

Worksheet: Environments of past and present

Senior Phase
Grade 7-9

Learning area: Natural Sciences

Strand: The changing Earth

Specific Aim 1: Acquiring knowledge of natural sciences

Specific Aim 3: Appreciating and understanding the importance and applications of natural sciences in society



Activity Sheet

We can understand much about our world today from what we have learned about past life on Earth.

An environment is made up of abiotic and biotic components. The abiotic components include air, water, soil and climate. The biotic components include all living things in the environment. Examples of different environments include, deserts, mountains, oceans, polar caps, forests and large freshwater bodies. Some environments are hot and dry, while others may be wet and humid.

Many organisms, plants and animals, have specific features that make them well adapted to the environment in which they live. This makes them better able to compete for limited resources, and to ensure their survival so as to continue as a species. If you look at the camel and polar bear, they both live in extreme environments (desert, and freezing conditions, respectively) and have developed features over time which make them ideally adapted to their specific habitat.

How are polar bears adapted to their cold environments?

There are no plants to eat, so they are adapted to a carnivorous diet.

They have thick blubber to help keep them warm.

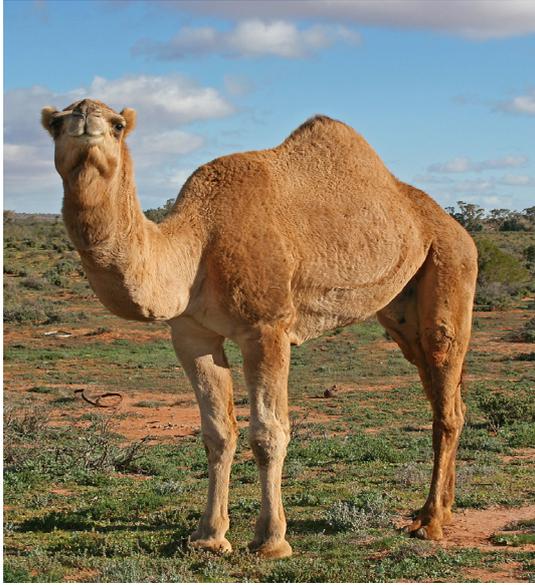


Their white fur acts as camouflage against the snow to help them creep up to their prey without being seen.

Big furry feet, similar to snow shoes, help them walk in soft snow.

Their black skin absorbs sunlight and helps keep them warm in the very cold weather.





How are camels adapted to their hot environments?

They have long eyelashes and thin slit nostrils that close to protect them from blowing sand.

They have long muscular legs for walking.

They have a very long intestine for reabsorbing all the water from their food, so they can travel long distances without drinking water.

They have wide feet for walking in the sand.

Environments are continually changing. Evidence of this change throughout the Earth's history can be found in the fossil record. If this change is gradual, there is a greater chance that the organisms it supports will have time to evolve to cope with the new challenges; if quick, there is the chance that the organisms will be unable to adapt or relocate, causing them to become extinct. Unexpected, catastrophic natural events, such as extreme environmental change in the past, have caused mass extinctions. An example of a mass extinction: 65 million years ago the dinosaurs went extinct as a result of a huge meteorite hitting Earth and causing radical climatic change worldwide.

Remember that environmental change usually takes place very slowly.

The fossil record contains a compressed view of many millions of years so change in environment is quite easy to detect.



Activity 1: Discussing animal adaptations

Choose an animal or plant and describe how it has adapted to its environment. Include the adaptation and reason for the adaptation. Present your information on an A4 sheet of paper as a picture, similar to the ones shown above for the camel and polar bear.



Activity 2: Group work

1. Describe the environment in which you live. What kind of plants and animals live in your environment?
2. Are we, as humans, evolving to cope with our environment?
3. How are we as living organisms influencing our environment?
4. Are we ensuring our survival or risking our environment?
5. How are we impacting other living organisms?
6. What do you consider to be the long term consequences of our actions?
7. Design a poster to educate your parents and guardians about the risks we are taking with our environment.





Activity 3: Do this after your visit to the park

1. Research how **Palaeontologists** learn about an environment that existed 5 million years ago.
2. What do they look out for?
3. Describe what the West Coast looked like 5 million years ago.
4. Describe how the West Coast looks today.
5. How has the evolving environment of the West Coast over the past 5 million years influenced or supported life?
6. What have we learnt from the fossils found at the Fossil Park?
7. Name one of the animals that lived at the Fossil Park that has become extinct. Suggest reasons why you think that it became extinct. Use the Fossil Park web site to assist you with this question (www.fossilpark.org.za)



Teacher notes

Activity 1: Discussing animal adaptations

Learners own answer.

Points to discuss with learners are that animals and plants are adapted to the conditions of the habitats in which they live. Some places on Earth are very hot, while others are very cold. Some places on Earth have a lot of water and plants, and other places have very little water and few plants. Animals can live in many different places in the world because they have special adaptations to the area they live in.

An adaptation is a way an animal's body helps it survive, or live, in its environment. Animals depend on their physical features to help them obtain food, keep safe, build homes, withstand weather, and attract mates.

Examples of the basic adaptations that help creatures survive:

- shape of a bird's beak
- the number of fingers
- colour of the fur
- the thickness or thinness of the fur
- the shape of the nose or ears

Each adaptation has been produced by evolution. This means that the adaptations have developed over many generations.

Activity 2: Group work

1. Learners own answer depending on where they live.
2. We are using technology and science to help make our lives better, healthier and easier. There are no longer the same selection pressures on us as existed a few thousand years ago so natural selection no longer affects us in the same way as when we were living in the wilds and hunting and gathering to survive.
3. There are many human activities which can destroy as well as endanger the environment and nature surrounding us. Our activities are leading to global warming as a result of an increase in the emission of greenhouse gases, and this is leading to climate change. Destructive activities include: mining, industrialisation, pollution, wastage of natural resources, destruction of natural habitats and the extinction of multiple organisms. We wage wars which are extremely destructive to the environment and have the potential to be cataclysmic.
4. We are risking our environment at present. However, some people have realised that we need to be more planet friendly and are trying to save the world by sustainable development, recycling, saving energy, and reducing our carbon footprint.



5. Earth is home to numerous unique species that are seriously threatened with extinction. Humans are continually having an effect on other organisms in almost all of their actions. Increasing human population numbers are putting great pressure on limited resources, and deplete resources which cannot be renewed. Population explosion is leading to the destruction of more and more natural habitats, and the loss of entire ecosystems represents a crisis for all living organisms on Earth. Human activities which have harmed ecosystems have resulted in a loss of diversity in living things.

6. Loss of habitat and destruction of natural habitats and their associated ecosystems.
Interference with the effective functioning of ecosystems.
Climate change – the ultimate effects of which remain uncertain, but which are likely to be catastrophic in the long term.
Extinction of organisms and a substantial decrease in the diversity of life on Earth.
Lack of resources due to unsustainable utilisation.
Interruption of natural processes which affect the Planet as an entity e.g. global warming.
Degrading our Planet.

7. Use rubric to assess poster.



POSTER COMMUNICATION SKILL ASSESSMENT

Assessment Criteria	Performance Indicator Levels				Comments	
	0	1	2			
Title	No title	Title present but incomplete	Complete title			
Aim of poster	Not clear	Partially clear	Very clear			
Main points	Not relevant	Some points relevant	All points relevant			
Facts / concepts	Mainly incorrect	Some correct with limited detail	Correct with interesting detail			
Language / spelling	Many language and spelling errors	Some language and spelling errors	No language and spelling errors			
Organisation / layout	Organisation / layout muddling	Organisation partially clear and logical	Organisation clear and logical			
Use of colour	No colour / all one colour	Some use of colour	Effective use of colour			
Letter size	Letters very small	Some letters larger	Most letters large			
Diagram / picture appeal / attractiveness	Not appealing / not attractive	Has some appeal / attractiveness	Appealing / attractive			
Diagram / picture relevance	Not relevant	Partially relevant	Totally relevant			
Diagram / picture accuracy (scientifically correct)	Not accurate	Partially accurate	Totally accurate			
Impact of poster	Does not make an impact	Makes an impact				
Impact of poster	No new ideas	Some signs of creativity / new ideas	Very creative and original			
Total = 25 marks						
7 Outstanding 80-100%	6 Meritorious 70-79%	5 Substantial 60-69%	4 Adequate 50-59%	3 Moderate 40-49%	2 Elementary 30-39%	1 Not achieved 0-29%

Review and recommendations



Activity 3: To be done after the park visit

1. Palaeontologists search sedimentary rocks to find the fossils of dinosaurs and other animals and plants which lived millions of years ago. The palaeontologist uses various scientific methods to find out more about fossil plant or animal life forms and asks questions regarding the age of the fossil and whether it fossilised on land, or under water. They use this, and other information, to learn more about the history of our Earth.

Palaeontologists walk through an area where they know the rocks or sediments are of a similar age to the fossils they are seeking. They search the rocks and ground to see if they can see any fossil bones or teeth sticking out. They get so good at finding fossils that they are able to identify a piece of fossil as small as your thumb nail. If the fossils are situated in soft sediment they are dug out and then transported to a research institution/museum. If the fossil is embedded in rock, the rock surrounding the fossil is removed with the fossil in situ and taken to a research institution. Dental drills (yes, the same kind of drills that dentists use on your teeth!) are then used to drill away the sedimentary rock surrounding the fossils. Once all the covering rock is drilled away, scientists study the animal or plant which is exposed to daylight once again, millions of years after it died.

Once fossils have been discovered the new fossil will be compared to other fossils, and sometimes with the skeletons of living animals. Animals which are extant (extant means 'living today'), and which are related to fossil animals can provide information about fossil species.

2. To find out clues of how extinct animals lived and behaved, palaeontologists study the fossilized bones and teeth they recover from various sites. Teeth are particularly useful as they are capped by enamel, an extremely strong and hard-wearing substance. Morphology is the study of how fossil bones or teeth have changed in size and shape over time. Changes in dental structure and wear patterns are used to work out changes in diet, the way the animal moved, and how the animal fed in its preferred habitat. In some cases, fossil teeth can even show how a species changed its diet over time as a result of competition with another species which ate the same food.

Bones also give clues to how ancient animals lived. The muscles and flesh covering the bones is not preserved in fossils, but you may be able to see the scars where muscles were attached to the bones. The muscles link the various bones together, so if sufficient bones are found, paleontologists are able to reconstruct the skeleton of the fossil animal.

3. The climate was warmer and wetter than today, and the area was a lush subtropical paradise which contained areas of open grassland, woodland and riverine forest.



4. The kind of vegetation found on the West Coast today is a scrubby fynbos, which has adapted to the relatively dry conditions in which it grows.
5. Animals have adapted and changed as the modern landscape evolved, and many of the Families and Species found at Langebaanweg have ancestors belonging to the same genus living in the area today, although some such as the sivatheres and sabre-tooth cats went extinct. Large mammals adapted to the relatively scrubby west coast fynbos, but man, and agriculture and farming, has had an extremely negative effect on the West Coast. The large mammals such as giraffe, hippo, elephant, rhino, lions, hyenas etc, were wiped out during historic times. The upwelling Benguela Current currently supports an extremely rich sea life.
6. Fossils tell us about the environment at the Fossil Park some 5 million years ago. The fauna tells us about the climate, the environment, and the habitats occupied by the animals.
7. Learners own answer.

Suggestions why these animals became extinct.

New competitors for resources may appear with the immigration of new species, or current competitors for resources may become relatively more competitive and successful. Vegetation and environment would have changed over time – it clearly changed in such a way that some animals were able to adapt to, but others were not. A great deal of time has elapsed since the fossils at the Park were laid down, so it is to be expected that major changes have occurred in both climate and environment, and hence in the resident fauna.

