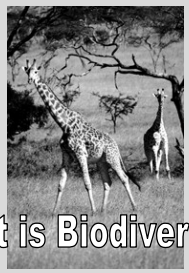


What is Biodiversity?

"Tuning in"

Learners are introduced to the main theme: Sustain-ability on Planet Earth

Grading:

Time:

Place: Inside

Group size: Groups of four

Activity Outcomes:

Learners are able to:

- identify life-sustaining processes and the availability of natural resources
- appreciate and respect life-sustaining processes on earth
- care for Planet Earth

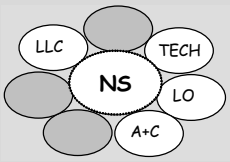
Assessment:

- Peer-assessment of group work and posters
  Use a rubric
- Educator assessment of group discussions and poster adjustments

Skills:

- Communicate findings
- Use knowledge to record data
- Understand the impor-tance of a life-sustaining environment

Learning Area links



What makes the earth a living planet?

Background

Learners are given a short introduction to the main theme of "Windows on the Wild" namely, to study the earth and its capacity to sustain life, as well as to find meaning for the concept of sustainability by investigating how certain conditions on the planet make it possible for life to exist and evolve indefinitely.

See Teacher guides 1 & 2

Activity Guidelines:

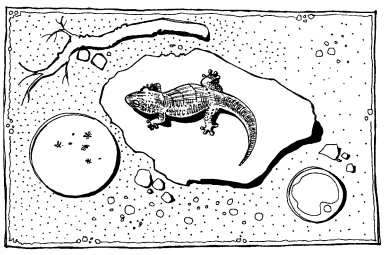
Needed: *Poster paper; koki pens; copies of pp A3 and A4*

- Divide class into groups of 4 to 5 learners.
- Each group discusses possible ways to illustrate the factors which make the Earth a living planet e.g. :
  - Position in space; movement (rotating and revolving)
  - Energy flow
  - Bio-geo chemical cycles
  - Plants and animals
  - Water
- Create posters which portray features which make life on Earth sustainable.
- Ask each group to present and explain their poster to the rest of the class.
- Keep all the posters on the walls and, as the session progresses, let learners revisit their presentations and make adjustments if necessary.

"We are shaped by the earth. The characteristics of the environment in which we develop, condition our biological and mental being and the quality of our life. [If only] for selfish reasons, therefore, we must maintain variety and harmony in nature" - René Dubos (WoW)

Variations

Building a self-sufficient living system

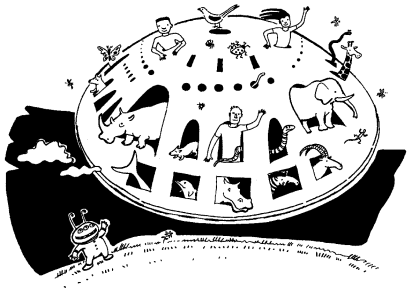


Example of a semi-desert human-made living system

Needed: *Large jar, soil, small plants, decomposers (eg. snails, woodlice) water.*

Build a self-sufficient natural system inside the large jar. Put the soil in first, then add the plants and the decomposers. Water the plants and then seal the jar tightly. Place in sunny spot. Keep checking the ecosystem to see if it is still as healthy as when you established it.

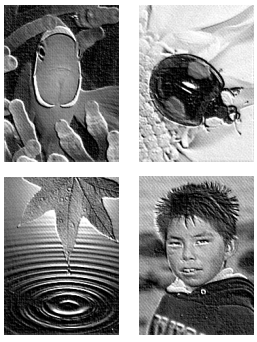
Spaceship Earth



Needed: *Sheet of paper; koki pens*

Design a poster which illustrates that Planet Earth is a spaceship with limited natural resources. This point must be clear to anyone looking at your poster. Use lots of colour and imagination. Discuss your spaceship with the other groups to find out if it has been well-designed and to make sure that it would not run out of any vital material.

Creating a travel brochure



Ask your learners to imagine that, sometime in the far future, the beautiful and lush planet Earth has become an intergalactic vacation spot. As the head of advertising for the Universal Travel Agency, each learner should design and create a travel brochure to entice potential, alien travellers to come to Earth for a photo-safari eco-vacation. Tell the class to keep in mind that these alien travellers may never have been to Earth before. The learner's job is to present the Earth's diverse life forms and ecosystems in an attractive, exciting manner, focusing on particular types of ecosystems or organisms (the ocean or undersea life, for example) or a variety of different types.

Earth day – 22 April

Ask your learners to design a pledge form to use in a "green pledge" project. Learners then hand out the forms on Earth Day and persuade people to sign a written pledge promising to do their share to help save the planet by letting their concern for the environment determine how they act, purchase, vote and support.

WHAT MAKES THE EARTH A SPECIAL PLACE?

Why is the earth unique in its ability to support life? The answer lies partly in its position in the solar system. In addition, Earth has other features, particularly its atmosphere and its oceans, that help keep the temperature stable.

EARTH IN THE SOLAR SYSTEM

The Earth is the only planet in our solar system where temperatures are just right for life. Factors such as the Earth's distance from the sun, its revolution around the sun, as well as its rotation on its own axis, all have a role in maintaining temperatures.

Distance from the Sun

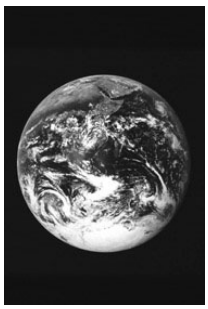
The Earth lies approximately 150 million kilometres from the sun. This is just the right distance for the provision of life-friendly (sustaining) temperatures.

The Orbit

The path or closed course that the Earth follows when it revolves around the sun is known as its orbit. The Earth's revolution along its orbit brings the Earth closer to the sun during certain times of the year, and takes it further during other times. It also helps to create the seasons that provide cycles of growth and dormancy (rest) for many plants and animals. In South Africa (Southern Hemisphere) we are closer to the sun in January (Summer: 147 million km) than in July (Winter: 152 million km).

The Earth's rotation on its own axis

Imagine the Earth as a ball with a sharp stick stuck through its middle. You could spin this ball around on the tip of the stick like spinning a top. As the earth orbits around the sun, it rotates on its own axis. The imaginary stick represents the earth's *axis*. The Earth rotates on its own axis and from *East to West* once every 24 hours, and this causes and regulates night and day. The half which is turned to the sun has day and the half which is away from the sun has night. Most forms of life are adapted to alternating periods of daylight and darkness, and the differences in temperatures that these periods cause.



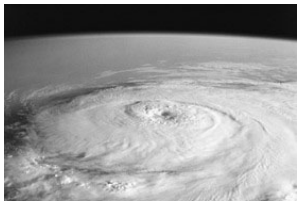
NOTE: Seasons are caused by a combination of the Earth's revolving around the sun, and the 23½° inclination of its imaginary axis.

The rotation of the Earth also causes air currents in the atmosphere to follow specific patterns. This means that if there was no rotation the air would simply move back and forth between the cold North and South Poles and the warm equator region. This rotation creates weather and temperature patterns that help support life.

EARTH'S UNIQUE TEMPERATURE REGULATORS

Earth has two more important features that help maintain life-giving temperatures. These are the atmosphere and the oceans.

The Atmosphere



Huge amounts of the sun's energy reach the Earth. Direct exposure to this energy would be harmful to life, but the Earth is protected by the gases that make up the atmosphere. Some of these gases serve to isolate the earth like a blanket, thus preventing too great a loss of the heat absorbed by the Earth. Other gases filter out much of the sun's harmful energy and help keep temperatures stable.

The composition of the atmosphere is also a very important feature of Earth's sustainability. Oxygen is an important atmospheric gas which is supplied by plants. Most living organisms need this oxygen to survive and are able to extract it from the air. The atmosphere also contains quantities of nitrogen gas, water vapour, carbon dioxide and other gases. All of these gases are important for life processes and, without interference by human actions, remain constant (stable). Pollutants caused by people can have harmful effects on the atmosphere's protective functions.

The Oceans

Earth is often called the Water Planet because there is so much water on Earth that, from space, it looks like a blue pearl. The enormous amount of water on Earth helps prevent huge fluctuations in the Earth's temperatures.

About 70 percent of the Earth's surface is covered by oceans. These huge oceans take up large amounts of the sun's energy and, by doing so, keep temperatures on Earth stable. The oceans also play an important role in the weather patterns which in turn are important for life processes.

WHERE DOES THE SPACESHIP GET ITS RESOURCES

Spaceship Earth uses enormous amounts of the chemical elements that build and maintain all living bodies. How is it possible that there seems to be no end to these resources? The answer lies in re-use and recycling - every single atom on this Earth is being used over and over. This means that each of the millions of atoms used to build and maintain living bodies has been used before, and will be used again by other living things. Water, carbon, and nitrogen are a few of the important resources that get recycled and re-used.

Without this constant recycling, Spaceship Earth would soon run out of materials necessary to build living bodies or to provide food for energy and growth.

The Bio-Geo-Chemical Cycles

These recycling processes are called bio-geo-chemical cycles, and are driven by the sun's energy. The term bio-geo-chemical is used as a way to explain how the Earth's resources are passed from living to non-living parts of the environment. For example, these resources are passed from soil, water or air, into plants and animals, and back again.

Every living creature plays very important roles in all of the bio-geo-chemical cycles. Plants, for instance, are an important link in the water cycle. They take water from the soil and, through transpiration, return it to the atmosphere in the form of water vapour. Plants are also part of the carbon cycle. They absorb carbon dioxide from the atmosphere and, through photosynthesis, use it to form sugars and starches that become food for animals.