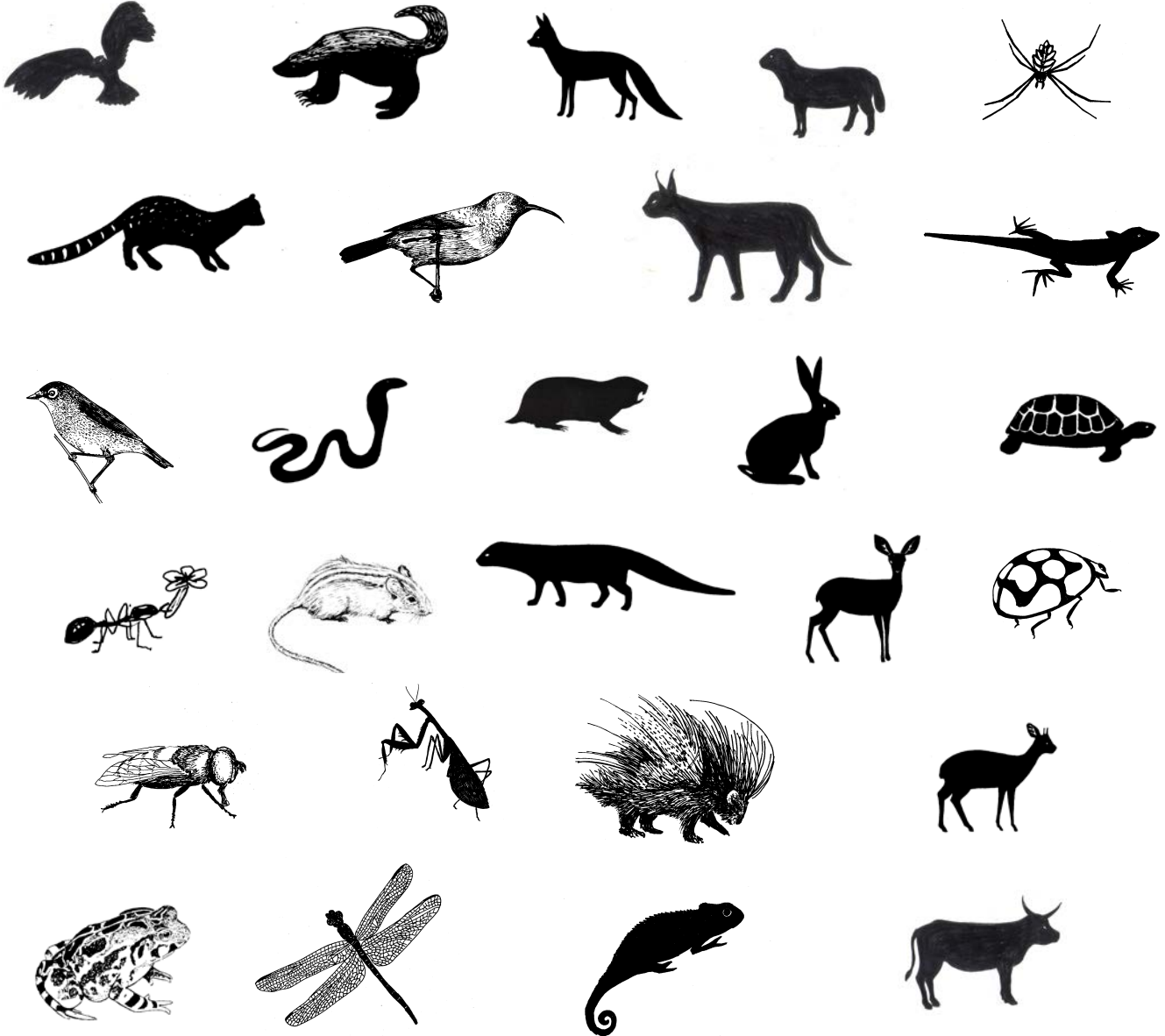
Grey leaves

Name the Animals



We look at the outline of an animal to identify it

1. Which of these animals do you know?
2. Look for each of these animals in the garden.
3. Write the correct name underneath each animal that you find.



Tortoise, owl, honey badger, mongoose, cobra, long horned cow,
Cape Fox, fat-tailed sheep, mole rat, Cape grysbok, Cape hare, genet,
porcupine, frog, lizard chameleon, dragonfly, ant, hover fly, witogie,
ladybird, mouse, sunbird, steenbok, spider, praying mantis, rooiat.

Lesson plan for Gr 5: Who eats who?

Time	Activity	Key concepts	Equipment
9h00-9h10 10 mins	Welcome and introduction 1. Start at the dome.	<ul style="list-style-type: none"> Look, learn, be curious. Do not run, shout, stamp on plants, destroy or litter. Keep to the paths. 	
9h10-9h30 20 mins	What is biodiversity and BSG? 1. Explain biodiversity and the importance of interactions. 2. 10 mins to walk around the garden and write down examples of the animals and plants that they can see or that they know. 3. For each example what other animal or plant does it interact with? For food or pollination or shelter. 4. Come back to the dome.	<ul style="list-style-type: none"> Bio = life, Diversity = differences Biodiversity is the amazing variety of life on earth. BSG is a special place for us to learn about the incredible diversity of animals and plants in the Western Cape. 9000 species in SW Cape, Many are endemic and occur nowhere else in the world BSG has 300 different plants Animals and plants live in a specific habitat: habitats and landscapes are part of biodiversity. Each one interacts with other species in order to live: to get food, shelter, for reproduction 	<ul style="list-style-type: none"> 'What is biodiversity ?' worksheet
9h30-9h45 15 mins	Interactions 1. Discuss the different kinds of interactions. 2. Focus on those visible in the garden.	<ul style="list-style-type: none"> Species need each other for food, shelter, reproduction. 	
9h45-10h10 15 mins	What do plants do all day? 1. Ask what do they think a plant does all day? 2. Discuss the many products we get from plants? 3. Role play. Everyone to pretend to be a seed, to germinate and grow into a plant with leaves that can photosynthesize - we are going to benefit from this when we eat our lunch. 4. Write an explanation.	<ul style="list-style-type: none"> Humans use plants for many things : food, medicines, fibres, building etc. All animals depend on green plants for energy. All life on earth is dependent on this ability of plants to photosynthesize and turn light and co2 and water into stored energy in the form of glucose sugar 	<ul style="list-style-type: none"> 'What do plants do all day?' worksheet
10h10-10h15	Appreciation 1. Ask someone to day grace to say thank you to plants for		<ul style="list-style-type: none"> Have examples of grace, poems or praise poems

	their many gifts especially the food we eat.		to say thank you to plants.
10h15-10h30	Break		
10h30-10h40 10 mins	Energy flow 1. Ask what did they eat and what is happening to the food now? 2. Recap on plant producers, herbivores and carnivores. 3. How does energy move in this garden?	<ul style="list-style-type: none"> • Refer to Appendix 1: The seven life processes. • Energy for living things comes from the sun. • Food chains always start with green plants, the producer of food. • Herbivores eat the plants • Carnivores eat other animals. • The energy flows away from plants through other animals to top carnivores. • All living things are dependent on plants because they are the only organisms that can carry out the process of photosynthesis. • See Appendix 2 for list of animals 	
10h40-11h15 35 mins	Who eats who 1. Hand each learner an animal card or information sheet. 2. Look for your animal in the garden and construct the simple food chain on the worksheet. 3. Come back to the dome.		<ul style="list-style-type: none"> • 'Who eats who' worksheet. • Animal cards and information sheets on each animal (see Appendix 3)
11h15-11h35 10 mins	Food web in the BSG 1. Discuss what you have found out about each animal. 2. Lay out the cards on the floor. 3. Use pegs and string to connect animals that interact. 4. Construct your own food web using the examples in the BSG.		<ul style="list-style-type: none"> • Ball of string or wool. • Scissors. • Pegs, 2 per learner. • 'BSG Food Web' Worksheet.
11h35-11h45 10 mins	Everything is connected 1. Explain how animals and plants are connected. 2. Are you part of this? 3. Write at least five sentences to explain how you are connected and depend on biodiversity.		<ul style="list-style-type: none"> • Blank sheet.
11h45-12h00 15 mins	Evaluation and close 1. Ask them to read what they have written and underline three really important concepts. 2. Ask for a word or sentence from each learner and make a class poem. 3. Read the poem to the class.		<ul style="list-style-type: none"> • Flip chart paper • Koki • Tape to put paper up

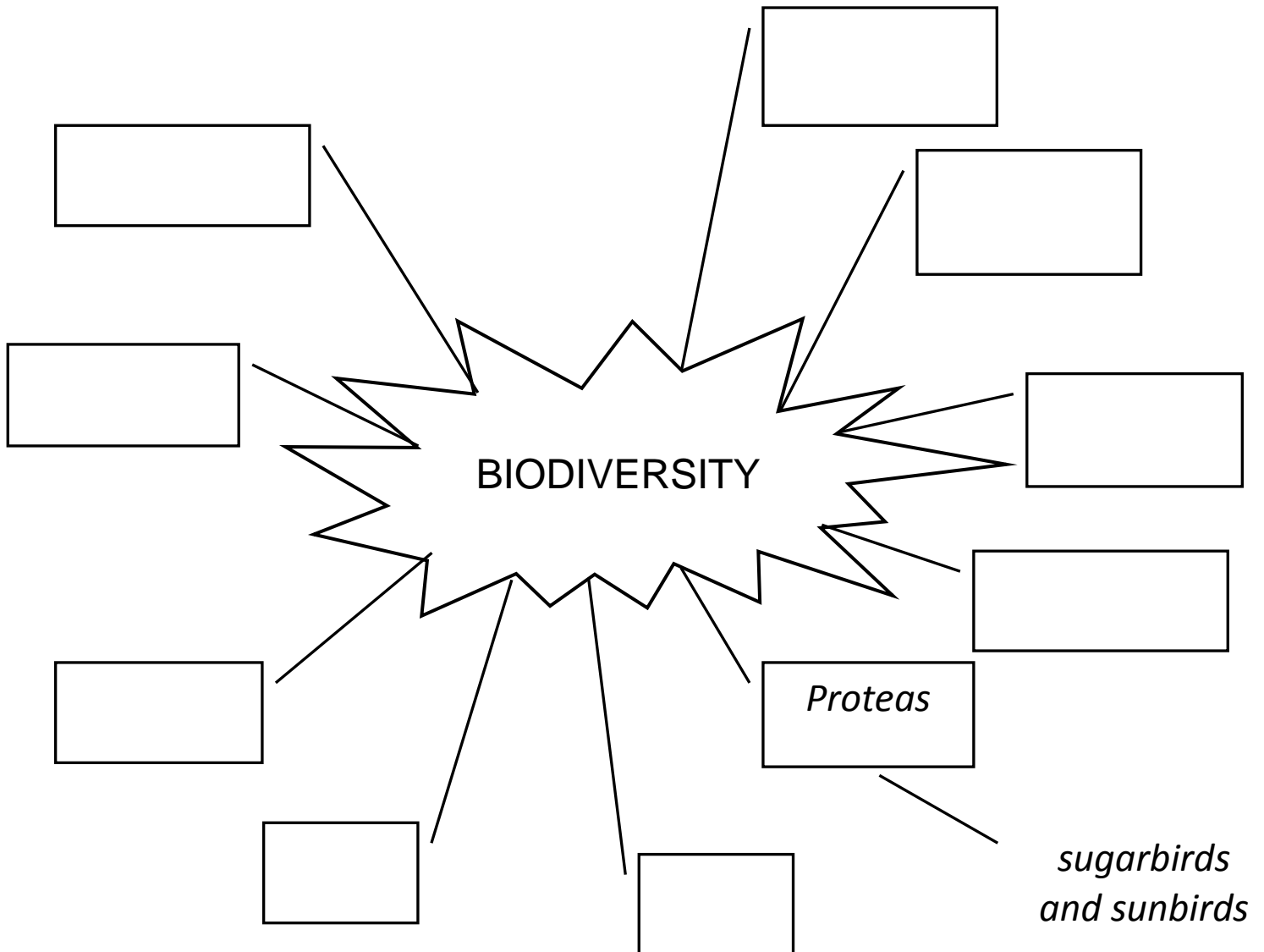


What is biodiversity?

Biodiversity is the amazing variety of life on earth. It includes the many different species of animals and plants in the world and the places where they live. It also includes the interactions that occur between different organisms.

Bio = life and Diversity = differences.

1. How many different species of animals and plants do you know? Write them down on the mind map below. You can use the animals and plants that you can see in this garden.
2. What other plants or animals do the species you have written down interact with? E.g. proteas provide nectar for sunbirds and sugarbirds.



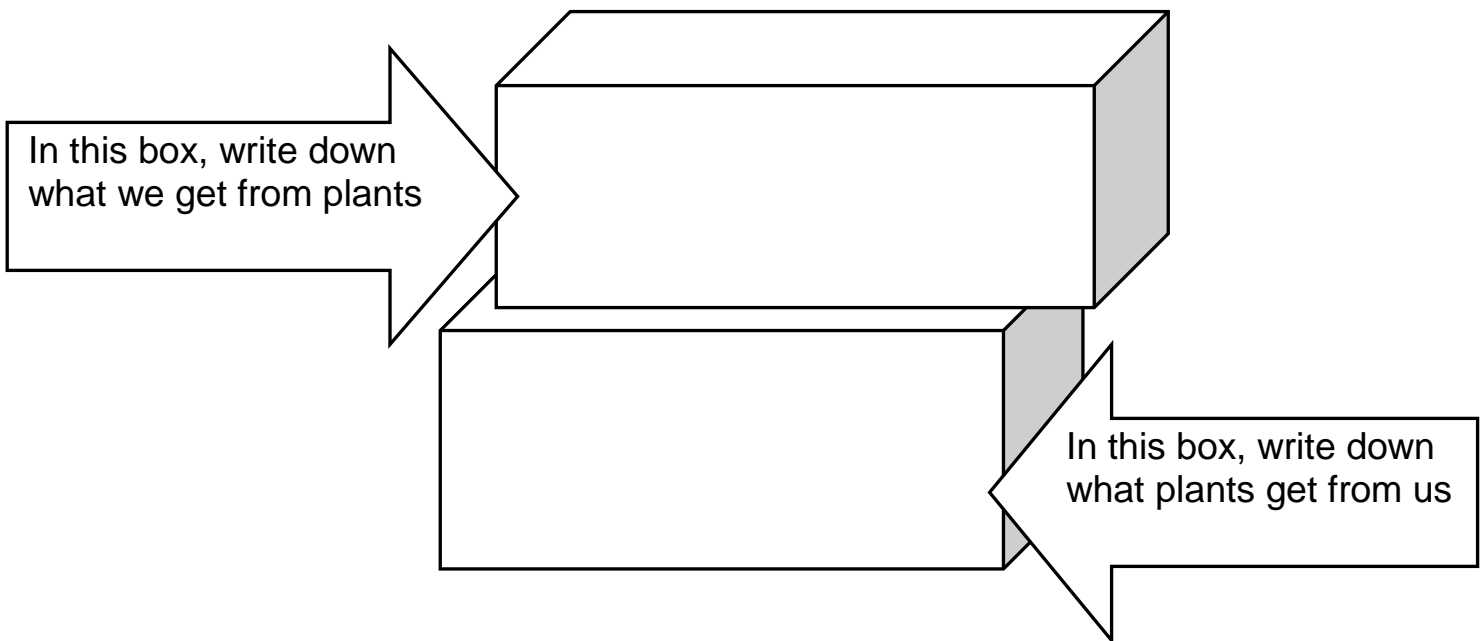
What do plants do all day?



All green plants have leaves that contain a green pigment called chlorophyll. During the day, leaves make food using sunlight, water and air. Leaves are mini solar panels that trap the energy of the sun and convert it into sugar molecules. Plants use these sugars to make other chemicals that they need to live e.g. starch. The only ingredients that this magical process of photosynthesis requires are: - water, sunlight and the waste gas from animals, carbon dioxide. Animals have to eat plants that contain sugar or starch to get energy to live.

All life on earth is therefore dependent on plants for all their energy

1. We get many gifts from plants. Do plants get any gifts from us?



In this box, write down what we get from plants

In this box, write down what plants get from us

2. What do you think a plant does all day? Write in your own words what you experienced in the role play activity of being a plant.

Who eats who?



- All plants use the energy of the sun to make their own food and are called **producers**.
- All animals have to feed on plants or other animals to get their energy.
- Some animals only eat plants and are called **herbivores**.
- Some animals only eat other animals and are called **carnivores**.
- **Omnivores** are animals that eat both plants and animals.
- Animals that eat dead animals are called **scavengers**.

You are going to construct a simple food chain:-

1. Read the card, draw a picture and write the name of your animal in the box below. Label your drawing.
2. Find out what food your animal eats and write it in the box on the left.
3. Find out what eats your animal and write it on the right hand side.

	Name of animal: _____	
My animal eats _____ _____ _____ _____ _____ _____	→	
		My animal is eaten by _____ _____ _____

Draw a picture of your animal in the box.

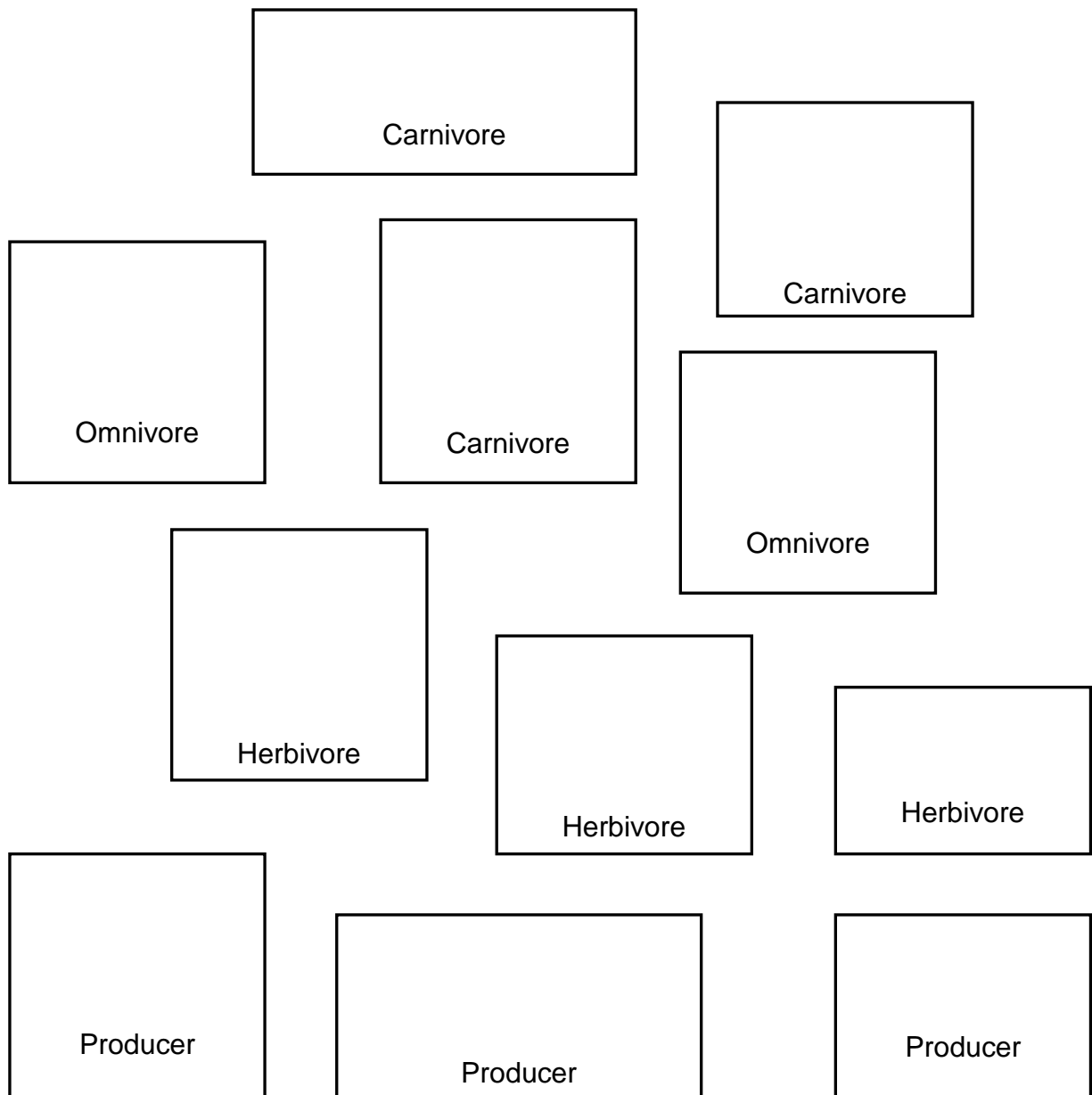
4. Choose the correct word from the brackets to describe your animal and put a circle around it. Give a reason for your answer

I think that my animal is a (**herbivore** **carnivore** **omnivore** **scavenger**)
because _____



All ecosystems have a network of animals and plants that depend on each other for different things. Food chains and webs indicate how they are connected by food. All animals have to eat plants or other animals to get their energy.

1. Use the examples discussed in the 'Who eats who' activity to construct your own food web. Write the names or draw pictures of the animals in the boxes below.
2. Draw arrows to indicate the flow of energy from the plant to the herbivore to the carnivore.



3. Explain what happens in ecosystems when plants are destroyed.

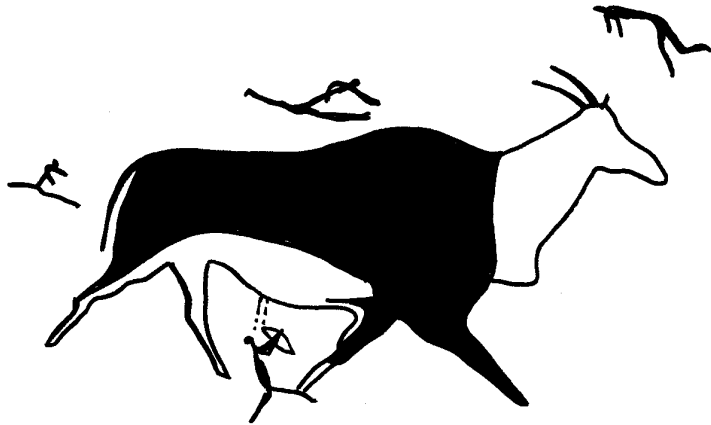
Lesson plan for Gr 5: Khoi khoi People and biodiversity

NB: this lesson needs at least 3 adults to facilitate the group work

**These activities could be done in class beforehand or used as consolidation activities after the class*

Time	Activity	Key concepts	Equipment
9h00-9h10 10 mins	Welcome and introduction 1. Work in the Khoi khoi settlement area or in the dome, depending on group size.	<ul style="list-style-type: none"> Look, learn, be curious. Do not run, shout, and damage plants or animals or story boards. Do not litter. Keep to the paths. 	
9h10-9h20 10 mins	What is biodiversity and BSG? 1. Explain how special the plants in the Western Cape are and why there are so many different species. 2. Explain the term biodiversity. 3. 10 mins to walk around the garden and write down as many different plants and animals as they can. 4. How many of the 300 plant species and 34 animals represented in this garden did they find?	<ul style="list-style-type: none"> Bio = life, Diversity = differences. Biodiversity is the amazing variety of life on earth. 9000 species in SW Cape, many are endemic and occur nowhere else in the world. BSG has 300 different plants and 34 animal sculptures. Animals and plants live in a specific habitat. Habitats and landscapes are part of biodiversity. 	<ul style="list-style-type: none"> 'What is biodiversity ?' worksheet
9h20-9h30 10 mins	Are people part of biodiversity? 1. Explain that people are also part of biodiversity. 2. Discuss the origins of San and Khoi khoi people and how they were pushed out by other people. 3. Refer to 'Did you know that?'	<ul style="list-style-type: none"> Different kinds of human beings are also part of biodiversity. San and Khoi Khoi people are indigenous to this area. San are the most ancient lineage of people in the world. All people in the world are descended from people who originated in Southern Africa. 	<ul style="list-style-type: none"> 'Did you know that?' sheet.
9h30-9h40 10 mins	Needs and wants* 1. Discuss in groups what we need to survive. 2. Discuss our needs that we cannot do without and wants that make our life easier. 3. Are our wants that same as people in the past? 4. Where do all these 'things' come from? Our environment	<ul style="list-style-type: none"> We get everything we need from our environment;- air, water, food, tools clothes, etc. Some of these things we cannot do without and will die without them- air, water, food = basic human rights. Others are important for making our life safe and comfortable and enable us to complete our lifecycle. 	<ul style="list-style-type: none"> 'Needs and wants' worksheet
9h40-9h50 10 mins	Language links* 1. Discuss how we communicate our needs and wants. 2. Role play gestures to indicate something. E.g. I am angry or there is an animal over there. 3. Explain how sounds and words are used to communicate.	<ul style="list-style-type: none"> We use body language and sounds to indicate what we want. Different cultures have developed different languages and people absorb words from different areas. Many words that are part of South African vocabulary are of San or Khoi khoi origin. 	<ul style="list-style-type: none"> 'Language links' worksheet Refer to 'Language Links' storyboard.
9h50-	Living by the seasons*	<ul style="list-style-type: none"> Khoi khoi seasons had a name 	<ul style="list-style-type: none"> 'Living by

10h00 10 mins	1. Discuss the seasons and the different things we do at different times of the year.	based on what was happening in the environment.	the seasons' worksheet
10h00- 10h15 15 mins	Tools to make life easier 1. Compare tools used by modern humans to what San and Khoi khoi herders would have used to get the things that they need to live: water, food, energy to cook food, clothes, shelter, protection, medicine	<ul style="list-style-type: none"> Stone, wood and fire have been used by humans for thousands of years to provide for their needs. Humans develop their technology by making tools from what they can find around them in their environment. We look at what humans have thrown away in their rubbish dumps to work out what they were using. 	<ul style="list-style-type: none"> 'Tools to make life easier' worksheet
10h15- 10h30	Break	•	•
25 mins for each session	Divide up into 3 groups and do three different activities and allocate one facilitator per group and then rotate groups <ul style="list-style-type: none"> Session 1: Khoi khoi fire area/ inside the matjies huts Session 2: People and plants section Session 3: Khoi khoi fire area/ inside the matjies huts 		
10h30- 10h55 25 mins	Session 1: Painting with ochres and sticks 1. Grind ochres to make paint. 2. Mix with water and paint a picture of tools used by San and Khoi khoi people or make your own rock painting of life of the San people.	<ul style="list-style-type: none"> Ochres were ground into a fine powder and mixed with sheep's fat and used to adorn the body to protect skin from the sun, and to do paintings on the wall. Many paintings can be seen on rock walls and give us an idea of how people lived in the past. 	<ul style="list-style-type: none"> Thick paper. Matches or sticks, Bottle of water. Ground ochre. beach shells.
10h55- 11h20 25 mins	Session 2: Useful plants 1. Answer questions in the plants and people sections.	<ul style="list-style-type: none"> Plants were a source of food, medicine, magic and fibres for string. People had to learn how to cook plants to make them edible. The clay pot enabled plants to be cooked together into a stew 	<ul style="list-style-type: none"> 'Useful plants' worksheet
11h20- 11h45 25 mins	Session 3: Evidence 1. How do we know what people in the past were doing? 2. Discuss how archaeologists look at the evidence left behind in middens to see what people discarded.	<ul style="list-style-type: none"> People discard items they no longer need. Ancient rubbish dumps are called middens. Only hard parts of tools such as bone, stone, pottery and shell remain. Soft parts have decomposed and disappeared. 	<ul style="list-style-type: none"> Numbered bags with items of evidence inside e.g. piece of bone, stone tool, ostrich egg shell, corm, potsherd, etc.
11h45- 12h00	Consolidation 1. What evidence will we leave behind for future generations? 2. What lessons could we learn from the way people lived in the past? 3. Write at least five sentences about the Khoi khoi and San.	<ul style="list-style-type: none"> People in the past lived in tune with the environment and they never took more than they needed and always made sure plants and animals would be able to continue to grow. Living sustainably was a natural part of life in the past. 	<ul style="list-style-type: none"> Blank page



Did you know that:-

- Two thousand years ago, everyone in the southern part of Africa was a hunter-gatherer.
- Only a handful of people in dry and remote areas of the Kalahari still live as hunter gatherers.
- The San people are thought to represent the most ancient lineage of people. The genetic diversity between different African people is more than that between African people and people from other countries
- This means that all humans around the world are probably descended from the people that used to live in this area.
- The hunter gatherers were pushed out of well watered areas of Southern Africa by other African people who herded sheep and cattle. More conflict and competition for land arose when people from Europe arrived in ships. People fought bitter wars with whatever weapons they could to control the land and the resources that it provides. Bows and arrows and spears were no match for guns and the local people were unable to resist the attacks and their way of life was changed forever.
- Millions of people have died in similar conflicts over land and its resources on all the continents of the world. Looking at the current news, we can see that the conflict is still going on.



What is biodiversity?

Biodiversity is the amazing variety of life on earth. It includes the many different species of animals and plants in the world, the habitats and landscapes where they live and the genetic variety that occurs within each species. It also includes the interactions between different organisms. Humans are also part of biodiversity.

You can find a range of animals and plants from the Greater Cape Town area in the Biodiversity Showcase Garden (BSG).

1. Walk around the garden and look at the different species of plants growing and the artworks of the animals.
2. Are there any that you know? Read the labels or ask if you are not sure of a name.
3. Use the space below to create a table of as many different animal and plant species that you can find in the BSG in the allocated time.

3. Why do you think examples of biodiversity from the Greater Cape Town area (Atlantis to Gordon's Bay) are used in this garden?



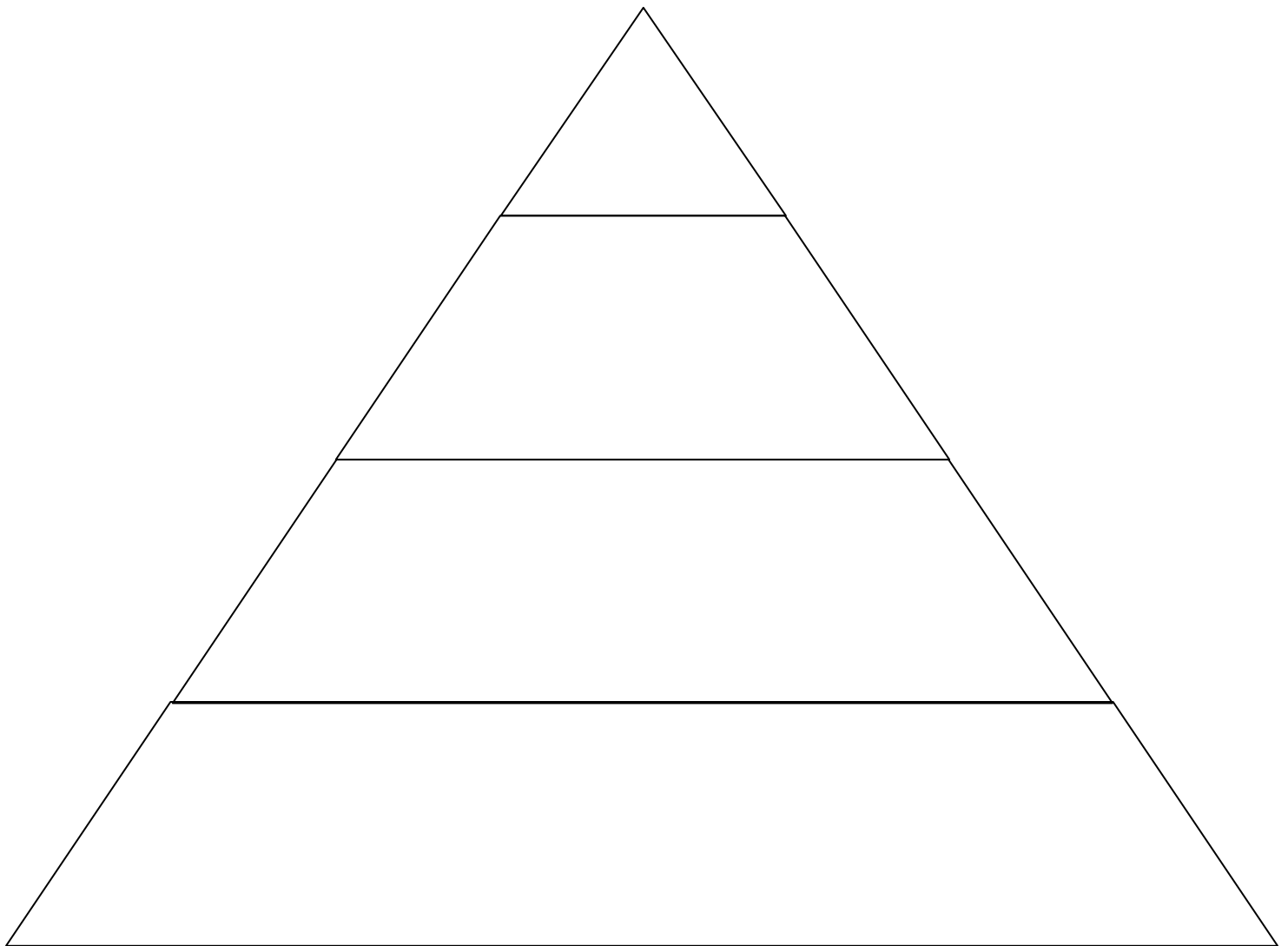
Needs and wants



Humans use what they can find in their environment to live their lives. Some things we need to have in order to survive and others are things that we want because they make our life easier, more comfortable, more enjoyable or safer.

1. Make a list of all the things that you think you need in your life, placing the things that are essential for survival at the base of the pyramid.
2. What are the things that you would like to have but can survive without? Place these wants towards the top of the pyramid.
3. Imagine a Khoi khoi child the same age as you, living somewhere in the Greater Cape Town area 500 years ago.....put a circle around your needs that would have been the same as the needs of that child.

Wants



Needs

Tools to make life easier



For thousands of years, humans have lived in Africa using sticks, stones, and fire to hunt, build shelters, make clothing, cook and protect themselves. We know that the San hunter gatherers and the Khoi khoi herders were the indigenous people who lived in this part of the SW Cape and Greater Cape Town area.

1. In the table below, compare how modern humans and San and Khoi-khoi people use/d tools and their environment to obtain the things they needed to survive.
2. There is space if you think of other common needs.

Modern humans		San people and Khoi khoi herders
	water	
	food	
	Energy source= making fire	
	cooking	
	clothes	
	shelter	
	protection	
	medicine	



There are many Khoi khoi words common in everyday Afrikaans and English speech in South Africa. There are place names such as *Outeniqua, Karoo, Gamka, Namaqualand, Kamdeboo, Keiskamma* and *Troe Troe*.

Words such as *karos* (cloak) and *kierie* (stick), *abba* (piggyback) *kamma* (make believe), *eina* (ouch) and *aitsa* (well-I-never) are all of Khoikhoi origin

1. Rearrange the letters in the bold boxes below to make animal and plant names that we know well.
2. Draw a line to connect each word to the correct description in the other boxes

gadag

gecko

uduk

A small insect

gggao

A bulbous plant with corkscrew leaves and a strongly scented fruit that can be used to flavour brandy and puddings

tjiegie

The leaves of this plant are smoked but it is an illegal narcotic drug

hubuc

A large antelope with horns that look like a corkscrew

manarkukukak

A plant with strongly scented leaves that can be used to treat many ailments

Read the sign in the medicinal garden if you need help to find the words



We are part of nature: biodiversity and the seasons affect us. For the Khoi khoi the year started with the rains in August. They referred to time according to the seasons. In the Khoi khoi language #, h, // and ! are pronounced as clicks.

August	#ha!am	broad green (rain, lots of grass, flowers and veldkos)
Sept	xoub/gu//khab	skittery-maan / shit moon (abundant milk caused diarrhoea)
October	(hoo)=gais	speckled ear (veld begins to dry)
November	!kani//khab	eland's moon (eland mating season)
December	/ga!kani	little eland
January	kei!kani	great eland
February	(ong)!!Oo-ha	star death
March	!hoa=gais	twisted ears (dassies have young)
April	gama/ais	krom vuur, crooked fire (not much food, hungry period)
May	=nu!!khab	black moon (grass is beginning to grow)
June	//hei//khab	pale moon (good grass, flowers start)
July	//gai/ab	chewing wood (becoming cold)

1. What do seasons mean to you?
2. When does your year start?
3. Are there times of the year that feel different to others? Sit quietly and think about how you feel or what activities you and your family are involved in throughout a year and see if you can find a reason for your feelings.
4. Create your own calendar. Choose an indigenous plant or animal as a symbol for each month.
5. Do you know of any other calendars used by different people around the world? What differences and similarities between the different systems are there?

Useful plants



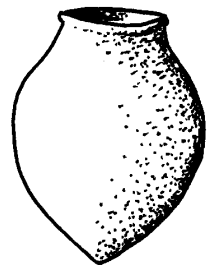
Khoi khoi and San people had to spend a lot of energy getting enough food to eat. If the men had an unsuccessful hunt, the families relied on the women to collect enough food plants to survive. The principle of sharing food enabled the family groups to help each other in times of need and meat from a successful hunt was always shared amongst the whole group.

Read the information boards in the plants and people section and answer the following questions.

1. Food was prepared in different ways. Find examples of each of these different food plants.

Method of preparation	Example of food plant
Cooked in a stew	
Baked in ashes	
Eaten raw	

2. Explain what the significance of pots made out of clay could have been in the life of a Khoi khoi mother.



3. Which plants were used to make refreshing drinks?

4. What do you think the most important source of sugar was for Khoi khoi people?



5. Explain how fat was used by Khoi khoi people. Do you know where they got it from?

6. Read about the medicinal plants. Choose one plant and draw a careful labelled diagram on the next page. Write a sentence explaining what the plant is used to treat.

Evidence

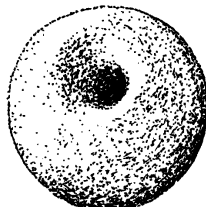
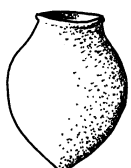


People in the past and people now are very similar – they discard things they no longer can use. Middens are the rubbish dumps created by groups of people living in the past. They are a rich source of information that can give us evidence as to what items people were using to live their lives. Only hard items that do not decompose like stone tools, shells, bones, charcoal and beads remain. Sometimes plant material can also be found. The arrangement of these items in an archaeological site can give us clues as to how these items were used and the possible thought processes, technologies, rituals and processes that accompanied the items.

Instructions

1. Look at the items that you can find around the fire place in the Khoi khoi settlement.
2. Try and work out what you think each item is made of, where it comes from and what it could have been used for.
3. In the table below, record what the numbered items are or are made of and it's possible use.

number	Origin of item	Use of item
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		



Lesson Plan for Gr 6: Adapting to survive

NB: 'Weather and climate' and 'Biomes' activities could be done in class before the outing

Time	Activity	Key concepts	Equipment
9h00-9h10 10 mins	Welcome and introduction 1. Start in the fountain area. 2. Explain behaviour expected in this area. 3. What is biodiversity and why is it important? What is the BSG?	<ul style="list-style-type: none"> Bio = life, Diversity = differences. Biodiversity is the amazing variety of life on earth and in South Africa. 	
9h10-9h25 15 mins	Importance of water 1. Demo: drip water from an ostrich egg shell into their mouth. 2. Refer to how we take water for granted, switch a tap on or carry it in a bottle. Not so in the past 3. Sit and listen to the water in the stream and write. 4. Importance of the Camissa Stream to the inhabitants of Cape Town in the past and for the garden.	<ul style="list-style-type: none"> All life depends on water. Lifecycles and life styles of animals and plants living in an area depend on the amount of water and the time that it arrives. San and Khoi khoi people used the perennial springs on Table Mountain called Camissa that means 'the place of Sweet Water'. Sailors stopped in Table Bay to get supplies and fresh water from these same springs. All water for Green Point Urban Park comes from these springs. 	<ul style="list-style-type: none"> 'Life Giving Water' worksheet. Ostrich egg shell containing water.
9h25-9h45 20 mins	Recap on the water cycle, weather and climate 1. Weather can be recorded by measuring air temperature, rainfall, wind speed and cloud cover.	<ul style="list-style-type: none"> Water moves in a constant cycle being evaporated by the heat of the sun, condensing when it gets cold, and precipitating as rain on the mountains. Weather constantly changes. Climate is the average weather conditions. Scientists predict that the climate is changing 	<ul style="list-style-type: none"> 'Weather and climate' worksheet. Weather maps cut out from the Argus.
9h45-10h00 15 mins	Biomes and Biodiversity of South Africa 1. Discuss the kinds of plants and animals indigenous to SA. 2. Explain how different plants in	<ul style="list-style-type: none"> The world can be divided into zones based on the climate, mainly rainfall and temperature. Different plants grow in different climatic regions 	<ul style="list-style-type: none"> 'Biomes' worksheet. Refer to Appendix 2 for list of different animals.

	<p>a biome reflect the climatic conditions and the soils of the area.</p> <p>3. Make a list of South African plants and animals. They can use the animals and plants that they can see in the garden</p>	<ul style="list-style-type: none"> SA can be divided into biomes is reflected by plants that grow there. Fynbos occurs in the SW Cape. Species diversity is very high with about 9000 different species. Many are endemic and occur nowhere else in the world 	
10h00-10h15 15 mins	<p>Fynbos Survivor</p> <ol style="list-style-type: none"> Discuss how a human can prepare for a range of weather conditions. Groups to work together on the 'Fynbos survivor' activity. Discuss ideas and dress one person up in the clothes. Explain the relevant adaptation that plants have to perform the same function. <ul style="list-style-type: none"> <i>This must be done before break to highlight the ability of humans to anticipate their needs- they have brought lunch, can walk to get water.</i> 	<ul style="list-style-type: none"> All organisms have to adapt to survive. Animals can move away or prepare for adverse conditions, plants can't move and have to have the physiological adaptations to survive. White shirt to reflect light = pale grey leaves. Sunglasses and sun cream to protect from UV light of sun = red leaf margin or growing in shade Water bottles= succulent stems or leaves 	<ul style="list-style-type: none"> 'Fynbos survivor' worksheet. One per group of 5 learners Props: white shirt, jersey, food, water, sun cream, sunglasses, insect repellent, sleeping bag, rain coat, umbrella, knife, toilet paper, medicines, etc.
10h15-10h30	Break		
10h30-11h00 30 mins	<p>How are plants adapted?</p> <ol style="list-style-type: none"> Explain the adaptations and ask them to find and draw the plants on the worksheet. Explain how special the plants in the Western Cape are and why there are so many different species –related to soils and climate. 	<ul style="list-style-type: none"> Plants have physiological adaptations to help them survive, many of them to reduce water loss and survive drought conditions Thick fleshy leaves to store water, small leaves to reduce surface area, hairy, furry or grey leaves to trap a layer of water, scented leaves to inhibit animals grazing 	<ul style="list-style-type: none"> 'Adaptations to survive' worksheet
11h00-11h30 30 mins	<p>Soils and veld types</p> <ol style="list-style-type: none"> Explain the basic rock types in this area. Rub rocks together to make soil, these different soil types 	<ul style="list-style-type: none"> Fynbos biome is where the climate is Mediterranean. Different soils and rainfall leads to different kinds of plants and in the fynbos 	<ul style="list-style-type: none"> 'Soils and veld types' worksheet Samples of granite,

	<p>support very different kind of plants.</p> <ol style="list-style-type: none"> 3. Shale is oldest and can be seen on Signal Hill. 4. Granite came up from underneath and can be seen on Lions Head. 5. Long periods of erosion and then sandstone laid on top that can be seen on Table Mountain. <p><i>NB: it is very complicated and this is a simplification.</i></p>	<p>biome in Cape Town we can see different veld types:-</p> <ul style="list-style-type: none"> • Renosterveld on shale soils. • Strandveld on alkaline sand (still has bits of shell in it). • Lowland Fynbos on acid sand from sandstone soils. • Mountain Fynbos in mountainous areas, soil is acid and poor. • Granite soil can have fynbos or renosterveld . 	<p>sandstone, shale rocks.</p> <ul style="list-style-type: none"> • Refer to 'Look up' and 'Veld Types' storyboards..
<p>11h30-11h45 15 mins</p>	<p>Cape Town is a biodiversity hotspot Discuss the following :-</p> <ol style="list-style-type: none"> 1. Why Cape Town is a biodiversity hotspot. 2. What is happening to these areas? Can we conserve them? <p>Go to the 'What can we do spiral'</p> <ol style="list-style-type: none"> 3. What are our responsibilities? 4. What can we do as individuals? 5. Walk and read the boards in the 'What can we do spiral?' 6. Make a commitment. 	<ul style="list-style-type: none"> • Cape Town is a biodiversity 'hotspot' because it has so many different types of soils and the mountains create variations in climate. • Biodiversity is threatened by human activities such as development, farming, alien plants and fire. 	<ul style="list-style-type: none"> • 'What can you do?' worksheet
<p>11h45-12h00</p>	<p>Consolidation</p> <ol style="list-style-type: none"> 1. Ask each person to find something constructive that they can do to. 2. Create a combined commitment poem from the class 	<ul style="list-style-type: none"> • Simple changes in the way we choose to live can help to conserve biodiversity. 	<ul style="list-style-type: none"> • Large piece of paper. • Koki. • Tape.

School: _____ Gr: _____ Date: _____

Name : _____



Life giving water

It is simple, life can only exist where there is liquid water and water can rightly be called the 'stuff' of life.

Sit quietly and listen to the sound of the water trickling in the pebbled stream nearby. Start anywhere on the page and write words or sentences or draw pictures that come into your mind when you think about water. Use all your senses to think about the magic qualities of water and the words that can be used to describe water. Create a word picture by placing your ideas in a pattern or picture.....or just write.

Weather and climate



Weather conditions change constantly as heat energy from the sun drives the water cycle and causes winds to blow. The average weather condition in an area is called the climate. Scientists tell us that the average temperature of the earth is rising. They warn us that this global warming is changing the weather patterns all over the world and predict that this will cause climate change. Records of extreme weather conditions have been reported from many parts of the world.

1. Work with a partner and look at the weather map cut out of the Argus. Use the key and read the weather for that day.
2. What is the kind of weather that we can expect in Cape Town in summer and winter? Record this in Cape Town climate box



Weather Box

Date/time	
Temperature	
Wind	
Rain	
Cloudy/ sunny	

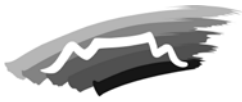
Record the weather conditions today in this box. You can use the symbols from the key.

Cape Town Climate

Summer weather		Winter weather	
Temperature		Temperature	
Wind		Wind	
Rain		Rain	
Cloudy/ sunny		Cloudy/ sunny	

What is the average kind of weather that we can expect in Cape Town in summer and in winter? Record this in the Cape Town Climate box.

3. Explain in your own words the difference between weather and climate.
4. Do you think the climate is changing? Explain your answer.



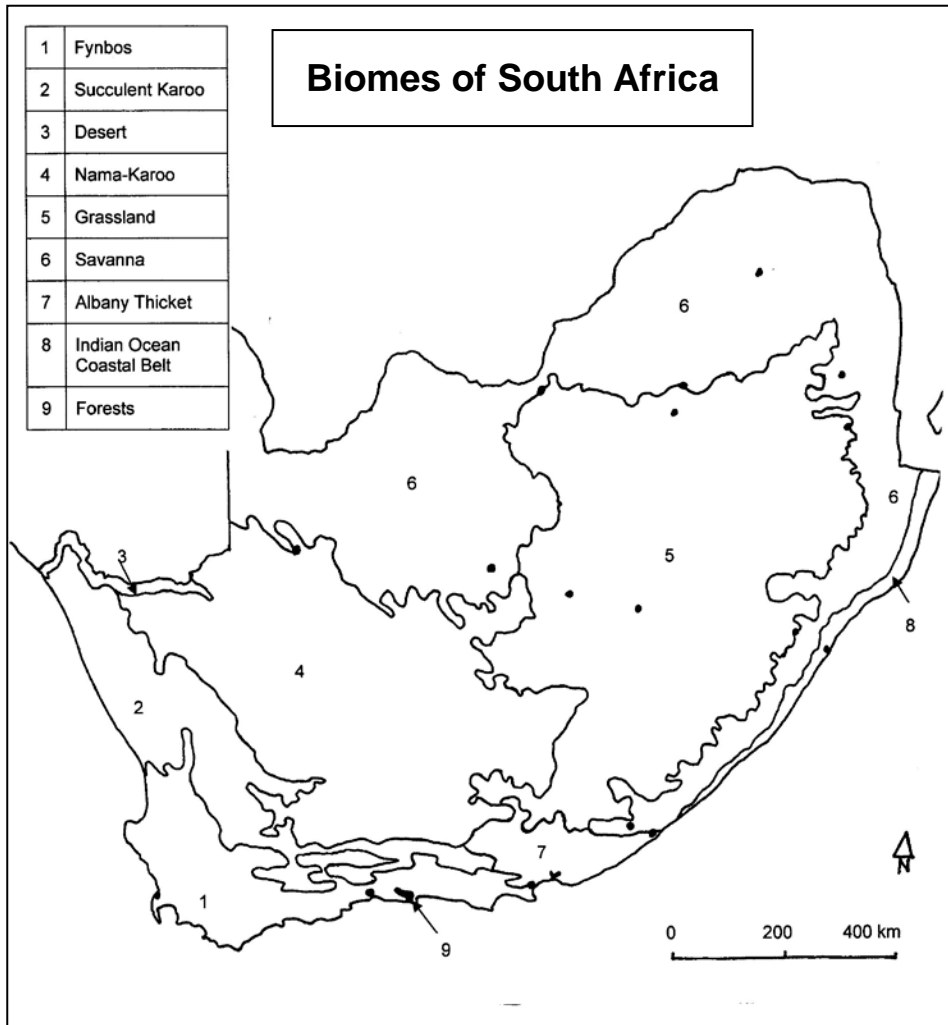
Biomes and biodiversity



- **Biodiversity is the amazing variety of life on earth and in South Africa. It includes the range of animals and plants, their genetic diversity and the habitats that they live in.**
- **South Africa can be divided into different zones based on climatic conditions, mainly rainfall, temperature and the soils. The plants that grow there are a useful indicator of these biomes.**
- **The fynbos biome occurs in the SW tip of South Africa where there is a Mediterranean climate with hot, dry summers and cool, wet, winters. Strong winds and frequent fires make conditions harsh for plants and animals to live there, but they have developed water saving adaptations to help them survive.**
- **This area has an extremely rich biodiversity with other 9000 different plant species.**
- **Some of them are endemic to this area and are found nowhere else in the world.**

1. The map below shows the 9 biomes in South Africa. Colour in the fynbos biome.
2. Make a list of the animals and plants that are indigenous to South Africa. You can use the animals and plants that you can see in this garden.
3. Do you know which biomes the animals and plants you have listed come from?
4. Can you find a plant that is endemic to the SW Cape?

Animals



Plants

Fynbos Survivor



In order to survive environmental conditions, the structure of an organism must be adapted. Animals are able to adapt their behaviour to avoid adverse conditions such as lack of water or heat and can hide during the heat of the day or move to where they can find water. Some animals can anticipate such conditions and can prepare in advance how they will survive.

CHALLENGE: *You are going to sit out in the fynbos veld for a period of 24 hours and you can bring along whatever you think you will need. Once you are in your position you are not allowed to move from that place and you must have with you everything that you need. You must prepare for all possible weather conditions.*

- 1. Describe the range of possible weather conditions that you could experience.*
- 2. Make a list of all the things that you think you will need.*
- 3. Explain why you need each item.*

Adaptations to survive



Plants in the fynbos biome have to survive harsh conditions of hot, dry summers, frequent fires, poor soils, strong winds and being eaten by herbivores.

1. Can you find the plants that show the following adaptations?
2. Draw a picture of the correct plant and write the name in the box

NB: each different kind of plant species has a common name and a latin name. You can use either name.

<p>A plant that stores food and water reserves in underground roots and stems.</p>	<p>A plant that has pale, grey-green leaves to reflect harsh sunlight and limit water loss.</p>	<p>A plant with hairy or furry leaves to trap a layer of moist air around the leaf and reduce water loss.</p>
<p>A plant that has fat, succulent leaves to store water.</p>	<p>A plant with red leaf margins that protect the leaf from the sun.</p>	<p>A plant with thick, leathery leaves that do not wilt.</p>
<p>A plant with scented leaves to discourage animals from eating them.</p>	<p>A plant with tiny leaves that helps it to save water because the surface area of leaves is less.</p>	<p>A plant that protects itself with thorns, spines or poisonous milky sap.</p>

Soils and veld types



The fynbos biome can be divided into different subgroups called vegetation types or veld types based on the specific set of plants that grow there and the soil they grow on. The underlying geology determines the kind of soils that occur in any given area. Four veld types are planted in the Biodiversity Showcase Garden.

1. Draw a quick sketch of Table Mountain, Signal Hill and Lion's Head and identify the different rock types that make up these mountains. Look at the rock samples and see if you can identify them and connect which ones would occur on these three mountains. Write the correct rock type that can be found in these three areas, and the type of soil that comes from these three rock types. *(see 'Look up' information board to see where sandstone, shale and granite rocks occur)*

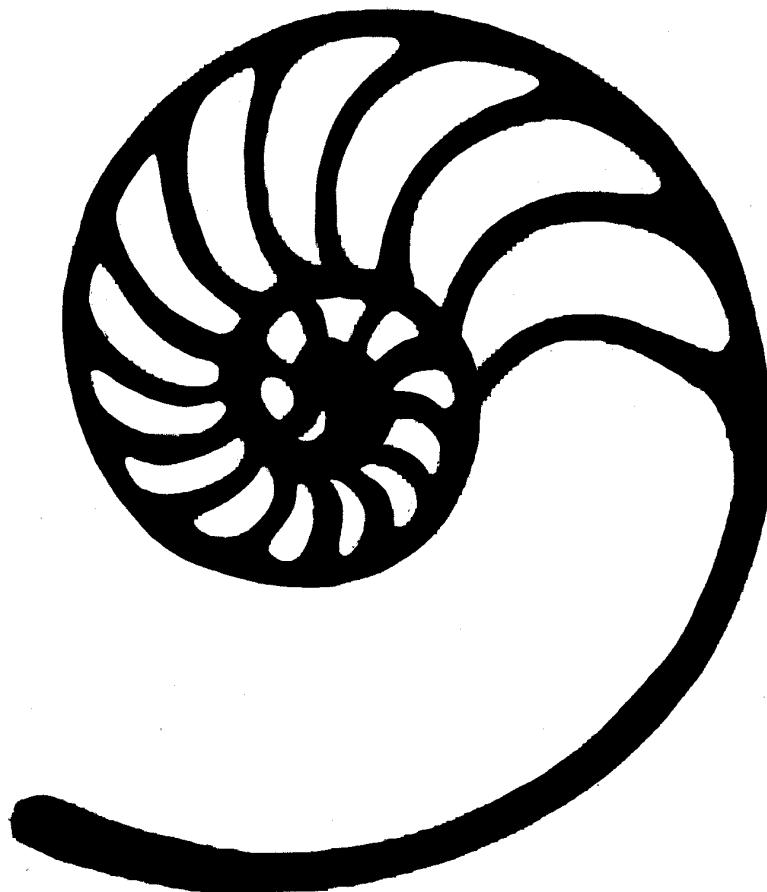
What can I do?



The weather changes constantly as energy from the sun is moved around the earth by wind and water. The climate of the earth has stayed stable for the last 10 000 years during which time human societies have flourished. However, it is common knowledge that our combined activities on earth are causing changes that are upsetting the weather patterns and our climate is changing.

In Cape Town, the effect will probably be to reduce the amount of rain and change the time it falls. Water shortages will have a knock-on effect in many areas of our lives and the lives of all the wild animals and plants living in and around Cape Townbut there are things that we can do.

1. Go to the spiral and find out about ways people can change their behaviour and make a small difference.
2. In the compartments of this spiral note down positive things that you can do



Connect with all the millions of people around the world doing small things.

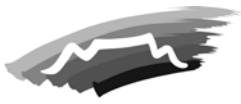
Lesson Plan for Gr 7: Threats to biodiversity

NB 'Needs and wants' activity could be done before or after the outing to prepare or consolidate

Time	Activity	Key concepts	Equipment
9h00-9h10 10 mins	Welcome and introduction 1. Explain behaviour expected in this area.	<ul style="list-style-type: none"> This garden is a place of reverence like a church and needs respect. BSG is a place for us to learn about the incredible diversity of animals and plants in the Western Cape. 	
9h10-9h25 15 mins	What is biodiversity? 1. Go to the fountain to start. 2. Allow them to walk from the water area into the BSG to find other examples of animals and plants. 3. Consolidate their information by using an example of a species, where does it live? It has to live in a habitat. It is part of a species, each one slightly different from each other. 4. Genetic, species and landscape diversity – fill in the worksheet of their own examples.	<ul style="list-style-type: none"> Bio = life, Diversity = differences. Biodiversity is the amazing variety of life on earth. Genetic diversity is differences in genes. Organisms show variation and have similarities and differences. A species is made of individuals that are similar enough to be able to reproduce successfully. In SW Cape, we have an incredible diversity, over 9000 different species, many are endemic and occur nowhere else in the world . Animals and plants live in a specific habitat. Habitats and landscapes are part of biodiversity. 	<ul style="list-style-type: none"> 'What is biodiversity?' worksheet.
9h25-9h45 20 mins	How are you connected? 1. In the dome, divide class into groups and give them 10 minutes to fill in how they are connected to biodiversity. <i>NB: do not allow them to spend too long on the drawing!</i> 2. Discuss why biodiversity is important, using their ideas.	<ul style="list-style-type: none"> We get everything from biodiversity – clean air, clean water, food, shelter, etc. We cannot live in isolation and without biodiversity. 	<ul style="list-style-type: none"> 'How are you connected?' worksheet.
9h45-10h15 30 mins	What is a species? <ul style="list-style-type: none"> Lid demo of 'What is a species?' Put all the lids out 	<ul style="list-style-type: none"> Species: Living things that look very similar and can successfully breed together all belong to the same species. There are many 	<ul style="list-style-type: none"> 'What is a species?' worksheet Bag of bottle top

	<p>placing different colours on different parts of the mosaic = different habitats.</p> <ul style="list-style-type: none"> Ask them to record the variation of characters in the "lid" species. 	<p>different species of plants and animals.</p> <ul style="list-style-type: none"> Different species prefer to live in different habitats. Yellow + yellow = yellow Red + red = red Yellow + red = orange Strange coloured ones = mutations 	<p>lids ranging from white, yellow, orange red and different sizes and plastic and some metal. Few odd ones</p>
10h15-10h30	Break	•	•
10h30-10h50 20 mins	<p>Why is diversity important?</p> <ol style="list-style-type: none"> Explain the difference between sexual and asexual reproduction. Explain why sexual reproduction is vital to maintain diversity. play the 'Climate Change Game'. 	<ul style="list-style-type: none"> Diversity is important to allow species to adapt when environmental conditions change. Individuals who happen to have a slight variation that makes them fitter will survive. The process of evolution depends on variation. This is how species are able to fine tune their adaptations to their environment. Sexual reproduction promotes variation. Asexual reproduction produces genetically identical clones. 	<ul style="list-style-type: none"> Lids from activity above. Large dice. Instructions for Climate Change game.
10h50-11h10 20 mins	<p>How do we measure biodiversity?</p> <ol style="list-style-type: none"> Explain that BSG has animals and plants from the Greater Cape Town area. How do we measure biodiversity? Discuss possibilities How many different species do you think there are in this garden? Explain how to do activity. Get feedback on the number of different species they counted. How close to 300 are they? 	<ul style="list-style-type: none"> BSG only has animals and plants from the Greater Cape Town area, 300 plants species, 34 animal sculptures. Have to measure and record differences and similarities to tell the difference between species. This exercise uses the colour and number of petals as features. Scientists would use many more than just two characters NB: they are counting different numbers of plant species NOT number of petals 	<ul style="list-style-type: none"> 'Measuring biodiversity' worksheet on counting different types of flower
11h10-11h30 20 mins	<p>Threats to diversity</p> <ol style="list-style-type: none"> In threats section explain the four main threats and show the four large logos. 	<ul style="list-style-type: none"> All human activities affect the environment. The main threats are fire, alien plants, development and farming. Harnessing the energy of the sun 	<ul style="list-style-type: none"> 'Human needs and wants' worksheet 'Threats of modern life'

	<ol style="list-style-type: none"> 2. Refer to 'Needs and wants' activity 3. Explain that all our needs come from the earth and biodiversity and the cost of our activities is that the existence of biodiversity as we know it today is threatened. Things have changed in the past but today we are causing the change. 4. Play the biodiversity game in the dome: see instructions 5. Discuss the implications of the game and what we have learnt. 6. What can you do to make a difference? 	<p>by burning fossil fuels would not be possible without biodiversity.</p> <ul style="list-style-type: none"> • Fossil fuel is fossilised animals and plants that lived millions of years ago and used the energy of the sun then. We are using something stored millions of years ago. • There is a consequence to this process • Releasing Carbon dioxide back into the atmosphere and disturbing the current balance.....climate change is the result • <i>NB: only give the amount of information relevant to the ability of the class. Biodiversity loss and climate change are big topics in themselves</i> 	<p>worksheet</p> <ul style="list-style-type: none"> • Squares of material = habitat • 'Threats to biodiversity' worksheet. • Pegs with names of animals. • Cake tin drum/ or bag of lids to make 'music' • Large logos of threats. • Rules of the biodiversity game.
<p>11h30-12h00 30 mins</p>	<p>Consolidation and close</p> <ol style="list-style-type: none"> 1. Go to the spiral to see the ideas of things that you can do to make a difference. 2. Assessment sheet to fill in 	<ul style="list-style-type: none"> • We need to acknowledge our dependence on biodiversity for survival and the mistakes that we have made • We need to be creative about finding ways to solve the problems we have created. • We need to find ways to look after biodiversity because biodiversity looks after us. 	<ul style="list-style-type: none"> • 'What do you think?' assessment sheet.



Human needs and wants

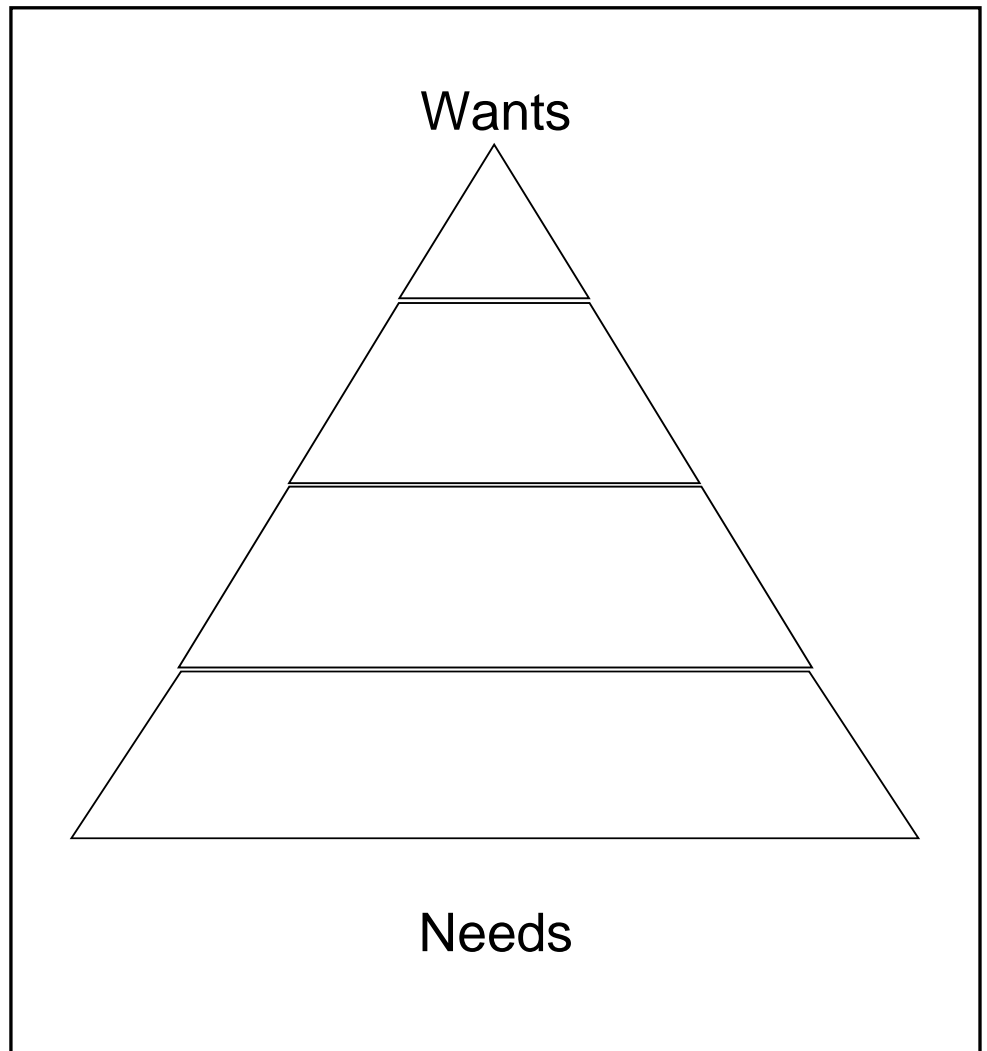


In healthy natural ecosystems resources are constantly recycled and used again. All organisms get what they need from their surroundings and any waste is used by other organisms. Humans also get what they need from the environment to live their lives but they want to make their lives easier, more comfortable and more enjoyable. Many things humans take from the environment are wants and not needs. In addition, human activities generate a lot of waste and toxic substances that cannot be processed by natural systems.

All of our needs and wants come from the environment and directly or indirectly affect biodiversity. This could be harvesting wild species, domesticating wild species and destroying natural habitats for farming, mining and development. Fires that are too frequent and the introduction of alien animal and plant species from different parts of the world upset the dynamics of natural ecosystems.

Natural ecosystems cannot continue to supply the increasing wants of human populations and absorb the increasing amounts of waste without a negative effect.

1. Can you identify and prioritise the things in your life that are needs and those that are wants?
2. Work in a group and discuss your ideas. Make a poster illustrating the things that are essential for survival at the base of the pyramid and place the others higher up the pyramid.
3. What waste products do human activities produce? Do you know what happens to it once it leaves your house or the factory?
4. Look at the 'Knock on effect' to see what can happen when toxic waste enters a river.
5. Discuss the challenge for human beings and what each one of us can do to make a change in our lifestyle that can make a difference.



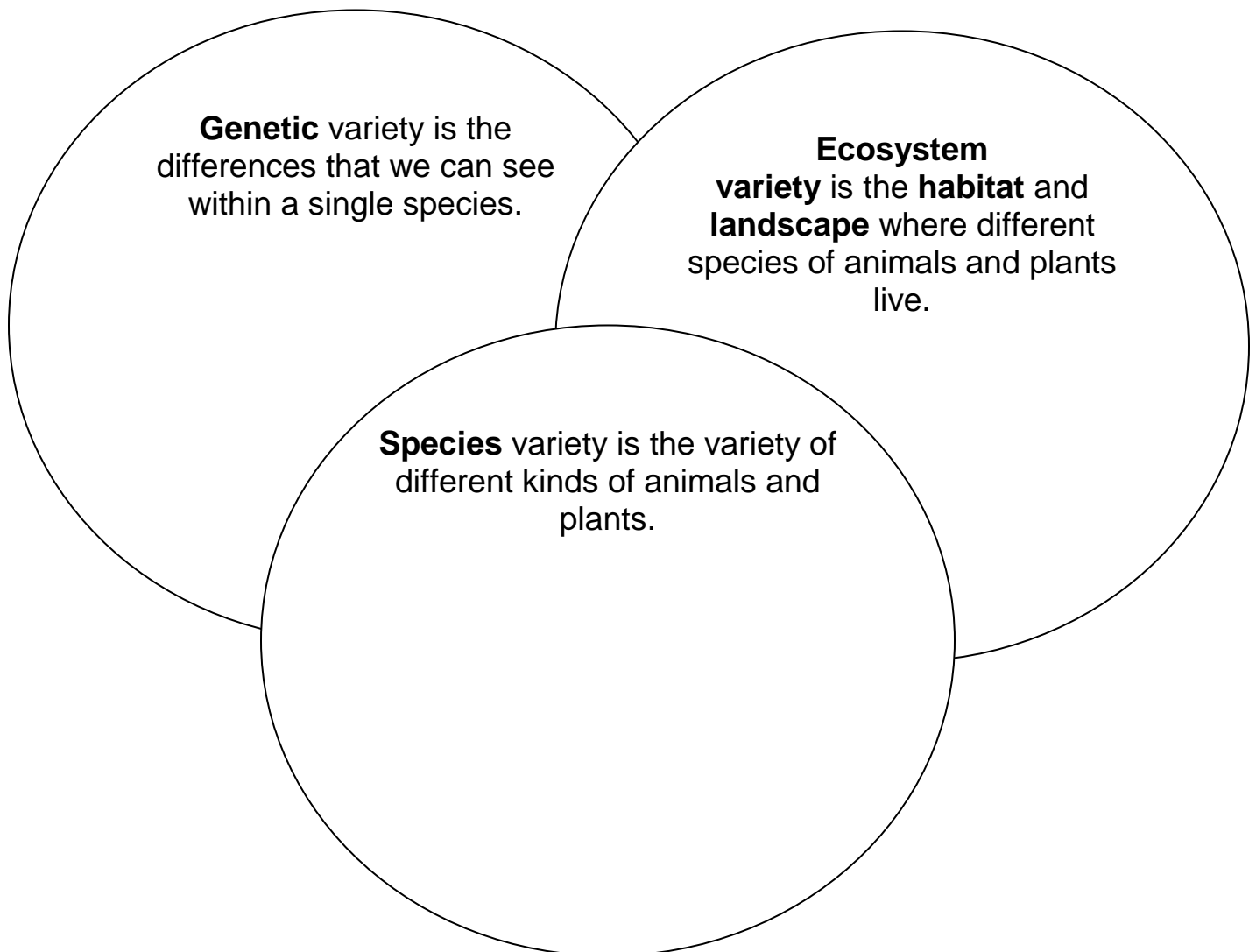
What is biodiversity?



Biodiversity is the amazing variety of life on earth. It includes the many different animals and plants in the world, the habitats and landscapes where they live and the variety that occurs within each species. Biodiversity is also about the connections between different organisms.

Everything is connected in a complex web of life. Without the connections biodiversity creates ecosystems fall apart.

1. Walk in the BSG and fill in the circles with information that you know or find out about biodiversity.
2. In the spaces outside the circles, record as many examples of interactions that you notice or read about in the garden.



How are you connected?



Biodiversity is the amazing variety of life on earth. Everything living is biodiversity which means you too are part of biodiversity. You are connected to everything around you in this wonderfully complex and timeless system.

- Most of the oxygen you breathe comes from plankton in the oceans of the world and the plants around you.
- The water you drink is part of a huge cycle involving you, clouds, rainfall, Table Mountain, rivers, glaciers and oceans.
- Your diet depends entirely on the plants and animals around us, from the grasses that give us maize and wheat to the fish, chickens and cattle. The fruit and vegetables you eat were probably pollinated by bees.
- Electricity you use in your house is generated from coal or oil that was extracted from the earth. These fossil fuels were once plants and animals living millions of years ago.

1. *Draw a picture of yourself and indicate the things that you are connected to.*
2. *If you are stuck think about the things that you do without thinking such as breathing, eating, reading, etc. Where do the things come from that you eat, drink or use to live your life?*

We rely on biodiversity – we can't exist without it!!!

‘What is a species’ demonstration

This demonstration uses different colour metal and plastic bottle top lids to represent individuals in a population. When the lids are positioned on the mosaic in the dome, or on the ground, they represent a population of organisms ‘living’ in their habitat. Depending on the characteristics that you choose for each set of lids many principles related to species, genetics and the process of sexual reproduction can be explained.

Equipment

- Bag of plastic and metal bottle top lids of different colours.
- A ‘habitat’ to position them on – in the BSG the mosaic of the cell in the dome works well.

Sexual and asexual reproduction

All organisms must produce offspring. Many simple organisms can simply divide in half or produce another individual by budding. This process of asexual reproduction produces individuals that are genetically identical. These are called clones.

Sexual reproduction enables genes to be mixed and to generate a range of individuals that are genetically slightly different. To reproduce sexually an organism must make special male and female cells. When a male cell and a female cell meet and fuse, a new individual is formed that has a combination of both sets of genes. This can only happen between individuals that are similar to each other and this is called a species.

Genetic diversity is therefore the basis of biodiversity.

Sexual reproduction in animals

If the lids are animals, in order to mate and produce offspring they would have to be adults and attract the attention of a mate by calling, emitting scent or displaying bright colours and showing off and generally the male moves towards and claims the female.

Sexual reproduction in plants

If the lids are plants, the process of sexual reproduction is more subtle. Male pollen must be carried by a pollinator or the wind to the female part of the flower in order to produce seed that can produce a new individual. The flowers are the sexual organs of plants.

Scenario 1

All lids regardless of colour and what they are made of can interbreed. If a red lid mates with a red lid, a red individual is likely to be the offspring. Discuss the possibilities of crossing individuals such as a red lid and a blue lid and then a blue plastic lid and a gold metal lid.

Scenario 2

All plastic lids are one species and all metal lids are another. A plastic and a metal lid cannot interbreed. Discuss what would happen if a plastic lid and a metal lid did manage to produce an offspring. The offspring would be a hybrid and would probably not be fertile e.g. a mule is the offspring produced from a horse and a donkey.

Scenario 3

All lids of one colour regardless of size and what they are made of are one species. Only lids of one colour can interbreed. How many different species have you got represented?

Suggested answers for 'What is a species?' worksheet

1. What do you understand by the concept of a 'species'? Use the bottle top lids to explain.

The bottle top lids spread on the floor represent a population of an animal or a plant. There are different colour lids and some are made of plastic and some of metal.

If all the lids are able to interbreed and produce viable offspring, then all the lids belong to one species.

If only plastic lids can breed with other plastic lids but not with metal lids, then plastic lids are one species and metal lids are another.

If only lids of the same colour can interbreed then each colour represents a different species.

2. If you were describing the species 'bottle top lids' write down what the range of variation would be for :-

- Colour : red, yellow, blue, gold, white(depends on the lids used)
- Size: large medium and small.
- Texture: metal and plastic.

3. Explain what would have to happen for two different species to evolve from this one species of bottle top lids?

Something would have to limit or prevent sexual reproduction and the flow of genetic material between the populations. The individuals could become separated by where they grow e.g. on two different mountains, or by a pollinator not being able to reach different populations.

A mutation could occur in one plant that makes it only able to breed with one kind of lid e.g. only white lids can interbreed.

Humans could selectively breed the lids as has been done with dogs. All dogs originally looked very similar and are able to interbreed but they are so different in size that very large and very small dogs would not produce viable offspring.

4. Plants can reproduce sexually and asexually. Most animals can only reproduce sexually

a. What is the difference between these two types of reproduction?

Asexual reproduction is where an organism can make more individuals without a mate. Each new individual is genetically the same. Most plants can reproduce asexually and a new plant can be made from pieces of the adult plant. These are called clones. This is extensively used in the horticultural industry to grow flowers and some crops are grown by vegetative means (e.g. pineapples, potatoes, bananas and sugarcane).

b. Why do plants bother to reproduce sexually if they can reproduce without sex?

Clones of plants are genetically identical. Sexual reproduction ensures that genetic diversity is maintained. When environmental conditions change, some individuals are better able to survive than others. A population made up of genetically identical individuals is far more likely to suffer a catastrophe from disease or climate change because there are no individuals with slight advantages. The process of evolution works on the principle of survival of the fittest. When conditions are favourable, all the individuals will survive, but when conditions are unfavourable, if they all have the same disadvantage, they will all die. It is vital to promote genetic diversity of plants to ensure their long term survival and sex therefore is a necessity even though asexual reproduction is easier.

Climate Change Game



This game is based on using a range of bottle top lids to represent the individual members of a population of one species of plant.

Equipment needed

- A bag of different sized plastic bottle tops including white, yellow, orange, red and a few odd ones (green, maroon) and a few metal ones.
- A large dice.
- Chalk to mark out different habitats on the ground.

Explanations

- The bottle tops represent individuals in a population of one species and within any one species there is a range of colour, size, and texture. Specify what size is large /small.
- Ask the participants to specify the range of these characteristics.
- If the species is an animal, then any two individuals can move to find each other and mate to produce a viable offspring.
- If the species is a plant, then the pollen from any one flower would have to be carried by wind or a pollinator to produce viable seed.
- The odd colours are due to mutations. Adults that look like this may or may not be able to reproduce but give the idea of variations occurring randomly.
- For separate species to develop, reproduction between different parts of the population must be restricted e.g. if only red and red mate and only white and white mate due to being separated by times of flowering then eventually, white and red will not be able to mate and produce viable offspring.

Rules of the Game

1. The dice will be thrown three times to represent possible changes in the environmental conditions that would cause part of the population to die.
2. Place the lids out on the floor, defining slightly different habitats that different coloured lids might prefer to live in e.g. red ones might prefer to live in a wetland and white ones on higher ground.
3. Throw the dice three times and see how many individuals survive.
 1. All red lids die
 2. All white lids die
 3. All large lids die
 4. All small lids die
 5. All metal lids die
 6. All plastic lids die

Measuring biodiversity



To measure biodiversity in a given area, we have to count the number of different species. Different species of plants have different flowers. We can use the colour and number of petals of different species to help us record the different species in the BSG.

1. Record as many different plants with flowers as you can.
2. Decide what colour the flower is e.g. purple.
3. Count the number of petals e.g. 6. Record one tally line in the purple row and the 6 column. Do not record that same plant again but you can record more purple flowers.
4. Look at the colour of the next flower e.g. purple and it might have 13 petals. Record one tally line in the purple row and >10 column.
5. Record as many flowers as you can, even though they might be the same colour.
6. Add up the total for each different colour i.e. each row.
7. What is the dominant colour of flower in the BSG today?
8. How many different species did you count? Add up the total number in the last column. This is the number of different species that you have counted.

Use the tally system to record



NB: you are NOT counting the total number of petals so complicated multiplication calculations are not necessary.

		Number of petals									
		0	1	2	3	4	5	6	7-10	>10	Total number in each row
Colour of petals	white										
	yellow										
	orange										
	red										
	pink										
	purple										
	pale purple										
	pale blue										
	dark blue										
	brown										
Grand total = number of different species of plants measured											

Biodiversity Game



This game is based on the popular children's game of Musical Chairs, except that instead of chairs a square of material is used and this represents the habitat that an animal needs in order to survive. The music is a bag of lids shaker.

Equipment needed

- 1 piece of material (about the size of a handkerchief) per person starting the game.
- 1 clothes peg per person starting the game, with an animal name written on it.
- 1 large dice with each side having a different coloured dot i.e. six different colours.
- Enlarged copy of the four main threats to biodiversity: fire, invasive alien plants, development and farming.
- Something to make 'music' with e.g. a bag of lids to shake, a cake tin to bang.

NB: each peg has the name of an animal written on it(see Appendix 2 for list of animals in BSG) and one of the six different coloured dots on it as well.

Rules of the Game

1. All players are given a peg with an animal name.
2. Each square of material represents the habitat.
3. The 'habitats' are arranged in a large circle and each 'animal' stands on one 'habitat'.
4. When the 'music' plays, all the animals must move in a clockwise direction and when the music stops, they must jump onto a 'habitat', which does not have to be the same one that they started out on.
5. Any 'animal' not finding a 'habitat' is out the game.
6. As the game progresses, habitats are destroyed by farming, alien invasive plants, development and fire. The squares of material are removed, which means that some animals will not be able to find a habitat.
7. The conservation dice represents concerned people who have set aside conservation areas. Throw the dice to see what colour dot comes up. If the dot on the dice matches the colour of the dot on the peg, those animals may re-join the game.
8. Continue the game until there are no habitats left. That is what humans are doing to the earth.
9. Ask players to write or express how it feels to have no home or habitat to go to.

The threats of modern life



For thousands of years sticks, stones and fire were the most important tools available to man but this has changed radically in the last few hundred years. Harnessing the energy of the sun (fire and burning fossil fuels), introduction of alien species, development and farming are major threats to biodiversity.

1. Look at the symbols below and label them.
2. Explain how you personally have benefited from these processes.



3. How have human activities in general affected biodiversity?

4. Explain how you feel after playing the biodiversity game.

What do you think?



Name : _____ School : _____ Gr _____ Date: _____

The Biodiversity Showcase Garden (BSG) is one of the City of Cape Town's Local Action for Biodiversity (LAB) Projects and aims to showcase the biodiversity of Cape Town and make the concept of 'biodiversity' accessible to the public.

You have spent a few hours in the BSG learning about biodiversity. Please answer the following questions honestly

1. Why do you think the City of Cape Town has spent a lot of money building the Green Point Urban Park with the BSG in the middle of it?
2. How does the garden make you feel? Find at least five words to describe how you feel.
3. What do you understand by the word biodiversity? Use your own words to describe it and why it is important.
4. Many plant species in and around Cape Town are threatened with extinction due to human activities such as alien plants, fire, development and farming. Does this matter? Explain.
5. What can you do to ensure your children will be able to benefit from Cape Town's rich biodiversity one day?

Appendix 1: The Seven Life Processes

(Adapted from People, Plants and animals – we are all alive. Life and Living Gr 4 booklet published by Primary Science Programme, Western Cape, 2004)

What makes something living?

There is an on-going debate in scientific circles about what exactly makes something “living”. At present, living things are seen as organisms that need energy to carry out their life processes. In other words, all living things carry out the same life processes, and they need energy to do so. All living things can do the following things:

They move and breathe (respire), they are sensitive (can respond), they grow, and reproduce, and they feed and excrete (make poos and wees). These are called the **seven life processes** and all living things do them naturally.

MRS GREN is a useful acronym to remember them

- **M**ovement (including growth movements)
- **R**espiration (breathing)
- **S**ensitivity (having senses)
- **G**rowth
- **R**eproduction
- **E**xcretion (getting rid of waste)
- **N**utrition (eating and drinking)

Are manmade machines living?

Of course, we know that there are machines that can do some of the things that plants and animals can do. For example, machines can move. However, machines cannot carry out all the life processes on their own, as plants and animals can. We also know that living things cannot live without air and water. Although air and water are essential to life, they are not themselves living.












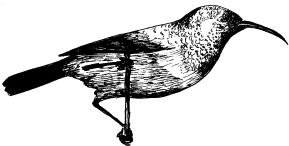

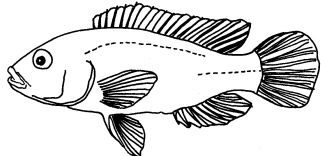
Biodiversity recycles everything

Biodiversity is the amazing variety of animals and plants on earth. Plants have the incredible ability to trap radiant light energy from the sun. All other organisms on earth are therefore dependent on plants for their energy requirements. Healthy ecosystems are a myriad of different plants and animals interacting, carrying out their life processes. The basic elements of carbon, hydrogen, oxygen, nitrogen and water are constantly used and reused. No waste is generated because all waste is food for another organism. These interactions can continue indefinitely as long as environmental conditions do not change drastically.

Ecological services: life processes of healthy natural ecosystems


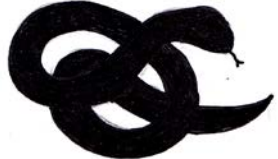



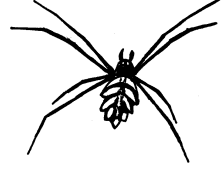



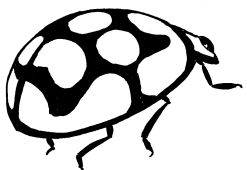
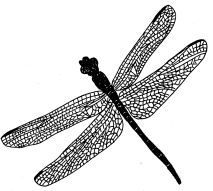
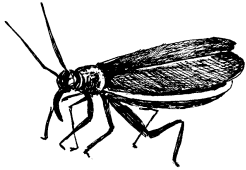

The life processes carried out by healthy ecosystems have been used by human societies for thousands of years to carry out their life processes. Many of us are not aware of the importance of these ecological services and the roles that they have played. The production of clean air and water, preventing flood damage, pollination of fruit trees, and decomposition of waste are all examples of interactions with other organisms humans depend on to live a healthy life.

Appendix 2: Reference sheet of animals in the BSG: herbivores and omnivores (see Appendix 3 for Animal Cards)

herbivores		
 <p>tortoise</p>	 <p>Cape Hare</p>	 <p>mole rat</p>
 <p>grysbok</p>	 <p>steenbok</p>	
omnivores		
 <p>Hover fly</p>	 <p>ant</p>	 <p>small spotted genet</p>
 <p>mouse</p>	 <p>White eye or wit-ogje</p>	 <p>mongoose</p>
 <p>sunbird</p>	 <p>honeybadger</p>	 <p>fish</p>

Appendix 2: Reference sheet of animals in the BSG: carnivores

(see Appendix 3 for Animal Cards)

carnivores			
 <p>chamelion</p>	 <p>mole snake</p>	 <p>owl</p>	
 <p>lizard</p>	 <p>toad</p>	 <p>spider</p>	
 <p>cobra</p>	 <p>rooikat</p>	 <p>Cape fox</p>	
 <p>ladybird</p>	 <p>dragonfly</p>	 <p>assassin bug</p>	 <p>praying mantis</p>

Appendix 3: Animal sculptures in the BSG

Information for each animal is either an Animal Card or an Animal Information Sheet.

- Animal Information Sheets from p. 81-94.
- Full set of animal cards available from Primary Science Programme ISBN 978-0-620-40553-9.

Animal Cards	Animal Information Sheet
Ant	Assassin bug
Chameleon	Cape fox
Cobra	Cape hare
Dragon fly	Cape mole rat
Lizard (gecko used)	Fish
Mongoose	Grysbok
Mouse	Honey badger
Owl	Hover fly
Praying mantis	Ladybird
Spider	Mole snake
Sunbird	Rooikat
Yoad	Small spotted genet
Tortoise	Steenbok
	Wit-ogie or White eye

Assassin Bug

Description

Assassin bugs are large, robust, black bugs with a distinctive yellow head and yellow markings down the side of their abdomen. The nymphs or young assassin bugs are also distinctive being bright red with black wing pads. They have a powerful mouthpart called a beak that is curved. They can rub this beak against a ridged groove under the body to produce a sound to discourage predators. These insects are clearly advertising that they are dangerous and can bite and should be left alone. They can deliver a painful bite to humans though do not usually do so.

Distribution and Habitat

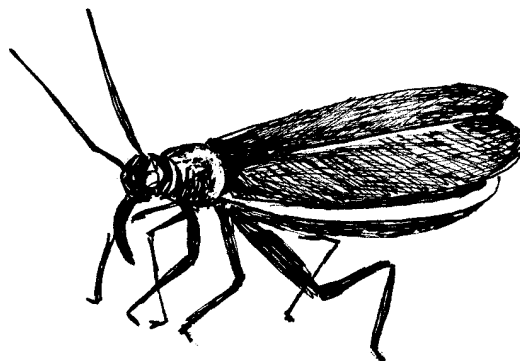
Assassin bugs can be found all over South Africa and are common in gardens and a variety of veld types. They live under stones, logs and leaves.

Food and Behaviour

They hide during the day and come out at night to hunt millipedes. They are ambush predators, moving slowly towards their prey and then rushing out and grabbing it with their forelegs. They use their beak to inject saliva into the prey that paralyzes it and prevents the millipede from releasing their own set of chemical defences. The millipede is then sucked dry by a feeding frenzy of adult and nymph assassin bugs.

Reproduction

The eggs hatch into nymphs that resemble the adults. They are red and have black wing buds on the outside of their bodies. At each successive moulting stage, the wings develop until the final moult produces the adult with fully developed wings.



Cape Fox

Description

The Cape Fox is the only true fox in South Africa. It is small, only measuring between 86 to 97 centimetres in length. It has a speckled silver-grey back and has whitish under parts. The tail is thick and fluffy, the hairs being white at the root end and dark brown at the tips. The head is reddish in colour but fades to off white in colour towards the cheeks.

Distribution and Habitat

Found in western regions of South Africa, this fox lives in open areas of grassland, scrub and Fynbos.

Behaviour

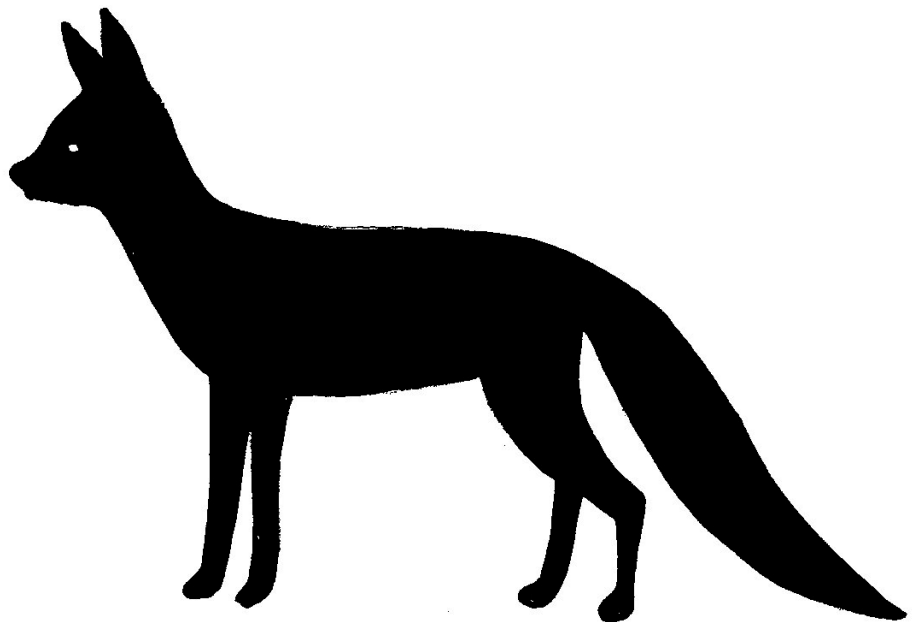
This hunter is nocturnal and lies low during the daytime in dense bush or holes. They are usually singular but are occasionally spotted in pairs.

Food

The Cape Fox is a carnivore (it eats other animals) that eats invertebrates (animals without a backbone such as insects), rodents, small mammals, reptiles and small birds.

Reproduction

Between 1 and 3 pups are born in the spring months.



Cape Hare

Description

The Cape Hare is a rodent. It has a grey-brown coat that is flecked with black hairs. The abdomen is off-white, as are the rings around the eyes. It has a short tail that is black on the upper side and white underneath. The hare has large upper incisors (teeth) that are continuously growing. The hare ranges from 51 to 55 centimetres in length.

Distribution and Habitat

The Cape Hare is widely distributed in the western and central areas of South Africa. This hare prefers an arid (dry), open habitat of woodland or scrub-like bush.

Food

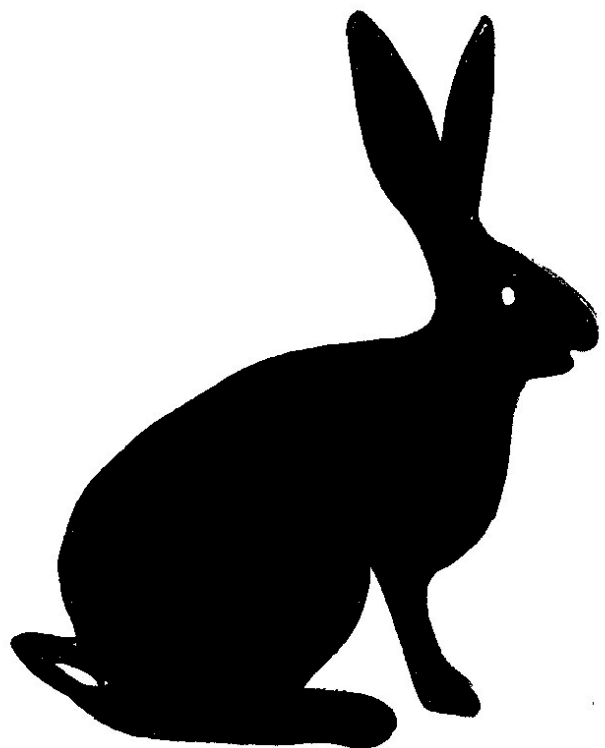
The Cape Hare is a grazer. This means it eats grassy vegetation (plants).

Behaviour

This animal is nocturnal. This means that it is active at night. It may, however, also be seen during the early morning and evening when it is cooler. The Cape Hare relies on its coat colouring for camouflage, and it lies still in 'forms' (shallow holes in the earth made by the body) until the very last moment when a predator is approaching. It then dashes off at high speed in a zigzag movement.

Reproduction

Young are born throughout the year, with up to 4 litters a year each consisting of 1 to 3 leverets (baby hares). Males compete for a female by standing on their hind legs and attacking one another with their clawed forelegs.



Cape Molerat

Description

The Cape Molerat is a rodent, that looks similar to a garden mole, but is larger, about 20cm in length, and has prominent (sticking out) incisors (front teeth). These rodents have soft fur and short tails. The Cape Molerat is distinguishable (is different) because it is the only molerat that has black-and-white markings on its head. Molerats live underground and so have short legs and long claws designed for digging.

Distribution and habitat

The Cape Molerat lives in sandy soils along the coastal regions stretching from the Cape to around Port Elizabeth. It can also be found in small, isolated areas in KwaZulu-Natal, Mpumalanga and the Free-State.

Behaviour

Molerats live in underground burrow-systems that they dig using their incisors (front teeth) and then move the earth away using their long claws. The burrow systems sometimes reach the surface of the ground, making mounds. Molerats are known to surface at night.

Food

Molerats are herbivores (eating only plant material). They mostly eat the roots, bulbs and tubers of plants.

Reproduction

Molerats are social animals, they live in large colonies, with a single queen molerat. This queen gives birth to all the other molerats in the colony. Very little is known about the number of young and other aspects of reproduction.



Rooikat

Description

The rooikat is a robust (strong and tough) cat with a lynx-like head and long black ears with sprinkles of white hairs, with characteristic black tufts of hair at the tips. They have hindquarters (back legs) that are slightly higher than their shoulders. Their fur is usually reddish-fawn but can be darker red in colour. Their under parts are off-white. Their faces are marked with black and white patches around the eyes and mouth.

Distribution and habitat

It occurs in most of southern Africa but does not occur in the coastal regions of Kwa-Zulu Natal. They are found in semi-desert, the savannah, coastal forests and mountainous regions.

Behaviour

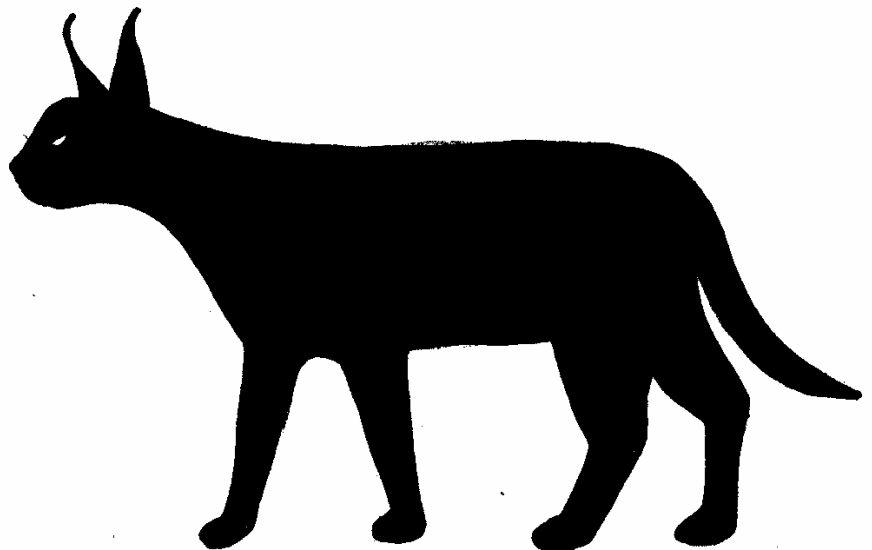
They are nocturnal predators and are solitary (found alone) except during mating and when females are rearing kittens. They rely on camouflage, stalking and short range pouncing or chase.

Food

The rooikat hunts small to medium-sized mammals as well as reptiles and birds. They are a nuisance to farmers for hunting sheep and goats.

Reproduction

It has a gestation period (pregnancy) of 79 days and a litter can consist of 1-3 kittens. The female rooikat will pick out dense vegetation, a burrow or rock crevice in which to give birth and rear her kittens.



Freshwater Fish

Distribution

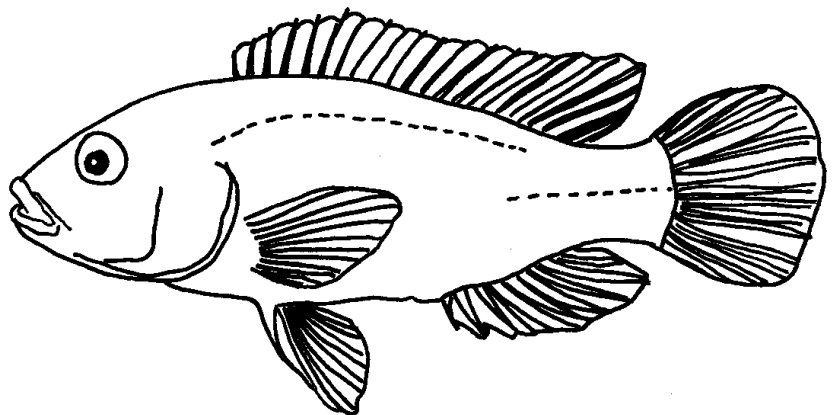
South Africa has approximately 250 species of freshwater fish. There is, however, only a very small variety of indigenous fish in the Cape region. Freshwater fish distribution (places they are found) is restricted by both geographical and climatic (temperature and weather related) factors. For example, rivers are often only seasonal (they flow for only part of the year) and as rivers dry up the fish stuck in pools are easy targets for predators; are susceptible (vulnerable) to disease and suffer from oxygen depletion. Oxygen depletion means that there is less oxygen in the water for the fish to absorb using their gills. This happens because the water is not flowing into a river and so no new oxygen can go into the water. Fish are also prevented from migrating (travelling to different places seasonally) by rapids (fast flowing water) and waterfalls.

Habitat

Some freshwater fish cannot survive in a saline (salty) environment, so die when the river reaches the sea. Others can adjust to changes in salinity (amount of salt): such fish are the Mozambique tilapia and freshwater eels. Coastal lagoons are home to both freshwater and marine (sea) fish and are particularly important places for fish spawning (egg laying) as they provide a sheltered habitat for marine fish to breed.

Feeding

Freshwater fish can be surface feeders; eating insects and or plants at the surface of the water, or bottom feeders; scavenging for food on the river bed. Other fish are predators eating insect larvae such as dragonfly larvae or mosquito larvae and are thus very important in the control of insect populations. Larger fish prey on smaller fish and crustaceans (animals like crabs with an exoskeleton).



Pollution

Freshwater fish are affected greatly by pollution as rain and drain water flows into rivers and picks up toxins (poisons) and different chemicals on the way to the rivers. This means that the river water can poison the fish. Poisoned fish can affect their predators such as wetland birds like herons.

Grysbok

Description and Habitat

The Grysbok is a small antelope that is restricted to the Fynbos kingdom. It has a shoulder height of only 55 centimetres and weighs between 8 and 12 kg. It is characterized by light brown fur with flecks of white. The under parts are lighter brown, almost white, in colour. They have black scent glands just under their eyes, which are used to rub against plants to mark their territory. The rams (males) have smooth, straight, black horns that are about 8 centimetres long.

Food

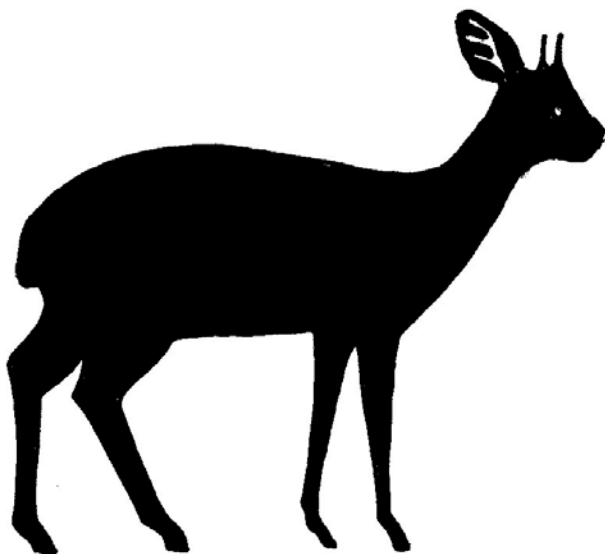
This antelope lives in scrub-bush Fynbos and it mainly grazes. This means that it eats grassy vegetation (plants). It is also an occasional browser. (eating shoots and leaves) and is considered a nuisance by farmers as it eats fruit and buds in vineyards and orchards. This antelope has adapted to the dry climate, by being able to go for long periods without water as it receives most of its water from the food it eats.

Behaviour

The Cape Grysbok is nocturnal (it comes out at night) but is also active in the early morning and late evening, as well as on cool cloudy days.

Reproduction

They are singular except during mating or when the ewes (females) are caring for lambs. Most lambs are born from September to December after a gestation period (pregnancy) of 180 days.



Honey badger

Description

A stocky black mammal with a silver-grey upper part, that starts from above the eyes and runs all down the back to the tip of the tail. It is approximately 1 metre in length with a shoulder height of 30 centimetres and weighing between 8 and 14 kg. The Honey Badger has a short tail that is held erect (upright) when walking. Their spoor (footprints) is distinct and leaves impressions of their large claws.

Distribution and Habitat

Found throughout South Africa excepting in the Free State and it is also not found in Lesotho. The Honey badger likes all types of terrain except true desert.

Behaviour

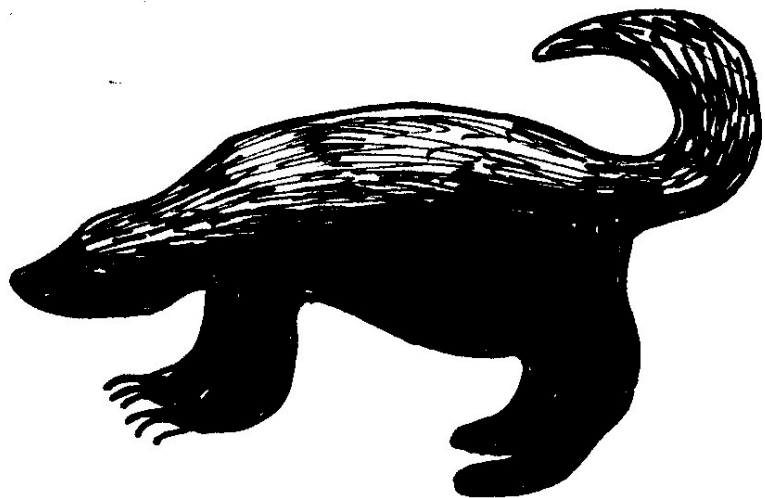
This animal is tough and very aggressive and has been known to attack humans, buffalo and even elephants when threatened. They are nocturnal but are occasionally seen in the early morning and late evening when it is cool. They can occur singly, in pairs or in family groups. They use anal glands to mark territory (their home area) or to scare off predators by emitting an unpleasant smell. The Honey Badger has a mutual symbiotic relationship with a small bird called the Honey guide. This means that the Honey badger and the Honey guide work together to help each other and both of them benefit from their relationship. The Honey guide leads the Honey Badger to a bee's nest, where the Honey Badger attacks the bees nest and opens it up. The Honey guide then feasts on the wax and grubs inside. This way, both the Honey Badger and the Honey guide get food.

Food

The Honey badger eats insects, small mammals, amphibians, reptiles as well as arachnids (spiders and scorpions)

Reproduction

Between 1 and 4 young can be born in a burrow at any time of the year.



Hover flies

Description

Hover flies have distinctive black and yellow stripes or spots and can easily be mistaken for bees or wasps. This is called mimicking. The advantage of looking like a bee or wasp, is that predators know that bees and wasps can sting, and will therefore most likely leave the hover fly alone. Hover flies are different from bees and wasps in having only one pair of wings and no sting. They are therefore harmless to man. There are about 226 species of hover flies

Behaviour

Hover flies are named for their hovering flight. This means that they can remain in one place using rapid (fast) beating of their wings.

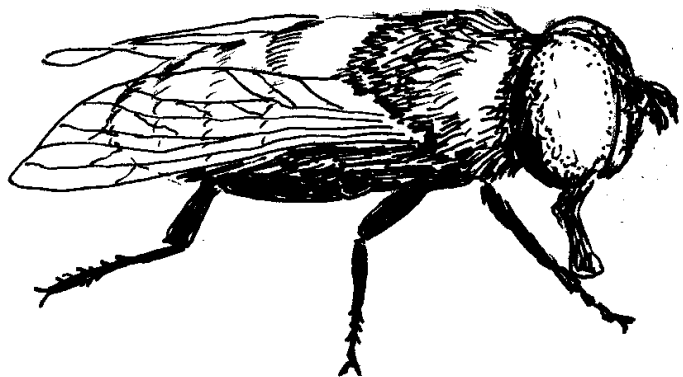
Food

Adult hover flies feed on nectar and pollen and are therefore important for pollination of flowers. The larvae of hover flies vary greatly in their appearance, diet and lifestyle. Some larvae feed on aphids, (making them a useful predator in the garden), some feed on dead ant larvae and pupae while others feed on decaying vegetation.

Breeding and habitat

Some larvae are aquatic living in stagnant pools of water in the muddy bottoms of polluted pools and blocked drains. They are known as 'rat-tailed' maggots which refer to the long tube that is attached to its abdomen. Dirty polluted water has no oxygen and the maggots are able to survive these anaerobic conditions by breathing through this tube to get oxygen from above the surface of the water.

The fact that rat-tailed maggots live in dirty water gives hover flies a bad name— in fact this fly does a lot more good than harm



Ladybirds

Description

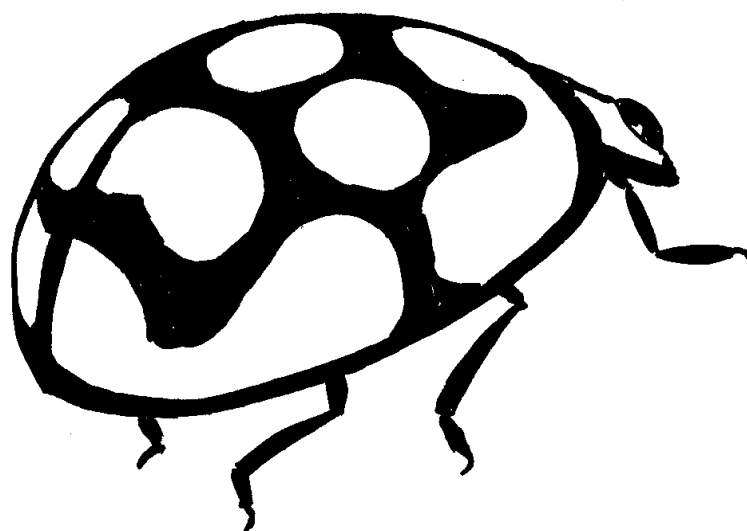
Ladybirds are beetles with 2 pairs of wings. The front pair is hard and horny, protecting the delicate rear wings that are used for flying and can be folded away when not in use. These beetles are brightly coloured with red, black, yellow or orange spotted or striped patterns. This bright coloration is in fact a warning to birds and other predators to avoid them. If you pick up a ladybird and manhandle it, it secretes a bitter, yellow unpleasant tasting liquid from between the joints on its legs. Ladybird larvae are black with prominent yellow or white markings.

Food

Adults and larvae are carnivorous and feed on small insects and mites. They are very important in controlling aphid populations and are therefore a beneficial pest-controller in the garden and should be encouraged.

Breeding

The female lays her cluster of 20-30 eggs on the lower surface of a leaf close to a colony of aphids. When the little black six legged larvae emerge they sink their sharp jaws into the aphids and suck out their juices. The mature larvae find a convenient stone or rock crevice to hide away and pupate.



Mole snake

Description

This snake is large (1-2 metres in length) and thick and is usually brown or reddish-brown in colour, but is often black in the western areas of the Western Cape. Juvenile snakes, however, are patterned with dark, pale-edged spots. The snake has a slightly hooked nose. Its body is smooth and has between 25 and 35 rows of scales. This snake is often mistaken for a cobra, but is in fact not poisonous.

Distribution and Habitat

This snake likes sandy scrubland, grassland and mountainous regions, where they live in abandoned animal burrows. It is found almost throughout South Africa excepting the very tip of Limpopo.

Food

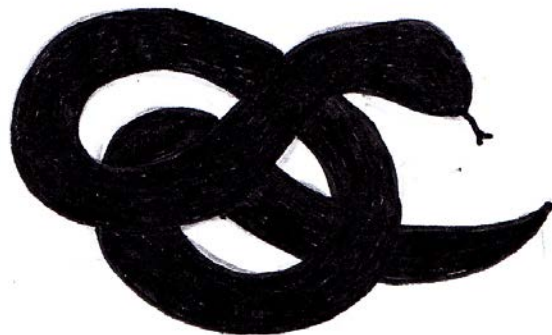
They prey on moles, molerats and rodents as well as small mammals. They also eat eggs and juveniles eat small reptiles.

Behaviour

These snakes are aggressive, and although they are not poisonous, they can thrash and have a nasty bite that leaves gashes that may require stitches. During mating season males fight each other for mates.

Reproduction

Mating season is in late spring and commonly 25-30 young are born during March-April.



Small-spotted Genet

Description

The small-spotted Genet is a long, slender mammal about 1 metre in length, including its long tail. It is greyish-white in colour, with dark brown or black spots on the body and black or brown stripes on its tail. It has bold dark facial features and a distinctive black chin.

Distribution and Habitat

Found throughout South Africa excepting on the coastal regions from the Eastern Cape to KwaZulu Natal. This genet is found in both desert and high rainfall regions.

Behaviour

These nocturnal animals are good tree climbers, aiding them in hunting, but they also spend a fair amount of time on the ground. They are solitary (live alone) animals. It stalks prey like a cat and defends itself by arching the fur on its back. It may also let off a bad odour from its anal glands when threatened.

Food

Predator of invertebrates (animals without a backbone for example insects), rodents, reptiles, amphibians, birds as well as small mammals. The Small-spotted Genet also forages for berries and wild fruit.

Reproduction

Two to four young are born during the summer months in a protected rock shelter or burrow.



Steenbok

Description

The Steenbok is a small antelope, that has a shoulder height of 50 centimetres and weighs about 11kg. This antelope is fawn (light brown) with white undersides. It has a very short tail and rams (males) have smooth straight horns. It has characteristic large ears and a black upside-down, triangle mark extending up its snout.

Behaviour

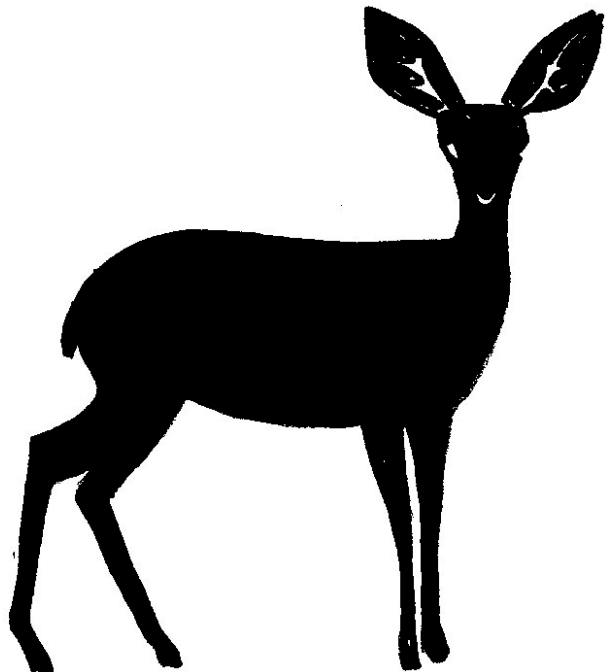
Steenbok are normally diurnal (active during the daylight hours) although they avoid the hottest time of day by hiding in the shade. They are occasionally active during the night. These antelope are territorial. This means that they live in a particular area and guard it by chasing off other competitor Steenbok that may steal their mates. They mark their territory by rubbing scent glands (situated between their hooves, in front of their eyes and on their jaw) on plants and trees. Steenbok are unique to other antelope as they defecate and urinate in shallow holes dug out by their front hooves and then cover the holes up again. They do this to hide the evidence from predators that they have been there. They may be seen singly or in pairs.

Food

This antelope is both a browser and grazer. A browser eats leaves and buds, whereas a grazer eat grassy vegetation (plants). They also dig for roots and bulbs using their front hooves.

Reproduction

Most lambs are born from September to December after a gestation period (pregnancy) of 170 days.



White-Eye or Wit-ogie

Description

The Cape white-eye is distinctive because of the white ring around its eyes. It has a grey-green head and back, and its underside is greyish, whitish, greenish or reddish-brown. This bird is about 12 centimetres in length and weighs only 11g.

Distribution or Habitat

These birds occur in most of South Africa. They live in forest , riverine bush and are also common garden birds; attracted to birdbaths and feeding trays of fruit.

Behaviour

They occur in flocks of a dozen (12) up to 100 birds. They are often seen bathing in birdbaths and fly up into nearby trees to preen afterwards. These social birds are constantly chirping to each other and sing a piping song.

Food

These birds are omnivorous (they eat plants and animals). They catch small insects and are fond of fruits and berries

Reproduction

The male and female build a small little cup-like nest from thin plat-fibres and spiders-webs. They balance the nest on small twig forks in trees. They lay 2-3 pale-blue or white eggs that are incubated (kept warm) by both the mother and father, who take it in turns. The eggs, once laid take 11 days to hatch and then the chicks are reared for a further 12 days.

