

Earth Cycle of Resources

Before you Begin

We constantly need oxygen to breathe, water to drink and food to live. The carbon dioxide which animals breathe out is converted to oxygen by plants through photosynthesis and vice-versa. This is a continuous process which happens over and over again and hence we call it a “Cycle”. Cycles are part of nature. There is a limited availability of resources like water; elements such as oxygen, carbon and minerals and nature keeps the supply by continuously cycling them. If nature did not recycle these, we would have run out of the resources years ago.

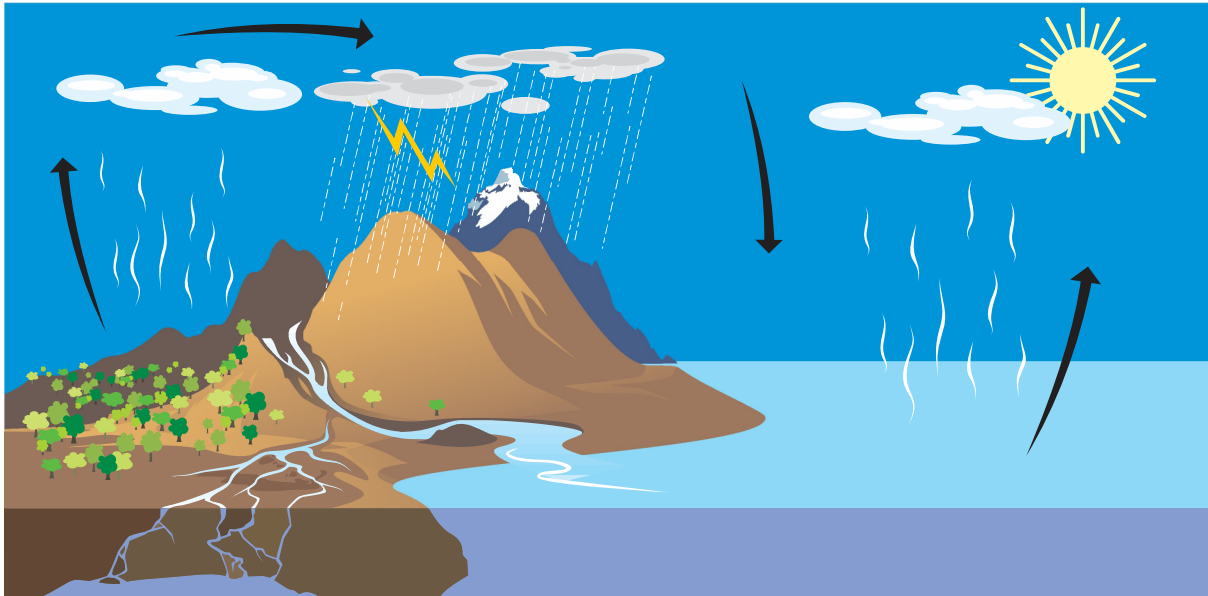
These cycles sustain various aspects of life on Earth including birth, growth, reproduction and death. The water cycle ensure the continuous circulation of water both above and below the ground. As part of the water cycle, water passes through all the different states that it exists as in nature - liquid water, gaseous vapour and solid ice. In addition to water there are a number of other substances that move through the abiotic and biotic components of the Earth. These constitute the biogeochemical cycles (bio = life; geo = Earth; chemical = elements including C, N, O, P). Some common examples of biogeochemical cycles are the carbon, nitrogen, phosphorous, nutrient and oxygen cycles. All these cycles together sustain the world and its various ecosystems.

Decomposition is the process by which organic substances are broken down into simpler matter. The process is a part of nutrient cycle and is essential for recycling the finite matter that occupies physical space in the biosphere. Bodies of living organisms begin to decompose shortly after death. Organisms that do this are known as decomposers.

Decomposers are organisms that break down dead and decaying organisms. They help recycle matter in an ecosystem. Decomposers are heterotrophic and derive energy by consuming other organisms. There are two main categories of decomposers. Chemical decomposers work by using chemicals in their bodies to break down organic matter into simple compounds for energy. Chemical decomposers include bacteria, protozoa, and fungi. Physical decomposers are detritivore that feed on the organic materials. Physical decomposers are mostly macro organisms that can be seen without a microscope. Some examples include worms, mites, flies, and snails.

It would help students to know the important role that different decomposers play in the decomposition process. Some decomposers are microscopic in nature e.g. bacteria and others are large enough and visible to the naked eye, e.g. earthworm. A short nature walk could help introduce students to some of the larger decomposers.

WATER CYCLE



Cross Country Decomposers



INTRODUCTION

The lesson is designed to conduct an enquiry in the process of decomposition and factors that affect it. The rate of decomposition is dependent on quality of organic matter and environmental conditions. Organic matter with higher concentrations of nutrients decompose at a faster rate. Soil temperature and moisture content are very important factors affecting decomposition rates. At favorable moisture conditions, increasing temperature results in an exponential increase in decomposition rates.

Objectives:

Students will be able to

- plan and conduct a simple investigation - related to decomposition.
- gather and analyze the data, and frame their conclusion/explanation.
- communicate results of the investigation and explanations with students from other countries.
- communicate the findings of their research in the form of an article (suggested for YRE students).

YRE steps: Investigate, Research Solution, Report, Disseminate

Curriculum Linkage: Science/
Environmental Studies/Social Science

Time required/ Duration:

- **Classroom Session 1:** 45 minutes to set the context and discuss with students the process of decomposition.
- **Group Assignment 1:** 4-5 weeks for response from the counterpart school. Two hours for consolidating, analysing and discussing the findings subsequent to the response received from the counterpart school.
- **Classroom Session 2:** 45 minutes for classroom interaction for consolidating, analysing and discussing subsequent to the response received from the counterpart school.
- **Group Assignment 2:** Three to four hours over three days for home based assignments for compiling and disseminating student articles.

Resources Required:

- Open space for conducting the investigation or similar sized earthen pots or other containers with equal quantities of similar type of soil placed in them
- Digging implements like - Stick/shovel/spade
- Different types of materials to check the rate of decomposition.
 - eg., those which decompose: vegetable peels, leaves, left over food, etc
 - eg., those which do not decompose: plastics, metal bits, cigarette butts, etc.
- Soil thermometer, stationery - books, pens, etc
- Resource 4 (Decomposition - data collection sheet)
- Internet



11-14
Years



Activity

Pre activity task for teachers/ facilitators

- With the help of your Eco-Schools/YRE National Operator, teachers should initiate the process of selecting a counterpart school in another country. This exercise of finding a counterpart school could take a few days to a few weeks.

Classroom session 1

- Set the context and brainstorm with students - the nature of things that decompose on their own.
- Ask students to make two lists of materials - those which decompose naturally and those which do not decompose.
- Assign students into groups. Group size of 4-5 students work best.

Group Assignment 1

- Student groups work over a period of 4-5 weeks to execute their investigation.
- Assign to different groups material which decompose and those which do not.
- Communicate to your counterpart school the materials selected for the experiment, this would help give better results.
- Students bury the material in soil and record their observations including sketches over a period of 4-5 weeks. Teacher should facilitate here that students put in only one type of material into a single pit.
- An exemplar resource 4 (data collection sheet) has been provided to record observations related to decomposition.

Classroom session 2

- Discuss findings in class - materials which decomposed and which did not, those which decomposed faster compared to others.
- Discuss the factors that affected the rate of decomposition.
- Share findings of your work with the counterpart school.
- Classroom interaction for consolidating, analysing and discussing subsequent to the response received from the counterpart school.

Activity

Group Assignment

2

As part of this groups take up the assignment of investigating an issue related to waste/litter or a live project with scope of impact can be reported in the form an article or in form of a photo story (2-3 working days should be provided to student groups to accomplish this task):

- Students should continue to work in groups and report one article per group.
 - The article should cover the purpose of taking up the short research, the differences in their findings if any.
 - Ask the student groups to share their articles to create awareness through the school social media page or share the same during an assembly in the school, etc.
- For article: Refer Lesson Plan 1 from chapter “Learning to be an Environmental Journalist”
 - For photo: Refer Lesson Plan 4 from chapter “Learning to be an Environmental Journalist”

Evaluation:

Ask students to list indicators that shows that decomposition is occurring and identify factors on which the rate of decomposition depends.

Resource 4

Data collection to measure decomposition

Material under investigation: e.g Vegetable peel						
Time	Observable changes in the material considered for investigation					Sketch of how the material looks
	Weight	Height	Temperature	Change in smell	Change in appearance	
Prior to burying						
Week 1						
Week 2						
Week 3						
Week 4						
Week 5						

References

<https://www.youtube.com/watch?v=HOPT8BRGtk>

<https://earthref.org/SCC/lessons/2010/biogeochemistry/nitrogen-carbon-cycles/>